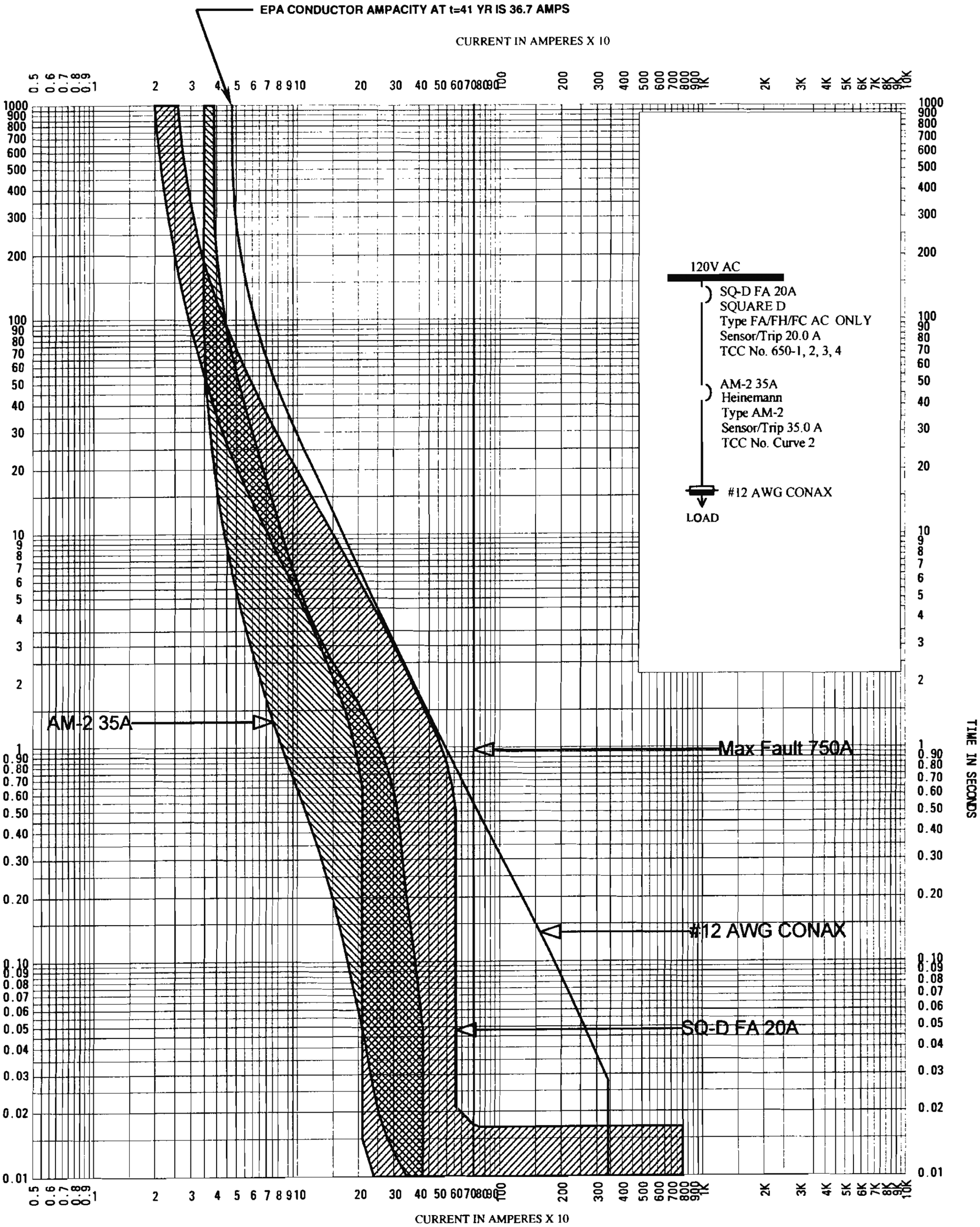


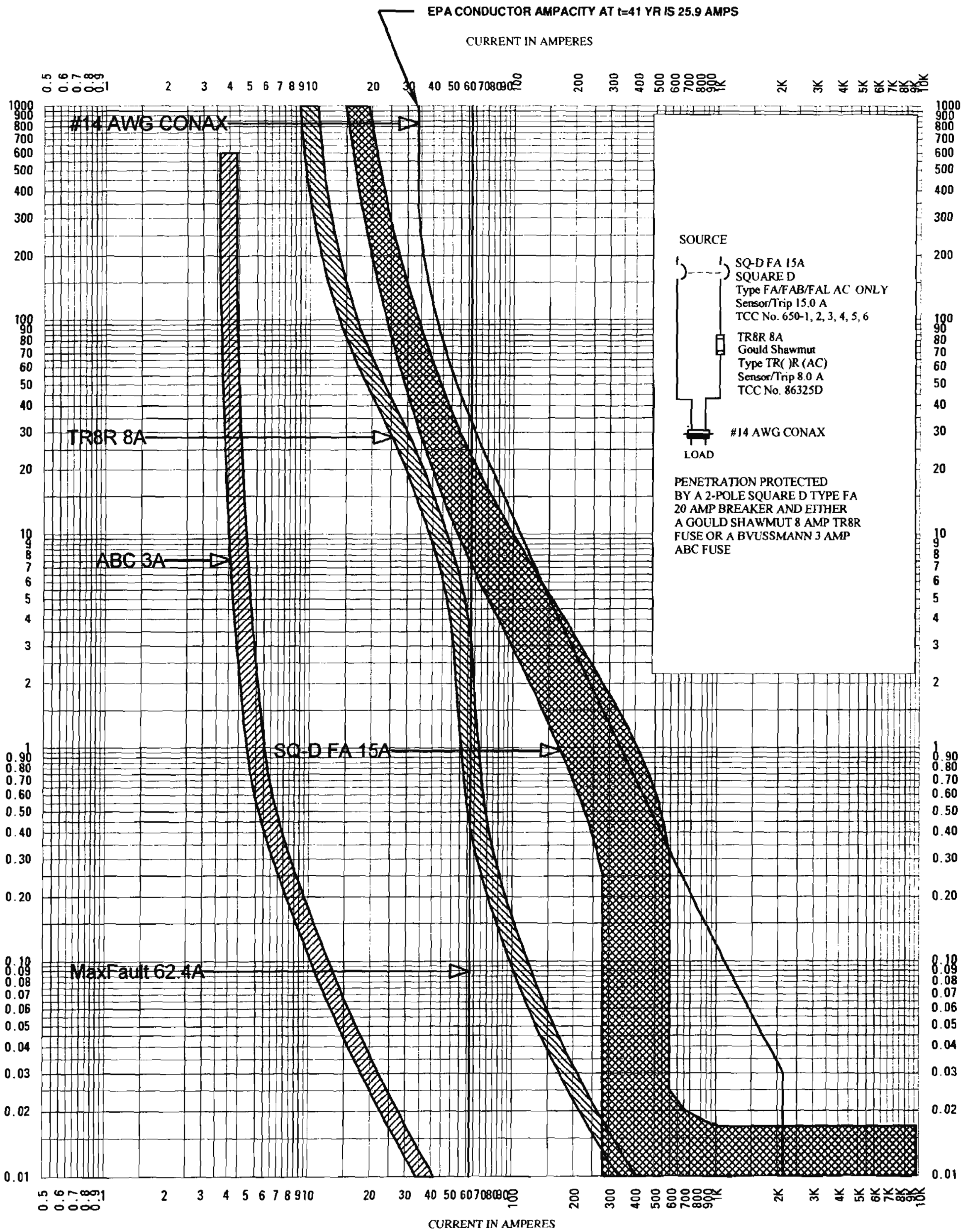
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1–1 (SHEET 25 OF 34)



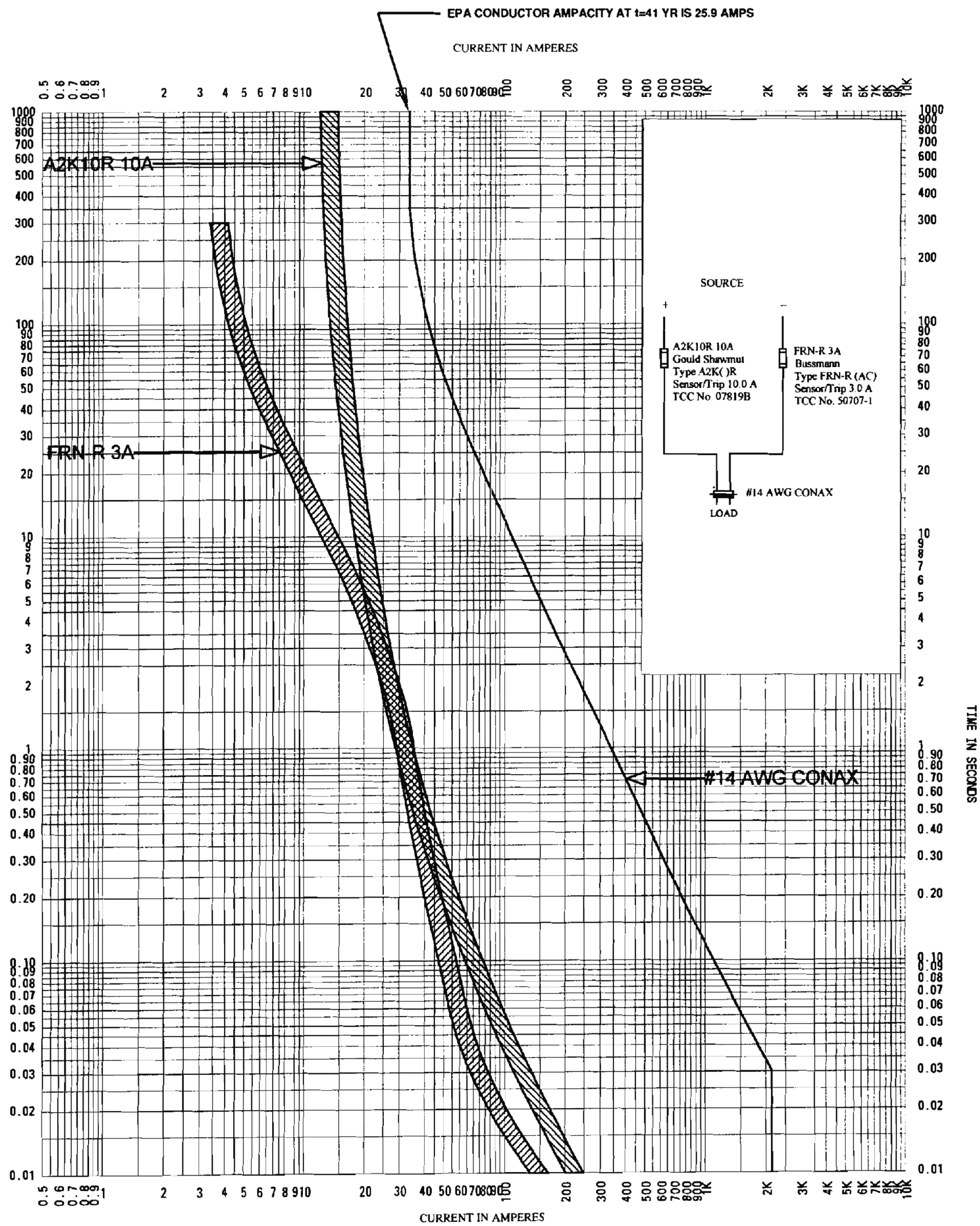
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1–1 (SHEET 26 OF 34)



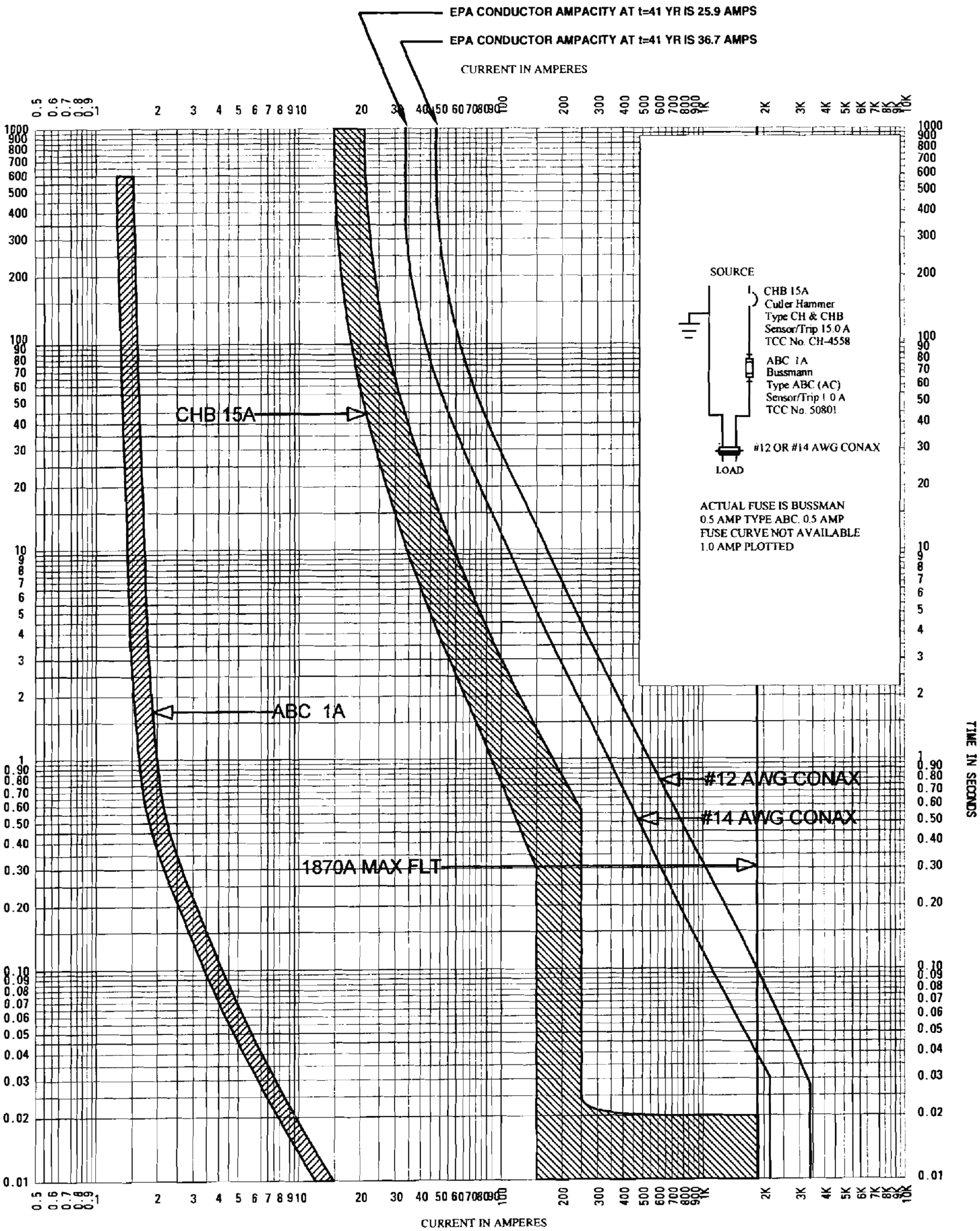
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

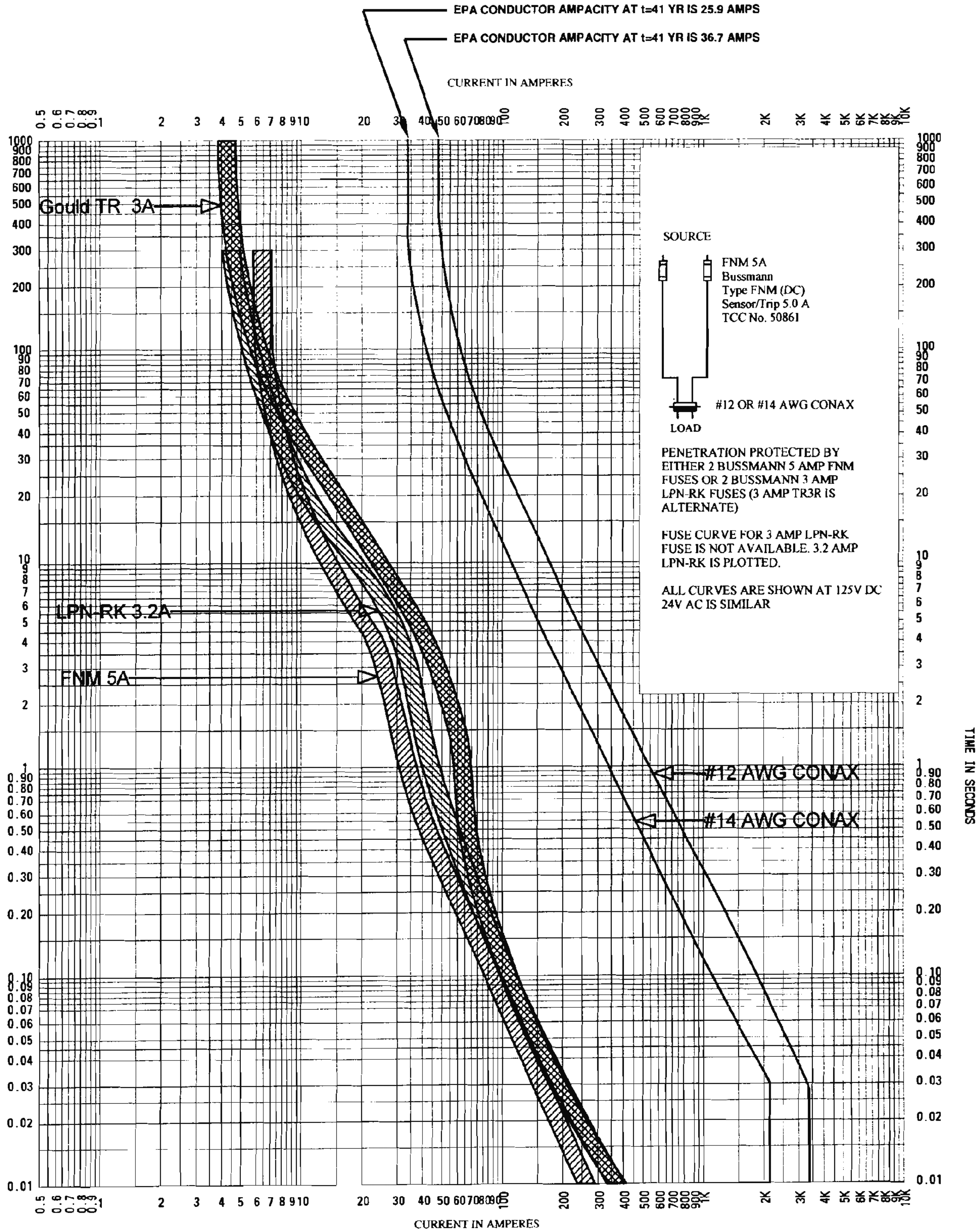
PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1–1 (SHEET 27 OF 34)



REV 16 10/10

SOUTHERN COMPANY VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	PENETRATION OVERCURRENT PROTECTION COORDINATION CURVES FIGURE 8.3.1–1 (SHEET 28 OF 34)



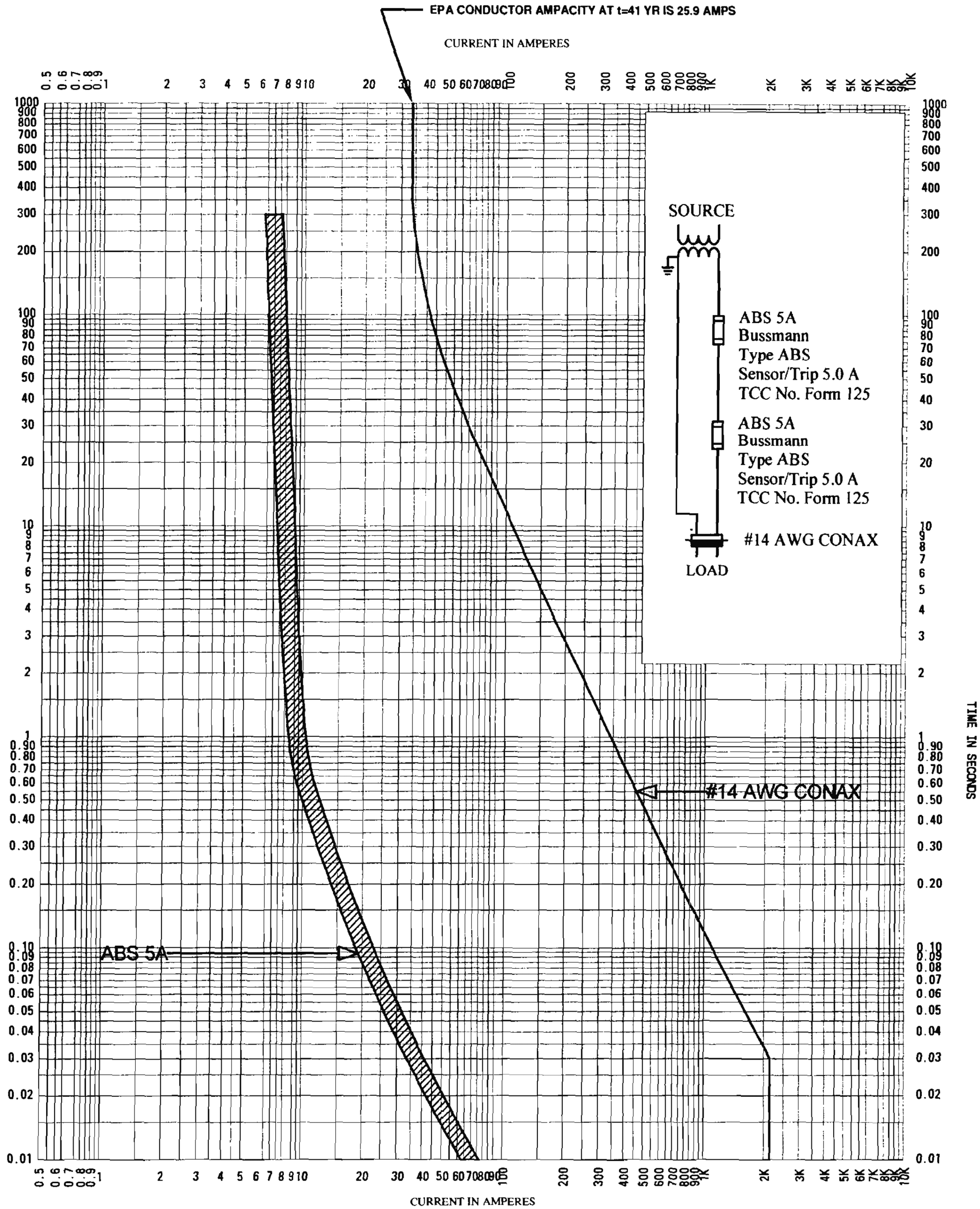
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT PROTECTION COORDINATION CURVES

FIGURE 8.3.1–1 (SHEET 29 OF 34)



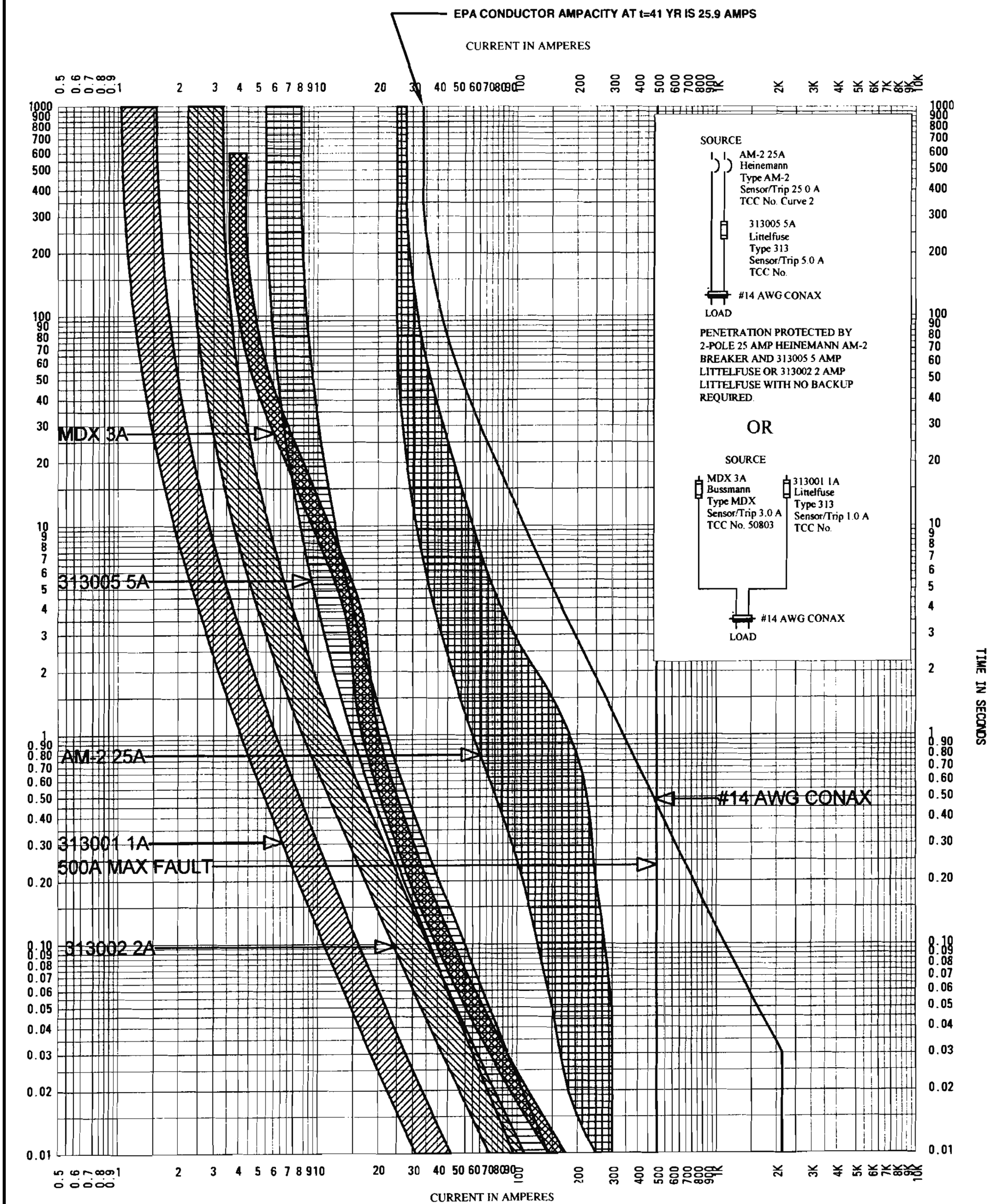
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1-1 (SHEET 30 OF 34)



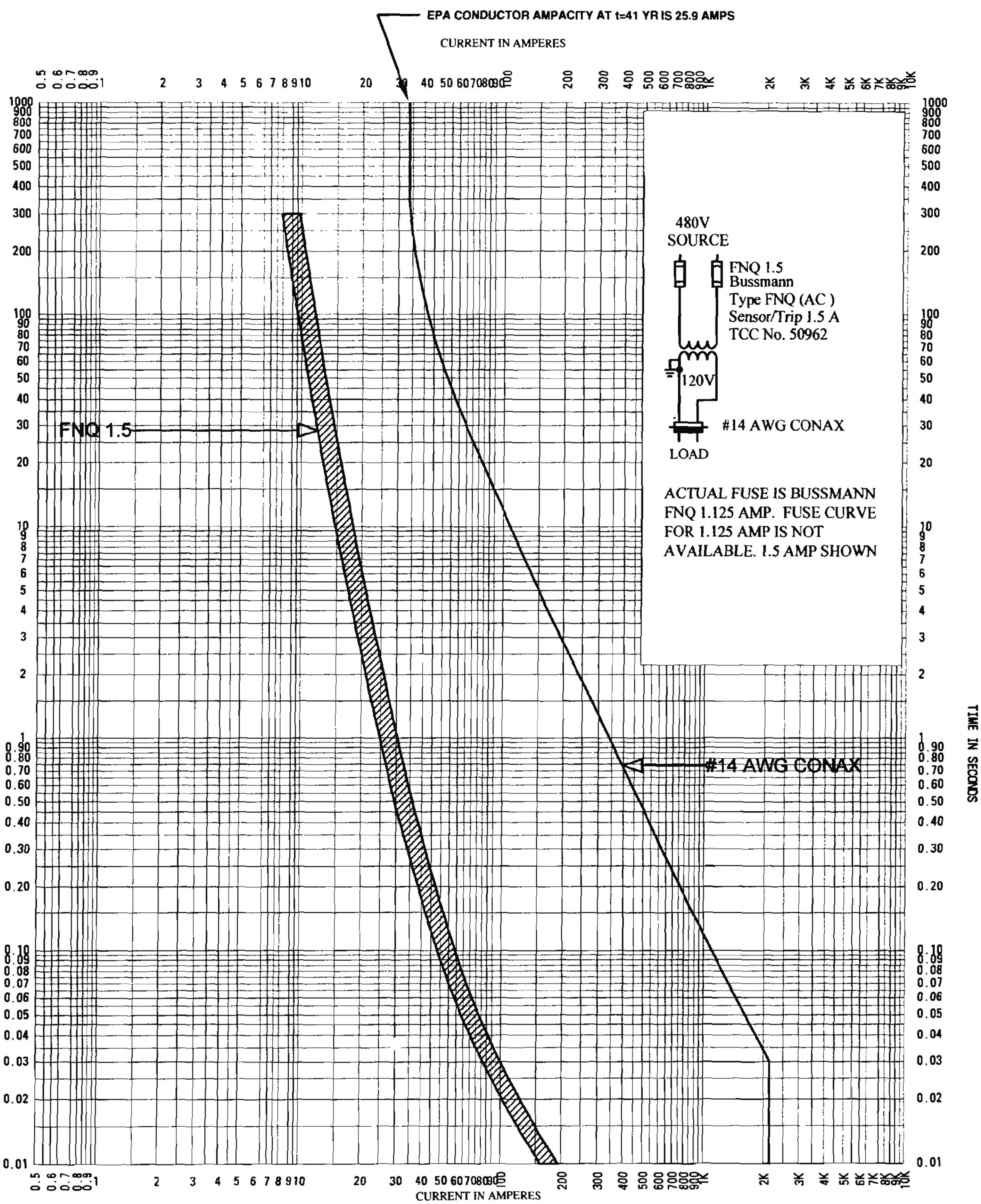
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1-1 (SHEET 31 OF 34)



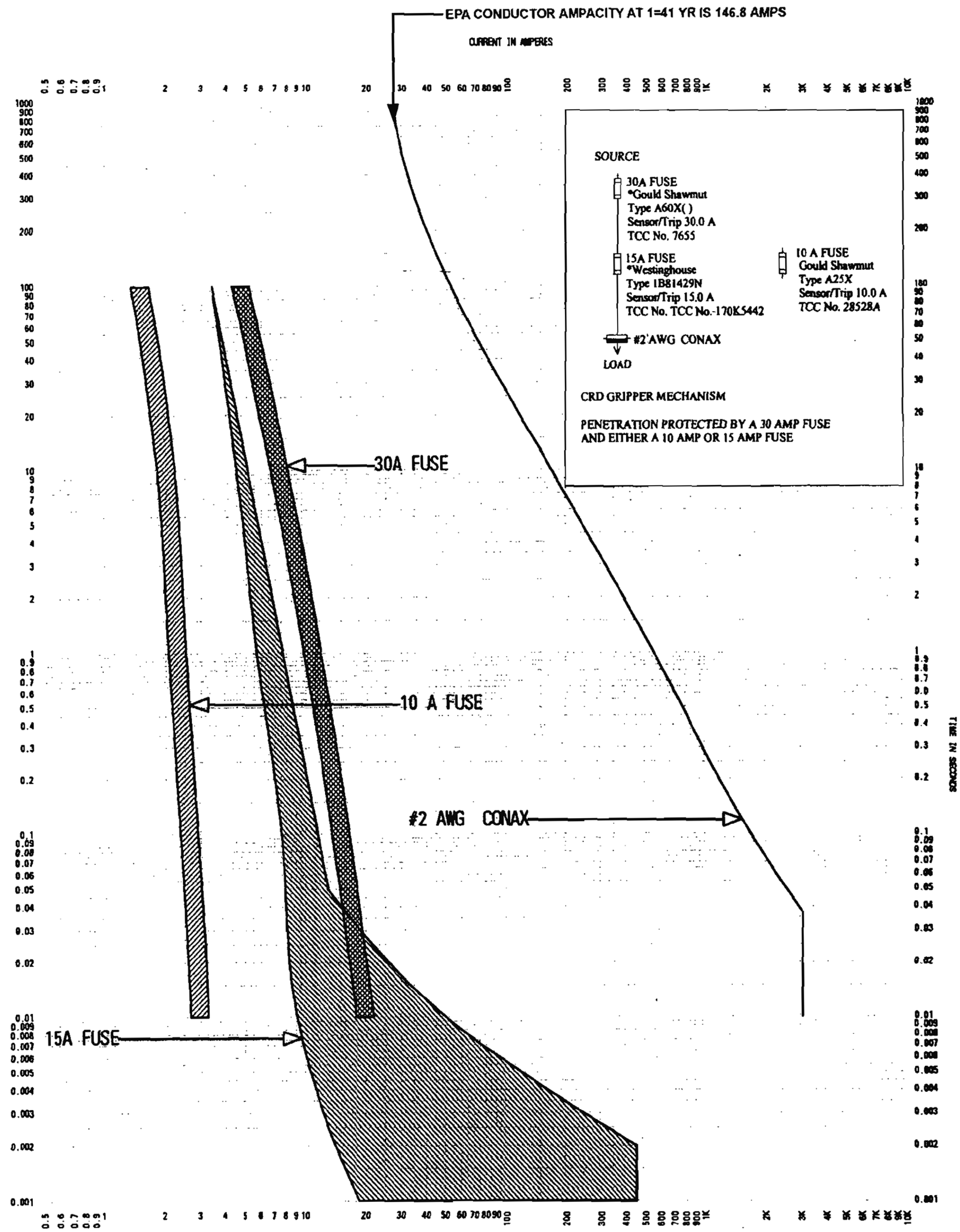
REV 16 10/10

SOUTHERN COMPANY

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PENETRATION OVERCURRENT
PROTECTION COORDINATION CURVES

FIGURE 8.3.1-1 (SHEET 32 OF 34)



FOR EPA CONDUCTOR PROTECTION AT TIME, t = 41 YR
SEE FIGURE 8.3.1-1 (SHEET 34 OF 34)

REV 16 10/10

SOUTHERN COMPANY	VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	PENETRATION OVERCURRENT PROTECTION COORDINATION CURVES FIGURE 8.3.1-1 (SHEET 33 OF 34)

THERMAL MAGNETIC CIRCUIT BREAKER RATINGS WHICH PROTECT THE EPA CONDUCTOR AT TIME t=41 YEARS UNDER LOW LEVEL LONG TERM FAULT (OVERCURRENT) CONDITION:

EPA CONDUCTOR SIZE AWG	EPA CONDUCTOR AMP AT TIME t=41 YR.; EPA MAX. TEMPERATURE OF 120°C AT EPA CONDUCTOR SEAL	MAX. THERMAL MAGNETIC BREAKER TRIP RATING IN AMPERES TO PROTECT EPA CONDUCTOR PER REG. 1.63
16	18.4	Not Applicable
14	25.9	20 (25) (NOTE 8)
12	36.7	30 (35) (NOTE 8)
10	36.7 (46.0) (NOTE 6)	20 (40)
8	51.9 (60.6) (NOTE 6)	40 (50)
6	73.4 (80.7) (NOTE 6)	60 (70)
4	103.8	70
2	146.8	125
2/0	247.4	125
500	667.3	NOTE 2
750	636.6 (NOTE 5)	NOTE 2

NOTES:

1. EPA CONDUCTOR SIZES 16, 14 AND 12 AWG ARE NOT USED FOR POWER SERVICE LEVEL CIRCUITS. THESE SIZES HAVE BEEN ANALYZED ON AN INITIAL CONDUCTOR TEMPERATURE (NORMAL OPERATING TEMPERATURE) OF 60°C. CONDUCTOR SIZES 10 AWG OR LARGER ARE USED FOR POWER SERVICE LEVEL CIRCUITS AND HAVE BEEN ANALYZED ON THE BASIS OF 90°C INITIAL CONDUCTOR TEMPERATURE.
2. EPA CONDUCTOR SIZES 500 AND 750 MCM ARE USED FOR CIRCUITS WHICH ARE PROTECTED BY OVERCURRENT RELAY PROTECTIVE DEVICES.
3. THE THERMAL OVERLOAD RELAY (TOR) CHARACTERISTICS SHOWN ON THE GRAPHS ADDRESS MORE CONSERVATIVE (HIGHER RATED) HEATER ELEMENTS THAN ARE TYPICALLY USED FOR THESE CIRCUITS. THESE TORS ARE USED IN CONJUNCTION WITH MAGNETIC ONLY (MO) BREAKERS WHOSE CHARACTERISTICS ARE DRAWN AT THE MAXIMUM SETPOINT FOR PENETRATION PROTECTION. ACTUAL MO BREAKER SETPOINTS ARE TYPICALLY LOWER.
4. BREAKERS USED TO PROTECT THE EPA CONDUCTORS SHALL HAVE TRIP RATINGS IN ACCORDANCE WITH THE RATINGS SHOWN ABOVE.
5. CONDUCTOR SIZE 750 MCM HAS BEEN ANALYZED FOR A MAXIMUM TEMPERATURE OF 90°C IN LIEU OF 120°C DUE TO A DIFFERENT EPA DESIGN.
6. IN SOME CASES, 10 AWG EPA CONDUCTORS HAVE BEEN PROTECTED WITH 40 AMPERE THERMAL MAGNETIC BREAKERS, 8 AWG EPA CONDUCTORS HAVE BEEN PROTECTED WITH 50 AMPERE THERMAL MAGNETIC BREAKERS, AND 6 AWG EPA CONDUCTORS HAVE BEEN PROTECTED WITH 70 AMPERE THERMAL MAGNETIC BREAKERS. THESE CONDUCTORS HAVE BEEN ANALYZED AND DEMONSTRATED TO BE CAPABLE OF CONTINUOUSLY CARRYING 46 AMPERES, 60.6 AMPERES, AND 80.7 AMPERES RESPECTIVELY BASED ON LOWER INITIAL OPERATING TEMPERATURES.
7. AMPACITIES SHOWN ARE FOR A SINGLE TWO OR THREE CONDUCTOR CIRCUIT UNDER OVERCURRENT CONDITIONS FOR THE 41 YEAR LIFETIME OF THE PLANT WITH THE REMAINING CONDUCTORS IN THE EPA OPERATING AT RATED CURRENT.
8. IN SOME CASES 14 AWG EPA CONDUCTORS HAVE BEEN PROTECTED WITH 25 AMPERE THERMAL MAGNETIC BREAKERS, 12 AWG EPA CONDUCTORS HAVE BEEN PROTECTED WITH 35 AMPERE THERMAL MAGNETIC BREAKERS. THESE BREAKERS FEED MULTIPLE LOADS AT THE SAME TIME. THE MAXIMUM EPA CURRENT FOR ANY ONE CIRCUIT BEFORE THE BREAKER TRIPS WILL BE BELOW THE MAXIMUM EPA CONDUCTOR AMPACITY.

8.4 STATION BLACKOUT (SBO)

8.4.1 INTRODUCTION

Section 50.63 (Station Blackout Rule) of 10 CFR 50 requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (SBO) of a specified duration. Utilities are expected to have the baseline assumptions, analyses, and related information used in their SBO evaluation documented and available for NRC review. It also identifies the factors that must be considered in specifying the SBO duration. Section 50.63 requires that, for the SBO duration, the plant be capable of maintaining core cooling and appropriate containment integrity.

The objective of the SBO rule is to reduce the risk of severe accidents resulting from SBO by maintaining highly reliable ac electric power systems and, as additional defense-in-depth, assure that nuclear plants can cope with an SBO for a specific period of time.

The governing criteria for station blackout is 10 CFR 50.63. The term "station blackout" is defined as the loss of offsite ac power to the essential and nonessential electrical buses concurrent with turbine trip and the unavailability of the redundant onsite emergency ac power systems. However, ac power to buses fed by station batteries through inverters is considered available along with the dc power to buses fed by the batteries.

8.4.1.1 SBO Coping Evaluation

Regulatory Guide (RG) 1.155 "Station Blackout" describes a means acceptable to the NRC for meeting the requirements of 10 CFR 50.63. Regulatory Guide 1.155 states that the NRC has determined that the Nuclear Management and Resource Council (NUMARC) document NUMARC 87-00 "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout At Light Water Reactors" also provides guidance that is in large part identical to the RG 1.155 guidance and is acceptable to the NRC for meeting these requirements. When reference to NUMARC 87-00 is made, it also includes reference to the supplemental NUMARC letter of January 4, 1990 (references 1 and 2).

The reactor core and associated systems have been reviewed to determine that in the event of an SBO there is sufficient capacity and capability to ensure that the core is cooled, reactor coolant system is isolated, and appropriate containment integrity is maintained for the required duration.

Systems required for decay heat removal have been reviewed to ensure that those portions of the systems which are required to cope with the consequences of an SBO are available. Effects of nonavailability of support systems such as instrument air, HVAC, and ac power are considered. Condensate storage tank and battery capabilities have been reviewed for adequacy.

Station blackout coping equipment (with the exception of emergency lighting) has been procured as safety-related; therefore, it is covered by an appropriate quality assurance (QA) program. For nonsafety-related emergency lighting equipment utilized by plant operators during an SBO, surveillance procedures are in place and performed to verify its continued operability. Therefore, the QA requirements of Regulatory Guide 1.155 are met with SBO coping equipment.

8.4.1.1.1 SBO Coping Duration

Regulatory Guide 1.155 and NUMARC 87-00, Section 3 were used to determine an SBO coping duration of 4 hours for VEGP Units 1 and 2. The specific SBO duration is based on the redundancy of the onsite emergency ac power sources, the reliability of the onsite emergency ac power sources, the expected frequency of loss of offsite power, and the probable time needed to restore offsite power. The coping duration is based on the following design characteristics using NUMARC 87-00 methodology:

A. Offsite power design characteristic group is classified "P1".

B. Emergency power configuration group is classified "C".

C. Emergency diesel generator (EDG) target reliability is 0.95.

8.4.1.1.2 SBO Coping Analysis Assumptions (Nonalternate ac analysis)

The assumptions used in the coping analysis are as follows:

A. In general, RG 1.155 and NUMARC 87-00 provide consistent guidance for the SBO coping analysis. In the case of any conflict between the two documents, RG 1.155 was considered the governing document.

B. Initial plant conditions are 100 percent rated thermal power of 3579 MWt for at least 100 days.

C. Initiating conditions will be loss of offsite power to both units. Station blackout, however, is assumed only for one unit due to the independence of emergency ac sources. No design basis events or additional single failures are assumed prior to or during the station blackout event, other than the loss of one emergency diesel generator on the nonblacked-out unit.

D. Reactor coolant system inventory losses are limited to normal system leakage and reactor coolant pump seal leakages (25 gpm pump maximum assumed). Letdown is isolated. Under these conditions the core stays covered and natural circulation continues.

E. Credit will be taken for operator actions where appropriate.

F. Equipment needed (both permanent and portable) for the station blackout coping duration will be available at the site.

8.4.1.1.3 SBO Coping Capabilities

Applicable plant systems/functions, as identified in RG 1.155 and the NUMARC 87-00 guidelines, are available to successfully cope with the SBO event to the extent required by RG 1.155 for the required SBO duration.

The SBO coping evaluation concludes that the various systems and components required for reactor core cooling are available. With some operational limitations, as discussed below, the battery capacity has been found to be adequate for the 4-hour coping duration. The ability to maintain RCS inventory and containment integrity has been evaluated and confirmed. The effects of the loss of ventilation on SBO have been evaluated. The plant can successfully cope with the SBO event for the required 4-hour duration with negligible impact on the equipment qualified life and with no impact on the operability of the equipment.

The plant has the capability to cope with an SBO for the coping duration of 4 hours as discussed below:

A. Capability to provide core cooling is demonstrated by the following:

1. Reactor coolant system isolation

   RCS isolation is provided to prevent loss of inventory through the letdown or any other normally open lines.

2. Main steam system isolation and steam generator pressure control

   Main steam isolation can be achieved by closing the main steam isolation valves and closure of main steam bypass isolation valves. Controlled steam release capability will be available to remove decay heat via the atmospheric relief valves (ARV). Atmospheric relief valves will be operated manually such that the auxiliary feedwater flow and steam flow are matched and the required water level is maintained in at least two steam generators.

3. Auxiliary feedwater (AFW) system availability

   During SBO, a steam flow path from the steam generators to the turbine driven auxiliary feedwater (TDAFW) pump will be available. A flow path from one of the condensate storage tanks to the TDAFWP suction will be available. Auxiliary feedwater discharge from the TDAFW pump to the steam generators will be available. Only one AFW pump discharge valve to the steam generators will be operated at a time to meet the battery load requirements.

4. Condensate storage tank capacity

   Adequate condensate inventory is available for the required coping duration without additional water supply. The inventory of one condensate storage tank (CST) is adequate for the required SBO coping duration of 4 hours.

5. Station battery capacity

   To maintain the electrical and instrumentation components needed for core cooling and decay heat removal following SBO, the station 125-Vdc Class 1E batteries are capable of powering the required loads for the SBO coping duration. Adequate battery capacity also exists to provide field flashing to one of the emergency diesel generators and closing of all required breakers in the final minute of the SBO coping duration.

6. Vital ac/dc system availability

   The station batteries power the Class 1E dc buses and inverters. The inverters supply ac power to the Class 1E 120-volt vital instruments. The vital 120-volt ac equipment and Class 1E dc equipment are available to supply power during the required SBO coping duration.

7. Compressed air system requirements

   Those pneumatically operated valves which are required for SBO all assume a fail-safe position upon loss of air pressure. The loss of the compressed air system during SBO would have no impact on maintaining both decay heat removal capabilities and reactor coolant system inventory.

8. Instrumentation requirements

   Adequate instrumentation is provided to assess the core reactivity, RCS inventory, core cooling capability, decay heat removal capability, and availability of Class 1E 125-Vdc and vital 120-Vac systems.

B. The ability to maintain adequate RCS inventory

There will not be any unisolatable paths that exist during SBO that would allow loss of RCS inventory. All boundary valves will be either closed or fail closed during SBO. As allowed by NUMARC 87-00 guidelines, the RCP seal leakage is assumed not to exceed 25 gpm per pump.

C. The ability to maintain appropriate containment integrity

Appropriate containment integrity will be provided during the required duration of the SBO.

D. The effects of loss of ventilation

Those areas of VEGP which contain equipment required to operate during an SBO to achieve and maintain safe shutdown have been evaluated to determine their average ambient steady state temperatures occurring during the SBO duration. This evaluation was performed in accordance with the guidelines established in NUMARC 87-00, Appendix F and as supplemented by the NUMARC January 4, 1990, letter to the NUMARC Board of Directors. This evaluation has established reasonable assurance of operability of equipment in these areas during an SBO event.

E. Equipment environmental evaluation

Areas of the plant housing components required for SBO coping have environmental conditions which are either below the component environmental qualification design or are only slightly above design and are well below the minimum generic limit established in NUMARC 87-00. To maintain a reasonable assurance for operation of the safety-related inverters, certain room doors within the control building must be opened within 30 minutes and remain open during an SBO. These rooms and doors are identified in reference 3.

Weather hazards such as extreme temperatures, wind, and flooding will not impact components required for an SBO.

Normal plant operating conditions for the areas containing SBO components have been reviewed and indicate that the initial temperatures at the beginning of the SBO event are maintained at acceptable levels to support the conclusions of the SBO coping analysis.

It has been demonstrated that there is reasonable assurance that the equipment will remain operable during and subsequent to an SBO event.

F. Identification of access to plant areas requirements

Applicable plant procedures which include operator actions necessary to cope with an SBO have been completed. Included in these procedures is consideration for the effects of ac power loss on area access, as well as the need to gain entry to other locked (secured) areas where remote equipment operation may be necessary.

G. Emergency lighting requirements

Emergency lighting for the main control room will provide minimum acceptable illumination levels. (NUREG 0700 section 6.1.5.4.c defines the minimum emergency lighting level at a control room work station to be 10 foot-candles.) Adequate emergency lighting will be available for those areas of the plant where operator actions and/or ingress or egress are required. The ingress and egress routes from the main control room to these areas will also be illuminated. Manual transfer switches and power feeders from the nonblacked-out unit diesel backed distribution panels have been added to ensure lighting in the main control room for the duration of the SBO.

H. Identification of required operator actions

Operator actions that are required, inside and outside the control room, to cope with the SBO event have been identified in plant procedures.

I. Procedures interface considerations

Regulatory Guide 1.155 provides the guidance that procedures and training should include all operator actions necessary to cope with an SBO for at least the duration determined according to Regulatory Position 3.1 and to restore normal long-term cooling/decay heat removal once ac power is restored. Procedures have been integrated with plant-specific technical guidelines and emergency operating procedure upgrade program established in response to Supplement 1 of NUREG-0737.

J. Diesel generator reliability program requirements

Elements of the emergency diesel generator program are contained in RG 1.155. These elements or their equivalent) have been addressed in the applicable plant procedures.

8.4.1.2 <u>References</u>

1. NUMARC 87-00 "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout At Light Water Reactors," Revision 1, August 1991.
2. NUMARC supplemental letter to the NUMARC Board of Directors, "Station Blackout (SBO) Implementation: Request for Supplemental SBO Submittal to NRC," dated January 4, 1990.
3. Letter to NRC, "Response to Station Blackout Questions," ELV-2867, dated June 7, 1991.

9.0 AUXILIARY SYSTEMS

9.1 FUEL STORAGE AND HANDLING

9.1.1 NEW FUEL STORAGE

Special nuclear material (SNM) in the form of fuel is stored in three locations. These are: (1) the new fuel storage area; (2) the spent fuel pool; and (3) the independent spent fuel storage installation (ISFSI). Storage of new fuel is described in FSAR subsection 9.1.1. Wet spent fuel storage in the spent fuel pool is described in FSAR subsection 9.1.2. Dry spent fuel storage is described in FSAR subsection 9.1.6.

9.1.1.1 Design Bases

New fuel is stored in racks. (See figure 9.1.1-1.) Each rack is composed of individual vertical cells which can be fastened together in any number to form a module that can be firmly bolted to anchors in the floor of the new fuel storage area. The new fuel storage racks are designed to include storage for 162 fuel assemblies at a center-to-center spacing of 21 in. This spacing provides a minimum separation between adjacent fuel assemblies of 12 in., which is sufficient to maintain a subcritical array even in the event the building is flooded with unborated water or during any design basis event. All surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel, whereas the supporting structure may be painted carbon steel.

The requirements of ANS 57.1 are addressed in subsection 9.1.4. The racks are designed to withstand nominal operating loads as well as safe shutdown earthquake and operating basis earthquake seismic loads. (See table 3.2.2-1.) The new fuel storage racks are designed to meet Seismic Category 1 requirements of Regulatory Guide 1.29. The racks are also designed to withstand the maximum uplift force of the fuel handling machine.

9.1.1.2 Facilities Description

One storage pit, located within the fuel handling building, satisfies the new fuel storage requirements for both Units 1 and 2. The storage pit is protected from the effects of natural phenomena, including earthquakes, winds, tornadoes, floods, and external missiles, by the Seismic Category 1 fuel handling building. See section 3.8 for a discussion of the structural design of the new fuel storage area.

The dry, unlined, approximately 14-ft-deep, reinforced concrete vault is equipped to provide storage volume for 10 new fuel storage racks. Nine of the racks hold 16 new fuel assemblies, and the tenth rack is designed to hold 18 new fuel assemblies.

The storage racks are supported by the walls and floor of the vault. Access platforms covered with grating form walkways between the fuel storage racks to allow inspection of the new fuel storage facility. The vault is covered to prevent objects from falling on the racks. Drawings 1X4DE317, 1X4DE318, and 1X4DE322 show the relationship between the new fuel storage facility and other aspects of the fuel handling building.

The security measures taken for the protection of the new fuel against industrial sabotage and theft are discussed in section 13.6.

9.1.1.3 Safety Evaluation

The design of the new fuel storage racks is such that the effective multiplication factor, k_{eff}, will not exceed 0.95 with new fuel of the highest anticipated enrichment (5.0 weight% U-235) in place, assuming the storage area is flooded with pure water. The design is such that k_{eff} will not exceed 0.98, assuming possible flooding of the new fuel storage facility by sources of moderation such as those that can arise during firefighting operations. Consideration is given to the inherent neutron absorbing effect of the materials of construction.

The new fuel storage racks are located in the new fuel storage area, which has a protective cover that protects the racks from dropped objects. Administrative controls are utilized when a section of the protective cover is removed for handling of the new fuel assemblies.

The new fuel assemblies are stored dry, and the 21-in., center-to-center spacing ensures a safe geometric array. Under these conditions, a criticality accident during refueling and storage is not considered credible.

Consideration of criticality safety analysis is discussed in paragraph 4.3.2.6.

9.1.1.4 Tests and Inspections

Prior to use, the new fuel storage racks and modules are inspected and functionally tested by inserting a dummy fuel assembly into the racks to ensure that no binding occurs when the actual fuel assemblies are installed. Thereafter, the new fuel storage racks are periodically inspected visually for structural integrity.

9.1.1.5 Instrumentation

As discussed in subsection 12.3.4, two area radiation monitors are provided within the fuel building to provide warning to the occupants of a deteriorated radiological condition. The monitors have an intermediate alarm setting of 1.0 mR/h and a high radiation alarm setpoint of 2.5 mR/h to give warning of high radiation if accidental criticality should occur.

9.1.2 WET SPENT FUEL STORAGE

9.1.2.1 Design Bases

Spent fuel is stored in high density racks. Each rack in the Unit 1 spent fuel pool consists of several cells welded together to form the rack top grid. The cells are welded at the bottom to a supporting grid structure. The Unit 2 spent fuel pool consists of an assemblage of cells interconnected to each other along their contiguous corners to produce a honeycomb cellular structure. All of these modules are free-standing, neither anchored to the floor nor braced to the wall. The rack arrays in the Unit 1 pool (figure 9.1.2-1, sheet 1), have a center-to-center spacing of 10.25 in., as shown in figure 9.1.2-2, sheet 1. The spent fuel storage racks include storage locations for 1476 fuel assemblies in the Unit 1 pool (figure 9.1.2-3). In the Unit 2 pool

(figure 9.1.2-1, sheet 2) rack arrays have a center-to-center spacing of 10.40 inches in the east-west direction and 10.58 in. in the north-south direction (figure 9.1.2-2, sheets 2 and 3). There are a total of 2098 storage locations in the Unit 2 pool. Spent fuel pool cooling is discussed in subsection 9.2.2, fuel handling building ventilation in subsection 9.4.2, and fuel handling building fire protection in appendix 9A, fire area 1-AB-LD-B.

9.1.2.2 Facilities Description

The wet spent fuel storage facility is designed to the guidelines of ANS 57.2. The wet spent fuel storage facility is located within the Seismic Category 1 fuel handling building. The facility is protected from the effects of natural phenomena such as earthquakes, winds, tornadoes, floods, and external missiles. The facility is designed to maintain its structural integrity following a safe shutdown earthquake and to perform its intended function following a postulated hazard such as fire, internal missiles, or pipe break. Each unit is provided with its own spent fuel pool. The units share a common cask loading and washdown area.

The spent fuel pool provides storage space for irradiated spent fuel. New fuel may be moved from the new fuel racks to the spent fuel racks in preparation for a refueling outage. Each nuclear unit has a separate pool. The pool is approximately 41 ft deep, constructed of reinforced concrete, and lined with 1/4-in. thick stainless steel plate. The normal water volume of the pool is about 447,030 gal of borated water with a nominal boron concentration of 2000 ppm. Drawings 1X4DE317, 1X4DE320, and 1X4DE322 show the spent fuel pools and the cask loading area.

The spent fuel racks are vertical modules designed to hold Westinghouse 17-by-17 fuel assemblies in various arrays. A total of 3574 storage locations will be provided. The Unit 2 pool will initially contain at least two racks with storage space for 198 fuel assemblies. The design allows the addition, during or before plant operation, of any number of racks up to a total of 20 racks in the Unit 2 pool as shown in figure 9.1.2-5.

Contiguous to each spent fuel pool is a short canal leading to the fuel transfer canal. The fuel transfer canal is connected to the refueling canal inside the containment by the fuel transfer tube. All portions of the spent fuel transfer operation are completed underwater, and the waterways are of sufficient depth to maintain a nominal 10 ft of shielding water above the active fuel. A metal gate with gasket assembly separates the short spent fuel pool canal from the fuel transfer canal. This allows the transfer canal to be drained without interfering with the water level in the fuel pool. Subsection 9.1.3 further addresses the minimum water level in the spent fuel pool. In the event that fuel is damaged and fuel fragments or pellets are collected on filters or other devices, the shielding requirements for the movement of the filters govern rather than the requirements on the submergence of spent fuel.

Common to the spent fuel pools and accessible by small canals is an approximately 47-ft-deep cask loading pit. The canals are separated from the spent fuel pools by metal gates with gasket assemblies. The cask washdown enclosure is an epoxy-coated internal structure of the fuel handling building provided for decontamination of spent fuel casks before movement outside the auxiliary building.

The spent fuel bridge crane traverses the spent fuel pools and the new fuel storage facility. It is used in the movement of both new and spent fuel assemblies. This crane also has access to the adjoining canals.

The cask handling bridge crane traverses the auxiliary building and a portion of the fuel handling building. The cask handling crane's path is perpendicular to the path of the spent fuel bridge crane and is designed such that the cask crane cannot pass over the spent fuel pools.

This precludes the movement of heavy loads (other than those associated with the spent fuel bridge crane) over the spent fuel pools, in accordance with Regulatory Guide 1.13. The cask handling crane is used for operations involving spent fuel casks.

During fuel handling operations, a controlled and monitored ventilation system removes gaseous radioactivity from the atmosphere above the spent fuel pools and processes it before discharge through the plant vent. Refer to subsection 9.4.2 for a detailed discussion of the fuel handling building heating, ventilation, and air-conditioning system and section 11.5 for process radiation monitoring.

The spent fuel pool is provided with a Seismic Category 1 backup water supply. Water can be either pumped or gravity-fed to the pool from the reactor makeup water storage tank. The reactor makeup water pumps are nonsafety-related Seismic Category 1 pumps which can be aligned to the emergency non-1E buses. In the event that the pumps fail to function, water can flow through the nonfunctioning pumps to provide makeup to the pool. All intervening piping is designed to Seismic Category 1 requirements.

9.1.2.2.1 Spent Fuel Rack Design

A. Applicable Codes, Standards, and Specifications

The racks are designed and fabricated to applicable portions of the following Nuclear Regulatory Commission (NRC) Regulatory Guides, Standard Review Plan Sections, and published standards.

1. April 14, 1978, NRC Position for Review and Acceptance of Spent Fuel Storage and Handling Applications, as amended by the NRC letter dated January 18, 1979.
2. NRC Regulatory Guides

1.13, Rev. 1, Dec. 1975,	Spent Fuel Storage Facility Design Basis
1.25, March 1972	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors
1.26, Rev. 3, Feb. 1976	Quality Group Classifications and Standards for Water Steam and Radioactive Waste Containing Components of Nuclear Power Plants
1.29, Rev. 3, Sept. 1978	Seismic Design Classification
1.92, Rev. 1, Feb. 1976	Combining Modal Responses and Spatial Components in Seismic Response Analysis
1.124, Rev. 1, Jan. 1978	Service Limits and Load Combinations for Class 1 Linear-Type Component Supports

3. Standard Review Plan - NUREG-0800

Rev. 2, August 1989	Section 3.7, Seismic Design (Unit 1)
Rev. 1, July 1981	Section 3.7, Seismic Design (Unit 2)
Rev. 1, July 1981	Section 3.8.4, Other Seismic Category I Structures
Rev. 3, July 1981	Section 9.1.2, Spent Fuel Storage
Rev. 1, July 1981	Section 9.1.3, Spent Fuel Pool Cooling System
NRC Branch Technical Position, Rev. 2, July 1981	ASB 9-2, Residual Decay Energy for Light Water Rectors for Long Term Cooling

4. Industry Codes and Standards

ANSI N16.1-75	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors
ANSI N16.9-75	Validation of Calculational Methods for Nuclear Criticality Safety
ANSI N210-76	Design Objectives for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Stations
ASME Section III-95	Nuclear Power Plant Components (Unit 1)
ASME Section III-83	Nuclear Power Plant Components (through Summer 1984 Addendum) (Unit 2)
ACI 318-63	Building Code Requirements for Reinforced Concrete (Unit 1 & 2)
ACI 318-71	Building Code Requirements for Reinforced Concrete (Unit 1)

B. Seismic and Impact Loads

The spent fuel racks are designed using the seismic loading described in this section.

Seismic analysis of the fuel storage racks is performed by the time-history method. The time histories and response spectrum utilized in these analyses represent the responses of the pool structure to the specified ground motion. The seismic analysis of the racks is performed with a damping value of 4% for safe shutdown earthquake (SSE) and 2% for operating basis earthquake (OBE).

Maximum dynamic forces and stresses are calculated for the worst condition as determined by combination with forces and stresses computed in accordance with paragraph C.

Deflections or movements of racks under earthquake loading are limited by design such that, in the active fuel region, the racks do not touch each other or the spent fuel pool walls, the racks are not damaged to the extent that nuclear parameters provided in paragraph 9.1.2.3 are exceeded, and the fuel assemblies are not damaged.

The interaction between the fuel elements and the rack is considered, particularly gap effects. The resulting impact loads are of such magnitude that there is no structural damage to the fuel assemblies.

C. Loads and Load Combinations

Table 9.1.2-1 shows loads and load combinations that are considered in the analyses of the spent fuel racks include those given in the NRC, OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications, dated April 14, 1978, as amended by the NRC letter dated January 18, 1979.

It is noted from the seismic analysis that the magnitude of stresses varies considerably from one geometrical location to the other in the model. Consequently, the maximum loaded major rack components are analyzed. Such an analysis envelops the other areas of the rack assembly.

For both the Unit 1 and Unit 2 pool racks, the margins of safety for the multi-directional seismic event were evaluated by applying statistically independent acceleration time histories in three orthogonal directions concurrently. Simultaneous application of the seismic slab motion dispenses with the need to perform statistical summations (square-root-of-the-sum-of-squares).

D. Design and Analysis Procedures for Spent Fuel Storage Racks

The seismic and stress analyses of the spent fuel rack modules considers the various conditions of full, partially filled, and empty fuel assembly loadings for the wet pool case. The Unit 2 analysis includes conditions of partially filled and empty fuel assembly loadings for the dry case. In addition, an analysis of a Unit 2 pool rack in the dry condition and fully loaded with new fuel was performed. The racks are evaluated for both operating basis earthquake (OBE) and safe shutdown earthquake (SSE) conditions and meet Seismic Category I requirements. A detailed stress analysis is performed to verify the acceptability of the critical load components and paths under normal and faulted conditions. The racks rest freely on the pool floor and are evaluated under all loading conditions to determine if rack-to-rack or rack-to-wall impact occurs.

The dynamic response of the fuel rack assembly during a seismic event is the condition which produces the governing loads and stresses on the structure. The seismic analysis of a free-standing fuel rack is a time-analysis performed on a nonlinear model.

1. Unit 1 Spent Fuel Pool Rack Analysis

The details of the structural models and the structural analyses of the Unit 1 spent fuel racks are described in the following paragraphs:

The analyses performed to confirm the structural integrity of the racks to demonstrate compliance with the USNRC Standard Review Plan(1) and the OT Position Paper(2) are as follows:

- 3-D transient analyses of the spent fuel racks individually and as an assemblage acting as free-standing submerged bodies subjected to seismic excitations applied as synthetic acceleration time-histories.
- Evaluation of the primary stresses in the rack structure to establish compliance with the stress limits for ASME Section III Subsection NF(3).
- Evaluation of the secondary and peak stresses amplitudes in the most severely loaded rack sections to ensure that failure from cyclic fatigue will not occur.

The spent fuel racks are designed as Seismic Category I as required by USNRC Standard Review Plan(4). The response of a free-standing rack module to seismic inputs is highly nonlinear involving a complex combination of motions (sliding, rocking, twisting, and turning), resulting in impacts and friction effects. An accurate simulation of the structural response is obtained by direct integration of the nonlinear equations of motion using pool slab acceleration time-histories as the forcing function.

Particulars of modeling details and assumptions for the 3-D single rack analysis for the fuel racks are given in the following:

a. The fuel rack structure motion is captured by modeling the rack as a 12 degrees-of-freedom structure. Movement of the rack cross-section at any height is described by 6 degrees of freedom of the rack base and 6 degrees of freedom at the rack top. In this manner, the beam-like response of the module, relative to the baseplate, is captured in the dynamic analyses once suitable springs are introduced to couple the rack degrees of freedom. Rattling fuel assemblies within the rack are modeled by five lumped masses located at H, .75H, .5H, .25H, and at the rack base (H is the rack height measured above the base). Each lumped fuel mass has 2 horizontal displacement degrees of freedom. Vertical motion of the fuel assembly mass is assumed equal to rack vertical motion at the base.

b. Seismic motion of a fuel rack is characterized by random rattling of fuel assemblies in their individual storage locations. All fuel assemblies are assumed to move in-phase within a rack. This exaggerates computed dynamic loading on the rack structure and, therefore, yields conservative results.

c. Fluid coupling between the rack and the fuel assemblies, and between the rack and the wall, is simulated by appropriate inertial coupling in the system kinetic energy. Fluid coupling terms for rack-to-rack coupling are based on either in-phase or opposed-phase motion of adjacent modules.

d. Fluid damping and form drag are conservatively neglected.

e. Sloshing is negligible at the top of the rack and is therefore neglected in the analysis of the rack.

f. Potential impacts between the cell walls of the racks and the contained fuel assemblies are accounted for by appropriate

compression-only gap elements between masses involved. The possible incidence of rack-to-wall or rack-to-rack impact is simulated by gap elements at the top and bottom of the rack in two horizontal directions. Bottom gap elements are located at the rack base.

g. Pedestals are modeled by gap elements in the vertical direction and as "rigid links" for transferring horizontal stress. Each pedestal support is linked to the pool liner by two friction springs. The spring rate for the friction springs includes any lateral elasticity of the stub pedestals. Local pedestal vertical spring stiffness accounts for the floor elasticity and the local rack elasticity just above the pedestal.

h. Rattling of fuel assemblies inside the storage locations causes the gap between fuel assemblies and cell wall to change from a maximum of twice the nominal gap to a theoretical zero gap. Fluid coupling coefficients are based on the nominal gap dimension.

Figure 9.1.2-4, sheet 1, shows a schematic of the dynamic model where p_i (i = 1,2,3,7,8,...,19) represents the translational degrees of freedom, and q_i (i = 4,5,6,20,21,22) represents the rotational degrees of freedom. Translational and rotational degrees of freedom 1 through 6 and 17 through 22 describe the rack motion; the rattling fuel masses, which are located at nodes 1*, 2*, 3*, 4*, and 5* in figure 9.1.2-4, sheet 1, are described by translational degrees of freedom 7 to 16.

The single rack 3-D model handles the array of variables as follows:

- Interface Coefficient of Friction

  Parametric runs are made with upper bound and lower bound values of the coefficient of friction. The limiting values are based on experimental data which have been found to be bounded by the values 0.2 and 0.8.

- Impact Phenomena

  Compression-only gap elements are used to provide for opening and closing of interfaces such as the pedestal-to-bearing pad interface, and the fuel assembly-to-cell wall interface.

- Fuel Loading Scenarios

  The fuel assemblies are conservatively assumed to rattle in unison which obviously exaggerates the contribution of impact against the cell wall. The different patterns of possible fuel assembly loadings in the rack are simulated by orienting the center of gravity column of the assemblage of fuel assemblies with respect to the module geometric center of gravity in an appropriate manner.

- Fluid Coupling

  The contribution of fluid coupling forces is ascertained by prescribing the motion of the racks (adjacent to the one being analyzed).

The whole pool multi-rack (WPMR) analysis methodology is the vehicle available to establish the presence or absence of specific rack-to-rack impacts during the seismic event.

In WPMR analysis, a 16 degrees of freedom discretization is used to model each rack plus contained fuel. The rack structure is modeled by 12 degrees of freedom, and the contained fuel is modeled by 4 horizontal degrees of freedom. The only difference between the single rack model, which is described in paragraph 9.1.2.2.1.D.2, and the WPMR model is the number of rattling fuel masses. The WPMR model has two fuel masses which are located at nodes 3* and 5* in figure 9.1.2-4, sheet 1. Thus, the WPMR model involves all racks in the spent fuel pool with each individual rack and its fuel modeled as a 16 degrees of freedom structure.

The WPMR model includes gap elements that represent compression-only pedestals, impact potential at fuel assembly-fuel rack interfaces, and impact potential at rack-to-rack and rack-to-wall locations. The rack-to-rack and rack-to-wall impact springs are located at the top and bottom corners of the rack. Each pedestal has two friction elements associated with the force in the vertical compression element.

The spring constants are equal to the corresponding values from the 22 degrees of freedom single-rack model.

The WPMR dynamic model is of all rack modules in the pool, and includes all fluid coupling interactions among them, as well as fluid coupling interactions between racks and pool walls.

The 3-D WPMR analyses demonstrate that all kinematic criteria for the spent fuel rack modules are satisfied, and that resultant structure loads confirm the validity of the single rack structural qualification. The results of the analyses indicate that (1) there is no rack-to-pool wall impact, and (2) no rack-to-rack impact in the cellular region of the racks containing active fuel.

2. Unit 2 Spent Fuel Pool Rack Analysis

The details of the structural model and the structural analysis are described in the following paragraphs:

The seismic analysis is performed in three steps:

a. Development of a nonlinear dynamic model consisting of inertial mass elements and gap and friction elements.

b. Generation of the equations of motion and inertial coupling and solution of the equations using the "component element time integration scheme" to determine nodal forces and displacements.

c. Computation of the detailed stress field in the rack (at the critical location) and in the support legs using the nodal forces calculated in the previous step. These stresses are checked against the design limits given in Table 9.1.2-1.

Since the racks are not anchored to the pool floor or attached to the pool walls or to each other, they can execute a wide variety of rigid body motions. For example, the rack may slide on the pool floor (so-called "sliding condition"); one or more legs may momentarily lose contact with the

liner ("tipping condition"); or the rack may experience a combination of sliding and tipping conditions. The structural model permits simulation of these kinematic events with inherent built-in conservatisms. Since these rack modules are designed to preclude the incidence of interrack impact, it is also necessary to include the potential interrack impact phenomena in the analysis to demonstrate that such impacts do not occur. Lift-off of the support legs and subsequent liner impacts must be modeled using appropriate impact elements, and Coulomb friction between the rack and the pool liner must be simulated by appropriate piecewise linear springs. These special attributes of the rack dynamics require a strong emphasis on the modeling of the linear and nonlinear springs, dampers, and stop elements.

These considerations lead to the following attributes of the analysis model:

a. The fuel rack structure is a folded metal plate assemblage welded to a baseplate and supported on a minimum of four legs. The rack structure itself is a very rigid structure. Dynamic analysis of typical multicell racks has shown that the motion of the structure is captured almost completely by the behavior of a six degrees-of-freedom structure. Therefore, the movement of the rack cross-section at any height is described in terms of the six degrees-of-freedom of the rack base. The rattling fuel is modeled by five lumped masses located at H, .75H, .5H, .25H, and at the rack base. (Figure 9.1.2-4, sheet 2 and Figure 9.1.2-4, sheet 3).

b. The seismic motion of a fuel rack is characterized by random rattling of fuel assemblies in their individual storage locations. Substituting the assemblage of rattling masses by an effective dynamic mass group greatly reduces the required degrees-of-freedom needed to model the fuel assemblies which are represented by five lumped masses located at different levels of the rack. The centroid of each fuel assembly mass can be located relative to the rack structure centroid at that level, so as to simulate a partially loaded rack (Figure 9.1.2-4, sheet 3).

c. The local flexibility of the rack-support interface is modeled conservatively in the analysis (spring KR in Figure 9.1.2-4, sheet 2).

d. The rack base support may slide or lift off the pool floor.

e. Fluid coupling between rack and assemblies, and between rack and adjacent racks, is simulated by introducing appropriate inertial coupling into the system kinetic energy.

f. Potential impacts between rack and assemblies are accounted for by appropriate "compression only" gap elements between masses involved.

g. Fluid damping between rack and assemblies, and between rack and adjacent rack, is conservatively neglected.

h. The supports are modeled as "compression only" elements for the vertical direction and as "rigid links" for horizontal displacement. The bottom of a support leg is attached to a frictional spring as shown in figure 9.1.2-4, sheet 2. The cross-section inertial properties of the

support legs are computed and used in the final computations to determine support leg stresses.

i. The possible incidence of interrack impact is simulated by a series of gap elements at the top and bottom of the rack in the two horizontal directions. The most conservative case of adjacent racks movement is assumed; each adjacent rack is assumed to move completely out of phase with the rack being analyzed.

j. The form drag opposing the motion of the fuel assemblies in the storage locations is conservatively neglected in the results reported herein.

k. The form drag opposing the motion of the fuel rack in the water is also conservatively neglected in the results reported herein.

l. The rattling of the fuel assemblies inside the storage locations causes the "gap" between the fuel assemblies and the cell wall to change from a maximum of twice the nominal gap to a theoretical zero gap. Therefore, the fluid coupling coefficients utilized are based on nonlinear vibration theory. Studies in the literature show that inclusion of the nonlinear effect (viz. vibration amplitude of the same order of magnitude as the gap) provides a more accurate characterization of the equipment response.

m. The cross coupling effects due to the movement of fluid from one interstitial (interrack) space to the adjacent one is modeled using potential flow and Kelvin's circulation theorem.

Figure 9.1.2-4, sheet 4 shows a schematic of the model. Six degrees-of-freedom are used to track the motion of the rack structure. Figure 9.1.2-4, sheet 3 shows the fuel assembly/storage cell impact springs at a particular level.

An important feature of the rack analysis is incorporation of the fluid coupling effects. The fluid coupling forces are a strong function of the interbody gap, reaching large values for very small gaps. The lateral motion of a fuel assembly inside the storage location encounters the fluid coupling effect. So does the motion of a rack adjacent to another rack. These effects are included in the equations of motion. Furthermore, the rack equations contain coupling terms which model the effect of fluid in the gaps between adjacent racks. The coupling terms modeling the effects of fluid flowing between adjacent racks are computed assuming that all adjacent racks are vibrating 180° out of phase from the rack being analyzed. Therefore, only one rack is considered surrounded by a hydrodynamic mass computed as if there were a plane of symmetry located in the middle of the gap region.

The fluid virtual mass is included in the vertical direction vibration equations of the rack; virtual inertia is also added to the governing equation corresponding to the rotational degree-of-freedom (See figure 9.1.2-4, sheet 4).

Damping of the rack motion arises from material hysteresis (material damping, relative intercomponent motion in structures structural damping), and fluid drag effects (fluid damping). In the analysis, a maximum of 4%

structural damping is imposed on elements of the rack structure during SSE seismic simulations, and 2% for OBE simulations. Material and fluid damping are conservatively neglected. The dynamic model constructed in this manner is employed to evaluate the rack module structural response for limiting values of the interface coefficient of friction (μ = 0.2 and 0.8), and a number of conditions of rack loading.

E. Structural Acceptance Criteria for Spent Fuel Storage Racks

The fuel racks are analyzed for the normal and faulted load combinations of paragraph C in accordance with the NRC, OT Positions for Review and Acceptance of Spent Fuel Storage and Handling Applications.

The major normal and upset condition loads are produced by the operating basis earthquakes. The thermal stresses due to rack relative expansion are calculated and combined with the appropriate seismic loads in accordance with the NRC, OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications[(2)].

The faulted condition loads are produced by the safe shutdown earthquakes and a postulated fuel assembly drop accident.

The computed stresses are within the acceptance limits identified in the NRC, OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications[(2)].

In summary, the results of the seismic and structural analysis show that the VEGP spent fuel storage racks meet all the structural acceptance criteria adequately.

F. Fuel Handling Crane Uplift Analysis

An analysis is performed to demonstrate that the rack can withstand a maximum uplift load of 5000 lb. This load can be applied to a postulated stuck fuel assembly without violating the criticality acceptance criterion. Resulting stresses are within acceptable stress limits, and there is no change in rack geometry of a magnitude which causes the criticality acceptance criterion to be violated.

G. Fuel Assembly Drop Accident Analysis

In the unlikely event of dropping a fuel assembly, accidental deformation of the rack does not cause the criticality acceptance criterion to be violated.

Analysis of radiological consequences considers the case of a dropped spent, irradiated fuel assembly in a flooded pool. The criticality analysis takes credit for dissolved boron in the water but takes no credit for burnup.

For the analysis of a dropped fuel assembly, two accident conditions are postulated. The first accident condition conservatively assumes that the weight of a fuel assembly, control rod assembly, and handling tool (2300 lb total) impacts the top of the fuel rack from a drop height of 3 ft. Calculations show that the impact energy is absorbed by the dropped fuel assembly, the cells, and rack base plate assembly. Under these faulted conditions, credit is taken for dissolved boron in the water, and the criticality acceptance criterion is not violated.

The second accident condition assumes that the dropped assembly and tool (2300 lb) falls straight through an empty cell and impacts the rack base plate

from a drop height of 3 ft above the top of the rack. The results of this analysis show that the impact energy is absorbed by the fuel assembly and the rack base plate.

The accident condition of an inclined drop of a fuel assembly on top of the rack is bounded by the above two accidents. No additional analysis was performed for this condition.

Criticality calculations show that $k_{eff} \leq 0.95$ and the acceptance criterion is not violated.

H. Fuel Rack Sliding and Overturning Analysis

Consistent with the criteria of the NRC, OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications(2), the racks are evaluated for overturning and sliding displacement due to earthquake conditions.

The nonlinear models described in paragraph D are used in this evaluation to account for fuel-to-rack impact loading, hydrodynamic forces, and the nonlinearity of sliding friction interfaces.

The fuel rack nonlinear time-history analyses show that the fuel rack slides a minimal distance. The factor of safety against overturning is well within the values permitted by Section 3.8.5.II.5 of the Standard Review Plan.

9.1.2.3 Safety Evaluation

The design and safety evaluation of the spent fuel racks is in accordance with the Nuclear Regulatory Commission position paper, Review and Acceptance of Spent Fuel Storage and Handling Applications.(2)

The racks, being Nuclear Safety Class 0 and Seismic Category 1 structures, are designed to withstand normal and postulated dead loads, live loads, loads resulting from thermal effects, and loads caused by the operating basis earthquakes and safe shutdown earthquake events.

The design of the racks is such that k_{eff} remains less than or equal to 0.95 under all conditions, including fuel handling accidents. Because of the close spacing of the cells, it is impossible to insert a fuel assembly in other than design locations. Inadvertent insertion of a fuel assembly between the rack periphery and the pool wall or placement of a fuel assembly across the top of a fuel rack is considered a postulated accident, and as such, realistic initial conditions such as boron in the water can be taken into account. This condition has an acceptable k_{eff} of less than 0.95. Should the spent fuel storage be used for new fuel storage in the dry condition, k_{eff} will be less than or equal to 0.98.

The racks are also designed with adequate energy absorption capabilities to withstand the impact of a dropped fuel assembly from the maximum lift height of the fuel handling machine. Handling equipment (fuel building crane) capable of carrying loads heavier than a fuel assembly is prevented by interlocks or administrative controls, or both, from traveling over the fuel storage area. The fuel storage racks can withstand an uplift force greater than or equal to the uplift capability of the fuel handling machine (4000 lb).

All materials used in construction are compatible with the storage pool environment, and all surfaces that come into contact with the fuel assemblies are made of annealed austentic stainless steel. All the materials are corrosion resistant and will not contaminate the fuel assemblies or pool environment. Venting of the boraflex and boral can be accomplished through the holes in the corners of the wrapper.

Design of the facility in accordance with Regulatory Guide 1.13 ensures adequate safety under normal and postulated accident conditions.

A discussion of the methodology used in the criticality analyses is provided in paragraph 4.3.2.6.

9.1.2.4 References

1. USNRC Standard Review Plan, NUREG-0800 (SRP 3.7.1, Rev. 2, 1989).
2. Nuclear Regulatory Commission, letter to All Power Reactor Licensees, from B. K. Grimes, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", April 14, 1978.
3. ASME Boiler & Pressure Vessel Code Section III, Subsection NF (1980).
4. USNRC Standard Review Plan, NUREG-0800 (SRP 3.8.4, Rev. 1, July 1981).

9.1.3 SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM (SFPCPS)

The SFPCPS is designed to remove the decay heat generated by stored fuel assemblies from the spent fuel pool water. This cooling is accomplished by taking high temperature water from the pool, pumping it through a heat exchanger, and returning the cooled water to the pool. A secondary function of the SFPCPS is to clarify and purify the spent fuel pool, transfer canal, and refueling water. A portion of the hot water discharged by the pump can be diverted through a water cleanup system and returned to the pool.

The SFPCPS is manually controlled and is capable of maintaining the pool water at a low enough temperature to prevent excessive vapor formation or evaporation from the water surface or to cause excessive discomfort to personnel during fuel handling operations. The SFPCPS is shown in drawing 1X4DB130. The SFPCPS for the two units are identical. From a heat load standpoint, the difference between the two pools is the capacity of the fuel storage racks, 1476 fuel assemblies for Unit 1 and 2098 fuel assemblies for Unit 2. However the expected heat removal requirements are greater for the Unit 2 pool than for the Unit 1 pool.

The normal refueling for each unit is a full-core (193 fuel assemblies) offload into its associated pool. A portion of these fuel assemblies will remain in the pool while some, along with new fuel assemblies, are reloaded into the core. The placement of the fuel assemblies is administratively controlled.

For the power uprate, governing design cases were reanalyzed. Values which represent power uprate conditions are so designated throughout this section.

9.1.3.1 Design Bases

A. Spent Fuel Pool Cooling System (SFPCS)

The SFPCS design capability to remove the decay heat generated by the spent fuel assemblies for the normal refueling and emergency offloading cases has been evaluated. The results of the evaluations are applicable to both Unit 1 and Unit 2 spent fuel pools.

When a unit is operating, its bulk pool temperature limit is 140°F with a single train of spent fuel pool cooling in operation. Prior to transferring fuel into the pool

of an operating unit, a heat load evaluation will be performed to assess the impact of the additional fuel on the total pool heat load. The requirement for performing a heat load evaluation is in the applicable procedures. By ensuring that the total heat load from fuel currently in the pool and the fuel to be transferred does not exceed 28.61 x 10^6 BTU/h, the bulk pool temperature will not exceed 140°F with a single train of spent fuel pool cooling in operation.

For a normal refueling, a full core (193 fuel assemblies) is offloaded into its associated spent fuel pool. The bulk pool temperature limit is 170°F with a single train of spent fuel pool cooling in operation. Prior to offloading a core to its associated pool, a heat load evaluation will be performed to assess the impact of the offload on the total pool heat load. The requirement for performing a heat load evaluation is in the applicable procedures. By ensuring that the total heat load from fuel currently in the pool and the core to be offloaded does not exceed 51.87 x 10^6 BTU/h, the bulk pool temperature will not exceed 170°F with a single train of spent fuel pool cooling in operation.

If, shortly following a refueling outage, the core has to be offloaded to its associated spent fuel pool, the heat load and pool temperature will be greater than that for a normal refueling because the fuel discharged from the recently completed refueling has had a relatively short decay time. This is considered to be an emergency offloading. For an emergency offloading, the bulk pool temperature limit is 182°F with a single train of spent fuel pool cooling in operation. Prior to emergency offloading a core to its associated pool, a heat load evaluation will be performed to assess the impact of the emergency offload on the total pool heat load. The requirement for performing a heat load evaluation is in the applicable procedures. By ensuring that the total heat load from fuel currently in the pool and the core to be offloaded does not exceed 58.13 x 10^6 BTU/h, the bulk pool temperature will not exceed 182°F with a single train of spent fuel pool cooling in operation.

A heat load evaluation will also be performed to demonstrate that at the time of criticality following a refueling, and prior to transferring fuel into the pool of an operating unit:

1. The average heat load from the spent fuel pool of the operating unit must be less than or equal to 20.66 E+6 Btu/h for the 30 days following criticality to ensure adequate NSCW basin inventory following a LOCA, <u>and</u>
2. The heat load from the spent fuel pool of the operating unit must be less than or equal to 23.64 E+6 Btu/h to limit the maximum NSCW basin temperature following a LOCA.

The determination of operational heat loads is discussed in paragraph 9.1.3.4B.

B. Spent Fuel Pool Dewatering Protection

System piping is arranged so that failure of any pipeline cannot drain the spent fuel pool below the water level required for radiation shielding.

C. Water Purification

The system's demineralizer and filters are designed to:

1. Provide adequate purification.
2. Permit unrestricted access for plant personnel.

3. Minimize pool surface dose rate during fuel handling operations in the spent fuel storage area.
4. Maintain optical clarity of the spent fuel pool water by use of the system's skimmers, strainers, and skimmer filter.

The water cleanup circuit contains a filter vessel with a disposable cartridge filter and a mixed bed demineralizer upstream of the filter. The cleanup system is designed for a flowrate of 100 gal/min while the demineralizer is in service and up to 250 gal/min while it is bypassed. This design flowrate is based on being sufficient to ensure adequate circulation of the pool water volume and to maintain the specified water chemistry.

The boron concentration in the pool water is maintained at approximately 2000 ppm by weight boron. Provisions are made to add makeup water to the pool, both as demineralized water to compensate for evaporation and as borated water corresponding to the refueling water concentration.

Sampling and analysis of spent fuel pool water for gross activity and particulate concentration is conducted on a weekly basis when the spent fuel pool cleanup system is in continuous operation. Analytical instrumentation used for measurement of boron and other chemical parameters is described in the plant chemistry procedures manual. For iodine, a decontamination factor of less than or equal to 10 is used to indicate a depleted or saturated demineralizer. In addition, gamma radiation is continuously monitored by the fuel handling building area monitor. In the event the area monitor alarms or the particulate or iodine airborne activity is greater than or equal to 0.3 derived air concentration (DAC) based on a 1-hour time period, additional sampling is conducted to initiate corrective actions. A differential pressure of 50 psid across the spent fuel pit filter indicates a clogged filter that should be replaced.

9.1.3.2 System Description

The Safety Class 3, Seismic Category 1 SFPCPS shown in drawing 1X4DB130 consists of two complete cooling trains. The SFPCPS conforms to the guidelines of Regulatory Guide 1.13, pertaining to the cooling and purification of the spent fuel storage facility. The Seismic Category 1 SFPCPS (piping, pumps, valves, and heat exchangers) is designed to remain functional during and following a safe shutdown earthquake. The nonsafety-related, Seismic Category 2 portion of the SFPCPS is not designed to remain functional during and following a safe shutdown earthquake.

There are three sources of makeup water available. The reactor makeup water storage tank serves as the Seismic Category 1 makeup water source for the spent fuel pool; makeup water can be pumped or gravity-fed into the discharge line from spent fuel pool pump A. Borated refueling water can be pumped or gravity-fed into the nonsafety-related purification loop. Opening of the manual isolation valve between the Seismic Category 1 RWST and the nonsafety-related Seismic Category 2 purification loop in operation Modes 1-4 is prohibited. Demineralized water can be pumped directly into the Safety Class 3 return lines of each spent fuel cooling loop. The cooling water return lines of the cooling loops transport the reactor makeup water, refueling water, or demineralized water into the spent fuel pool.

During equipment maintenance, water from the transfer canal is transferred to the recycle holdup tanks for temporary holdup. The borated water is returned to the transfer canal directly

by the recycle evaporator feed pump. Interconnecting piping between the evaporator feed pumps and the spent fuel pool is nonnuclear safety related.

Each cooling train incorporates one heat exchanger and pump. One purification loop, with demineralizer and filter and associated piping, valving, and instrumentation, services both cooling loops. One surface skimmer loop is also provided. Each cooling train is designed to service the spent fuel pool with the temperatures and heat loads described in paragraph 9.1.3.1.

The SFPCPS removes decay heat from fuel stored in the spent fuel pool. Spent fuel is placed in the pool during the refueling sequence and stored there until it is shipped offsite. Heat is transferred from the SFPCPS through the heat exchanger to the component cooling system.

When either cooling train is in operation, water flows from the spent fuel pool to the spent fuel pool pump suction, is pumped through the tube side of the heat exchanger, and is returned to the pool. The suction line, which is protected by a strainer, is located at an elevation 4 ft below the normal spent fuel pool water level, while the return line contains an antisiphon hole near the surface of the water to prevent gravity drainage of the pool.

While the heat removal operation is in process, a portion of the spent fuel pool water may be diverted through a demineralizer and a filter to maintain spent fuel pool water clarity and purity. Transfer canal water may also be circulated through the same demineralizer and filter by opening the gate between the canal and the spent fuel pool. This purification loop is sufficient for removing fission products and other contaminants which may be introduced if leaking fuel assemblies are transferred to the spent fuel pool.

The demineralizer and filter can be isolated from the heat removal portion of the SFPCPS to allow purification and cleanup of the refueling water while spent fuel pool heat removal operations proceed. Connections are provided to the isolated loop such that the refueling water may be pumped from the refueling water system through the demineralizer and filter and discharged either to the refueling cavity, the refueling water storage tank, or the recycle holdup tanks.

To assist further in maintaining spent fuel pool water clarity, the water surface is cleaned by a skimmer loop. Water is removed from the surface by two skimmer strainers, pumped through a filter, and returned to the pool surface at three locations remote from the skimmers.

The spent fuel pool is initially filled for use with water that has a boron concentration of approximately 2000 ppm. Demineralized water from an external source could be tanked to the plant and transferred to the pool by temporary connections. Boron may be added to the fuel transfer canal from the chemical and volume control system and then pumped to the spent fuel pool by temporary connections. However, a more direct way to initially fill the spent fuel pool would be to add water from the reactor makeup storage tank or borated water from the RWST. Demineralized water can be added for makeup purposes, i.e., to replace evaporative losses, through a connection in each cooling train's purification return loop. In addition, demineralized water provides a dilution source for the RWST.

The pool water may be separated from the water in the transfer canal by a gate. The gate is installed so that the transfer canal may be drained to allow maintenance of the fuel transfer equipment. The water in the transfer canal may be transferred to the recycle holdup tanks in the boron recycle system. When required, the water may then be returned directly to the transfer canal by the recycle evaporator feed pumps (boron recycle system).

9.1.3.3 Component Description

Codes and classifications for the SFPCPS are given in table 3.2.2-1. Equipment design parameters are given in table 9.1.3-1.

A. Spent Fuel Pool Pumps

Two identical pumps are installed in parallel in the heat removal portion of the SFPCPS. Each pump is sized to deliver sufficient coolant flow through its associated spent fuel pool heat exchanger to meet the system cooling requirements. In addition to the spent fuel pool heat removal duty, the pumps may also be used in the transfer and clarification of the transfer canal water.

The pumps are horizontal, centrifugal units, with all wetted surfaces being stainless steel or an equivalent corrosion-resistant material. The pumps are controlled manually from a local station.

B. Spent Fuel Pool Skimmer Pump

The 100-gal/min spent fuel pool skimmer pump circulates surface water through two skimmer strainers and a filter and returns it to the pool.

C. Spent Fuel Pool Heat Exchangers

Heat exchangers are the shell and U-tube type. Spent fuel pool water circulates through the tubes while component cooling water circulates through the shell. The tubes and other surfaces in contact with the pool water are austenitic stainless steel; the shell is carbon steel. The tubes are welded to the tube sheet to prevent leakage of pool water. The heat exchangers for the Unit 1 and Unit 2 spent fuel pools are identical.

D. Spent Fuel Pool Demineralizer

The flushable, mixed bed demineralizer is designed to provide adequate fuel pool water purity for unrestricted access to the pool working area while maintaining visual clarity. Design flow is 100 gal/min.

Overtemperature protection is not required for the spent fuel pool demineralizers. For the normal refueling case, the pool temperature, with failure of one train of spent fuel pool cooling, may reach 170°F. The ion removal capacity of the resins is significantly reduced at this temperature. An alarm in the control room is provided to warn the operator of the increase in spent pool temperature to take corrective action.

E. Spent Fuel Pool Cartridge Filter

The spent fuel pool filter is designed for a flow of approximately 250 gal/min. A disposable cartridge filter is used to improve the pool water clarity by removing insoluble particles which obscure visibility.

F. Spent Fuel Pool Skimmer Filter

The spent fuel pool skimmer filter is designed for a rated flow of 100 gal/min. A 5-μm filter cartridge is used to remove insoluble particles.

G. Spent Fuel Pool Strainers

Strainers are located in each spent fuel pool pump suction line for removal of relatively large particles which might otherwise clog the spent fuel pool demineralizers or damage the spent fuel pool pumps.

H. Spent Fuel Pool Skimmer/Strainers

Two spent fuel pool skimmer/strainers are designed to remove debris and recirculate water from the surface of the spent fuel pool. The elevation of the skimmers is limited over a range of 2 ft by means of lanyards.

I. Valves

Manual stop valves are used to isolate equipment; manual throttle valves provide flow control. Valves in contact with spent fuel pool water are austenitic stainless steel or equivalent corrosion-resistant material.

J. Piping

All piping in contact with spent fuel pool water is austenitic stainless steel. The piping is welded except where flanged connections are used to facilitate maintenance. The SFPCPS return line within the refueling cavity is constructed of welded pipe with a threaded 90 degree elbow.

9.1.3.4 System Operation

A. Startup, Normal Operation, and Cooldown

The SFPCPS is not directly associated with plant startup, normal operation, or shutdown but is operated when there is need to cool, clarify, or purify the pool water. All situations are dependent upon the pool fuel loading and upon the elapsed time that the spent fuel has been in the pool.

One spent fuel pool pump is started manually on or before a high water temperature alarm, after assurance that cooling water is being furnished to the associated spent fuel pool heat exchanger.

The spent fuel pool water chemistry may then be checked at local sample points. If purification is required, a portion of the system flow is diverted through the spent fuel pool demineralizer and filter and returned to the pool. However, if only undissolved solids are to be removed, this flow may be circulated directly through the filter. A local sample connection is provided in the purification return line so that the effectiveness of either the filter or the demineralizer may be checked as well as the boron concentration.

The spent fuel pool pump may also be used to transfer water from the fuel pool to the recycle holdup tanks. This capability may be used to transfer water from the spent fuel pool for temporary holdup or to recycle and reuse the water at a later time.

To maintain water surface clarity, a separate cleaning loop, the spent fuel pool skimmer/strainer loop, is also provided. This subsystem, which is started manually, collects surface water from the pool, strains and filters it, and returns it to the pool at three remote locations. By proper location of the two skimmer/strainers and the three return lines, cleaning of the complete pool surface is accomplished.

B. Refueling

The SFPCPS has its maximum duty during the refueling operation when the decay heat from the spent fuel is the highest. The system is normally placed in operation prior to the transfer of any fuel and continues in operation as long as required to maintain temperature and water purity within prescribed limits.

C. Operational Limitations

Prior to transferring irradiated fuel into either spent fuel pool, or prior to criticality following a refueling outage, a heat load evaluation is performed as described in paragraph 9.1.3.1. Operational heat loads may be determined using a decay heat formulation that has been demonstrated to be conservative.

9.1.3.5 Safety Evaluation

A. Availability and Reliability

The SFPCPS has no emergency function during an accident. A cooling train may be shut down for limited periods of time for maintenance or replacement of malfunctioning components. In the event of the failure of a spent fuel pool pump or loss of cooling to a spent fuel pool heat exchanger, the second cooling train provides backup capability which ensures continued cooling of the spent fuel pool. A failure mode and effects analysis for the cooling portion of the SFPCS is provided in table 9.1.3-2.

The SFPC system was evaluated to determine the effects of the power rerate on the SFPC system capability to maintain fuel pool temperatures with one train in operation. For a normal refueling, the temperature of the pool will not exceed 170°F with only one train of spent fuel pool cooling in operation. For an emergency offloading, the pool temperature remains below boiling with only one train of cooling in operation even though a single failure is not required to be postulated for this case. Therefore, the analyzed cases are in accordance with NUREG 0800 (SRP 9.1.3).

The result of the unlikely failure of both spent fuel cooling loops would be a rise in pool water temperature followed by an increase in evaporative losses. These losses could be made up indefinitely from the reactor makeup water system, the refueling water system, or the demineralized water system.

Each of the above sources can supply makeup water to the spent fuel pool via the cooling water return lines. In addition, the boron recycle evaporator feed pumps can pump from the recycle holdup tanks directly into the spent fuel pool via the transfer canal when the gate between the pool and canal is open.

B. Spent Fuel Pool Dewatering

The most serious failure of this system would be complete loss of water in the storage pool. In accordance with Regulatory Guide 1.13, the design of the SFPCPS limits the loss of coolant that could be caused by maloperation or failure of system components such that spent fuel does not become uncovered.

The spent fuel pool cooling pump suction connections are located near the normal water level so that the pool cannot be gravity drained. Each return line contains an antisiphon hole to prevent the possibility of gravity draining of the pool via these lines. Finally, the lines to and from the skimmer/strainers are

located near the normal water level and the skimmer/strainers are limited in their vertical travel.

The accidental opening of the gate between the spent fuel pool and the transfer canal, if the canal is dry, would lower the water level approximately 6 ft, leaving about 18 ft of water over the top of the spent fuel assemblies.

Prior to refueling, verification of proper operation of the fuel transfer machine will be made as discussed in paragraph 9.1.4.4. This operation may necessitate opening the transfer tube while leaving the transfer canal and refueling cavity dry. Before the transfer tube is opened, the refueling cavity openings will be sealed to mitigate the loss of SFP water should a leak in the SFP occur due to failure of the gate or seal. The lowest water level that could result from accidental opening or failure of the SFP gate or seal would be approximately 11 ft above the spent fuel assemblies. The radiation dose rate at the operating floor of the FHB would be less than 25 mR/h at this lowest water level. This dose rate allows adequate time and accessibility for operator action to terminate or limit leakage and then recover the spent fuel pool level. If this verification operation is performed during mid-loop conditions, procedures and administrative controls will be implemented to reasonably assure that containment closure will be achieved prior to the time that core uncovery could result from loss of decay heat removal capability.

Makeup water sources are provided to replace evaporative and minor leakage losses. These sources include the refueling water storage tank, the reactor makeup water storage tank, the demineralized water storage tank, and the recycle holdup tanks. Makeup to the spent fuel pit should be started upon a low-level alarm signal from the spent fuel pool level instrumentation.

The spent fuel pool, transfer canal, and spent fuel cask loading pit have stainless steel liners welded to embedments in the walls and floors. At every liner weld seam continuous drains are provided for leak detection. These are interconnected and drain to a collection point which is monitored to determine whether leakage is occurring.

C. Water Quality

Only a very small amount of water is interchanged between the refueling canal and the spent fuel pool, as fuel assemblies are transferred in the refueling process. Whenever a fuel assembly with defective cladding is transferred from the fuel transfer canal to the spent fuel pool, a small quantity of fission products may enter the spent fuel cooling water. The purification loop removes fission products and other contaminants from the water. By maintaining radioactivity concentrations, excluding tritium, in the spent fuel pool water at or below 5×10^{-3} μCi/g for dominant gamma-emitting isotopes, the dose rate at the surface of the pool is 2.5 mrem/h or less.

9.1.3.6 Tests and Inspections

Active components of the SFPCPS are in either continuous or intermittent use during normal system operation. Periodic visual inspection and preventive maintenance are conducted using normal industry practice.

No special equipment tests are required, since system components are normally in operation when spent fuel is stored in the fuel pool.

Sampling of the fuel pool water for gross activity and particulate matter concentration is conducted periodically. The layout of the components of the SFPCPS is such that periodic testing and inservice inspection of this system are possible. Details of the inservice inspection program are outlined in section 6.6.

A. Instrumentation Application

The instrumentation provided for the SFPCPS is discussed in the following paragraphs. Alarms and indications are provided as noted.

B. Temperature

Instrumentation is provided to measure the temperature of the water in the spent fuel pool and to give local indication as well as annunciation in the control room when normal temperatures are exceeded.

Instrumentation is also provided to give local indication of the temperature of the spent fuel pool water as it leaves either heat exchanger.

C. Pressure

Instrumentation is provided to measure and give local indication of the pressures in the spent fuel pool pump suction and discharge lines and in the skimmer pump suction and discharge lines. Local annunciation is provided to indicate the skimmer pump has tripped on low suction pressure. Instrumentation is provided to trip the skimmer pumps on low suction pressure. Instrumentation is also provided at locations upstream and downstream from the skimmer filter and the spent fuel pool filter so that pressure differential across these filters can be determined. High differential pressure across the spent fuel pool filter is annunciated locally and in the control room.

D. Flow

Instrumentation is provided to measure and give local indication of the purification loop flow downstream of the spent fuel pool filter.

E. Level

Instrumentation is provided to give an alarm in the control room when the water level in the spent fuel pool reaches either the high-level or low-level setpoint. A local alarm is also provided for low-level setpoint.

F. Radiation

Gamma radiation is continuously monitored in the fuel handling building. A high-level signal is alarmed locally and annunciated in the control room. This is described in detail in subsection 12.3.4.

9.1.3.7 Standard Review Plan Evaluation

Design heat loads were calculated by the method stated in NRC Branch Technical Position ASB 9-2, Revision 2, dated July 1981.

9.1.4 LIGHT LOAD HANDLING SYSTEM (RELATED TO REFUELING)

9.1.4.1 Design Bases

The light load handling system (LLHS) consists of equipment and structures used for conducting the refueling operation in a safe manner; this system conforms to General Design Criteria 61 and 62 of 10 CFR 50, Appendix A. The LLHS meets the guidelines of American Nuclear Society (ANS) 57.1. The maximum kinetic energy developed by some loads, such as fuel handling tools, which may be handled above stored spent fuel exceeds that developed by a spent fuel assembly and its associated handling tool if dropped. However, it has been demonstrated by analysis that such an event would not lead to unacceptable damage to the stored spent fuel or the spent fuel storage racks.

The following design bases apply to the LLHS:

A. Fuel handling devices have provisions to avoid dropping or jamming of fuel assemblies during transfer operation.

B. Handling equipment has provisions to avoid dropping of fuel handling devices during the fuel transfer operation.

C. Handling equipment used to raise and lower spent fuel has a limited maximum lift height so that the minimum required depth of water shielding is maintained.

D. The fuel transfer system (FTS), where it penetrates the containment, has provisions to preserve the integrity of the containment pressure boundary.

E. Criticality during fuel handling operations is prevented by the geometrically safe configuration of the fuel handling equipment.

F. In the event of a safe shutdown earthquake (SSE), handling equipment cannot fail in such a manner as to damage Seismic Category 1 equipment.

G. The inertial loads imparted to the fuel assemblies or core components during handling operations are less than potential damage causing loads.

H. Physical safety features are provided for personnel who operate handling equipment.

9.1.4.2 System Description

The LLHS consists of the equipment needed for the refueling operation on the reactor core. This equipment is comprised of fuel assemblies, core component and reactor component hoisting equipment, cranes, handling equipment, and an FTS. The structures associated with the fuel handling equipment are the refueling cavity, the refueling canal, the fuel transfer tube, the spent fuel pool, the cask loading pool, the cask washdown area, the new fuel storage pool, and the new fuel pool receiving and inspection area.

The elevation and arrangement drawings of the fuel handling facilities are provided by figures and drawings in subsection 1.2.2.

9.1.4.2.1 Fuel Handling Description

The fuel handling equipment is designed to handle the spent fuel assemblies underwater from the time they leave the reactor vessel until they are placed in a container for temporary storage pending shipment from the site. Underwater transfer of spent fuel assemblies provides an effective, economic, and transparent radiation shield, as well as a reliable cooling medium for removal of decay heat. The boric acid concentration in the water is sufficient to preclude criticality.

The associated fuel handling structures may be generally divided into two areas: the refueling cavity and refueling canal, which are flooded only during plant shutdown for refueling, and the fuel pools, which are kept full of water and are always accessible to operating personnel. The refueling canal and the fuel storage area are connected by a fuel transfer tube which is fitted with a blind flange on the canal end and a valve on the fuel storage area end. The blind flange is in place except during refueling to ensure containment integrity. Fuel is carried through the tube on an underwater transfer car.

Fuel is moved between the reactor vessel and the containment fuel storage area by the refueling machine. The FTS is used to move fuel assemblies between the containment building and the fuel handling building. After a fuel assembly is placed in the fuel container, the lifting arm pivots the fuel assembly to the horizontal position for passage through the fuel transfer tube. After the transfer car transports the fuel assembly through the transfer tube, the lifting arm at that end of the tube pivots the assembly to a vertical position so that the assembly can be lifted out of the fuel container.

In the fuel handling building, fuel assemblies are moved about by the fuel handling machine. When lifting fuel assemblies, the hoist uses a long-handled tool to ensure that sufficient radiation shielding is maintained. Initially, a shorter tool is used to handle new fuel assemblies, but the new fuel elevator must be used to lower the assembly to a depth at which the fuel handling machine, using the long-handled tool, can place the new fuel assemblies into or out of the fuel storage racks.

The RCCA change tool and the thimble plug change tool are located on the east wall of the Unit 1 spent fuel pool. These tools are capable of removing and reinstalling individual RCCAs or thimble plugs utilizing the fuel handling machine. Burnable poison rod assemblies (BPRA) and Wet Annular Burnable Absorbers (WABA) can also be relocated within the pool using the BPRA or WABA handling tool. All four tools are long handled to ensure that sufficient radiation shielding is maintained during movement of the inserts.

Decay heat, generated by the spent fuel assemblies in the fuel pools, is removed by the spent fuel pool cooling and cleanup system. After a sufficient decay period, the spent fuel assemblies are removed from the fuel racks and loaded into spent fuel casks for storage pending removal from the site.

9.1.4.2.2 Refueling Procedure

New fuel assemblies received for refueling are removed one at a time from the shipping container and moved into the new fuel assembly inspection area utilizing the monorail on the cask handling crane. After inspection, the accepted new fuel assemblies are initially stored in the new fuel storage racks. The new fuel assemblies may be moved to the spent fuel pool in preparation for a refueling outage.

The refueling operation follows a detailed procedure which provides safe and efficient refueling. Prior to initiating the refueling operation, the reactor coolant system (RCS) is borated and

cooled down to refueling shutdown conditions as specified in the Technical Specifications. Criticality protection for refueling operations, including a requirement for checks of boron concentration, once per 72 hours is also specified in the Technical Specifications. The following significant points are ensured by the refueling procedure:

A. The refueling water and the reactor coolant contain approximately 2000 ppm boron. This concentration, together with the negative reactivity of control rods, is sufficient to keep the core approximately 5% $\Delta k/k$ subcritical during the refueling operations. It is also sufficient to maintain the core subcritical in the unlikely event that all of the rod cluster control assemblies (RCCAs) are removed from the core.

B. The water level in the refueling cavity is high enough to keep the radiation levels within acceptable limits when the fuel assemblies are being removed from the core.

The refueling operation is divided into these four major phases: preparation, reactor disassembly, fuel handling, and reactor assembly. Fuel assembly reconstitution may also be performed. A general description of a typical refueling operation through the phases is given as follows.

9.1.4.2.2.1 Phase I - Preparation. The reactor is shut down, borated, and cooled to refueling conditions (< 140°F) with a final k_{eff} < 0.95 (all rods in less the most reactive rod). Following a radiation survey, the containment building is entered. At this time, the coolant level in the reactor vessel is lowered to a point slightly below the vessel flange. Then, the fuel transfer equipment and refueling machine are checked for proper operation (paragraph 9.1.4.4).

9.1.4.2.2.2 Phase II – Reactor Disassembly. All cables are disconnected at the patch panels to allow removal of the vessel head. The refueling cavity is then prepared for flooding by checking the underwater lights, tools, and FTS; closing the refueling canal drain lines; and removing the blind flange from the fuel transfer tube. With the refueling cavity prepared for flooding, the vessel head is unseated, raised to just above the operating deck level, and placed on its storage pedestal using the containment polar crane (dry cavity lift method).

After the head is raised from the vessel, water from the refueling water storage tank is transferred into the RCS by gravity draining or by the residual heat removal pumps, causing the water to fill the refueling cavity. When the water level reaches a sufficient depth to provide adequate radiation protection, the control rod drive shafts are disconnected. When the water reaches the safe shielding depth for spent fuel transfer (paragraph 9.1.4.3.4), the upper internals are removed from the vessel. The fuel assemblies and RCCAs are now free from obstructions, and the core is ready for refueling.

An alternative method that may be used in lieu of the above is to maintain the vessel head just above the water as the water level is raised while the refueling cavity is being filled. When the water reaches the safe shielding depth for spent fuel transfer (paragraph 9.1.4.3.4), the head is taken to the storage pedestal (cavity fill/slow lift method). The remaining sequence of the vessel disassembly after the head lift is as discussed above.

9.1.4.2.2.3 Phase III – Fuel Handling. All fuel assemblies are offloaded and transferred to the spent fuel pool. While in the spent fuel pool, the fuel inserts are shuffled. After the inserts

are shuffled, the fuel assemblies are to be reused, and the new fuel assemblies are transferred to the core.

The general fuel handling sequence is as follows:

A. The refueling machine is positioned over a fuel assembly in the core.

B. The refueling machine withdraws a fuel assembly from the core and raises it to a predetermined height sufficient to clear the vessel flange and still leave sufficient water covering the fuel assembly. An in-mast sipping test may be performed at this time that will determine if the fuel assembly contains leaking fuel rods.

C. The FTS car is moved into the refueling canal from the fuel storage area.

D. The fuel assembly container is pivoted to the vertical position by the lifting arm.

E. The refueling machine is moved to line up the fuel assembly with the FTS.

F. The refueling machine loads a fuel assembly into the fuel assembly container of the transfer car.

G. The FTS container is pivoted to the horizontal position by the lifting arm.

H. The FTS container is moved through the fuel transfer tube to the fuel building by the transfer car.

I. The FTS container is pivoted to the vertical position. The fuel assembly is unloaded by the spent fuel handling tool attached to the fuel handling machine.

J. The fuel assembly is placed in the spent fuel storage rack. This process is continued until the core is offloaded.

K. The fuel inserts are shuffled inside the spent fuel pool. The RCCA change tool and the thimble plug change tool are capable of removing and reinstalling individual RCCAs or thimble plugs utilizing the fuel handling machine. BPRA and WABA can also be relocated within the pool using the BPRA or WABA handling tool. All four tools are long handled to ensure that sufficient radiation shielding is maintained during movement of the inserts.

L. A fuel assembly is taken from a spent fuel storage rack and loaded into the fuel assembly container by the spent fuel tool suspended from the fuel handling machine.

M. The FTS container is pivoted to the horizontal position and moved back into the containment building.

N. The FTS container is pivoted to the vertical position.

O. The fuel assembly is withdrawn from the fuel container by the refueling machine and placed in the location prepared for it in the reactor core.

P. This process is continued until the core is loaded.

9.1.4.2.2.4 Phase IV – Reactor Assembly. Reactor assembly, following refueling, is achieved essentially by reversing the operations given in Phase II - Reactor Disassembly. The water is lowered to just below the flange and then the vessel head is lowered onto the flange.

An alternative method that may be used in lieu of the above is to lower the vessel head and water simultaneously until the vessel head engages the guide studs. Then the water is lowered to the top of the reactor vessel flange, and the placement of the head on the vessel is resumed.

9.1.4.2.2.5 Fuel Assembly Reconstitution. The fuel assemblies have mechanical features that permit the replacement of damaged fuel rods with filler rods which contain stainless steel or natural uranium instead of enriched uranium. Fuel reconstitution is performed in the northeast end of the Unit 1 fuel transfer canal using the new fuel elevator fitted with a reconstitution basket.

During fuel assembly reconstitution, the affected assembly will be located in the new fuel elevator reconstitution basket, which replaced the new fuel elevator basket. The fuel assembly in the reconstitution basket will have a minimum water depth of 10 feet above the top of the assembly. The gate between the Unit 1 spent fuel pool and the fuel transfer canal will be kept open during fuel reconstitution. With this gate open, the spent fuel pool low water level alarm will also monitor the fuel transfer canal, and increase the effective water volume above the fuel assembly. The fuel transfer tube gate valve (1-1213-U6-086) will be kept closed if the fuel transfer tube blind flange is not in place. This will limit the amount of water that could be lost into containment if a leak were to occur.

The fuel handling accident described in subsection 15.7.4 envelopes any fuel handling accident during reconstitution because only one fuel assembly can be damaged, and administrative controls will limit reconstitution to fuel assemblies with at least 249 hours of decay time.

9.1.4.2.3 Spent Fuel Cask Handling

The spent fuel assemblies are stored onsite, in the spent fuel pool, until fission product activity is low enough to permit shipment. A general procedure for preparing spent fuel for temporary storage pending shipping fuel offsite is detailed below:

A. An empty multipurpose canister (MPC) is placed inside the HI-TRAC 125D transfer cask that is placed on a specially designed low profile cart prior to movement into the auxiliary building.

B. The transfer cask is pushed into the auxiliary building using a fork lift or similar device. Floor loads are distributed using the existing rails embedded in the auxiliary building floor.

C. The spent fuel cask bridge crane (SFCBC) is used to lift the transfer cask off of the cart and place the transfer cask into the cask washdown area (CWA) where it is prepared for loading.

D. The spent fuel pool gates to the cask loading pit are closed for defense-in-depth while moving the cask into the cask loading pit.

E. The transfer cask containing an empty MPC is placed into the cask loading pit.

F. The spent fuel pool gates to the cask loading pit are opened to allow fuel transfer from the storage racks to the spent fuel transfer cask.

G. The fuel handling machine is positioned over the specific spent fuel assembly to be removed from the spent fuel storage rack. The assembly is then picked up and transported into the cask after the gate between the spent fuel pool and the cask loading pool is opened. During transfer from pool to cask loading pool, the fuel assembly is maintained with the top of the active fuel at least 10 ft (nominal) below the pool water surface. This ensures that the direct radiation from the fuel at the surface of the water will be maintained below 2.5 mrem/h. In the event that fuel is damaged and fuel fragments or pellets are collected on filters or other devices,

the shielding requirements for the movement of the filters govern rather than the requirements on the submergence of spent fuel.

H. When the cask is fully loaded and still in the cask loading pool, the MPC lid is placed on top of the cask to provide the required shielding. The gate to the spent fuel pool is closed.

I. The cask is then lifted out of the cask loading pool to the cask washdown area. Water is drained from the cask as necessary to maintain the weight of the loaded transfer cask to less than 125 tons and facilitate canister lid welding.

J. Swipes are taken to check the surface for radiation level. When the swipes are found to be below the specified limits of 49 CFR 173.397, Contamination Control, the cask is placed on the specially designed low-profile cart.

The cask is hooked up to the cooling system, if required, and readied for transport to the cask transfer facility (CTF) for transfer to the HI-STORM 100S, Version B, storage overpack.

K. Following transfer of the MPC to the storage overpack, the loaded storage cask is lifted from the CTF and transported to a designated area on the ISFSI pad.

L. The storage overpack is subsequently recovered from the ISFSI and the MPC transferred to a transportation cask for shipment offsite.

During all operations, sufficient water is maintained between plant personnel and fuel assemblies that are being moved to limit dose levels to those acceptable for continuous occupational exposure. The cask loading pool walls are sized to provide sufficient shielding for personnel who are working in the cask decontamination area at the same time that spent fuel is being loaded in the cask loading pool.

9.1.4.2.4 Component Description

A. Refueling Machine

The refueling machine (figure 9.1.4-1) is a rectilinear bridge and trolley system with a vertical mast extending down into the refueling water. The bridge spans the refueling cavity and runs on rails set into the edge of the refueling cavity. The bridge and trolley motions are used to position the vertical mast over a fuel assembly in the core. A long tube with a pneumatic gripper on the end is lowered down out of the mast to grip the fuel assembly. The tube is long enough so that the upper end is still contained in the mast when the gripper end contacts the fuel. Mounted on the trolley, a winch raises the gripper tube and fuel assembly up into the mast tube. While inside the mast tube the fuel is transported to its new position.

Fuel may be checked for leaking rods by the telescoping sipping system. The sipping system detects fission products that are released from a defective fuel rod as the fuel assembly is raised and transported during offload or fuel shuffle.

All controls for the refueling machine are mounted on a console in the trolley. The bridge is positioned on a coordinate system laid out on one rail. A television monitor on the console indicates the position of the bridge and trolley. The drives for the bridge, trolley, and winch are variable speed and include inching controls for the bridge and trolley. The approximate maximum speeds for the bridge and trolley are 60 ft/min and 20 ft/min, respectively. The hoist travels at an approximate

maximum speed of 40 ft/min. The auxiliary monorail hoist on the refueling machine has hoisting speeds of approximately 7 and 20 ft/min.

Electrical interlocks and limit switches on the bridge and trolley drives prevent damage to the fuel assemblies. The winch is also provided with limit switches to prevent a fuel assembly from being raised above a safe shielding depth should the limit switch fail. In an emergency the bridge, the trolley, and the winch can be operated manually using a handwheel.

The refueling machine is also provided with a bypass interlock switch. This switch will bypass all electrical interlocks associated with the bridge and trolley boundaries, the hoist overload and underload, and the upper and lower limits associated with the encoders. The switch will not override the normal up limit switch that prevents lifting the fuel above a safe shielding depth. The bypass interlock switch is a key operated switch, which must be turned and held for operation. Control of this key is maintained in accordance with the key control program.

B. Fuel Handling Machine

The fuel handling machine (figure 9.1.4-2) is a wheel-mounted walkway spanning the spent fuel pools; it carries a trolley-mounted electric hoist on an overhead structure. This machine is used for handling fuel assemblies within the fuel storage area by means of a long-handled tool suspended from the hoist. A load monitoring device, an integral part of the hoist, is used to monitor all loads. The hoist travel and tool length are designed to limit the maximum lift of a fuel assembly to a safe shielding depth.

The bridge trolley and hoist speeds are variable. The approximate maximum speed for the bridge and trolley is 30 ft/min and for the hoist is 20 ft/min.

C. New Fuel Elevator and Reconstitution Basket

The new fuel elevator (NFE) (figure 9.1.4-3) consists of a box-shaped elevator assembly with its top end open and sized to house one fuel assembly. It is used to transfer new fuel assemblies between the new fuel storage area and the spent fuel pool. It is also used in the process of placing ancillary equipment in spent fuel storage rack locations (e.g., failed fuel rod storage basket, debris basket, etc.). The elevator winch has a load sensing device which prevents a fuel assembly from being raised in the elevator. The NFE is located at the northwest end of the Unit 2 transfer canal.

The new fuel elevator reconstitution basket (NFERB) is located at the northeast end of the Unit 1 transfer canal. The NFERB interchanges with the site spent fuel pool new fuel elevator basket. The NFERB is designed to rigidly support the repair fuel assembly and accept all removable top nozzle (RTN) tooling required. This basket is designed to sit and ride on the spent fuel pool new fuel elevator tracks. The basket is made with a bottom section specifically designed to provide fuel assembly holddown during RTN reconstitution. The track has a mechanical hard stop installed as a safety precaution to ensure a safe shielding depth in the case of a limit switch failure. The NFERB is installed in a manner that allows for conversion back to the NFE if needed.

D. Fuel Transfer System

The FTS (figures 9.1.4-4 and 9.1.4-5) includes an underwater, electric motor-driven transfer car that runs on tracks extending from the refueling canal, through

the transfer tube, and into the fuel storage area; a hydraulically actuated lifting arm is at each end of the transfer tube. The fuel container in the refueling canal receives a fuel assembly in the vertical position from the refueling machine. The fuel assembly is then lowered to a horizontal position for passage through the transfer tube. After passing through the tube, the fuel assembly is raised to a vertical position for removal by a tool suspended from a hoist mounted on a fuel handling machine in the fuel storage area. The fuel handling machine then moves to a storage loading position and places the spent fuel assembly in the spent fuel storage racks.

During reactor operation, the transfer car is stored in the fuel storage area. A blind flange is bolted on the containment end of the transfer tube to seal the reactor containment. The terminus of the tube outside the containment is closed by a valve.

E. Spent Fuel Assembly Handling Tool

The spent fuel assembly handling tool (figure 9.1.4-6) is used to handle new and spent fuel assemblies in the fuel storage area. It is a manually actuated tool, suspended from the fuel handling machine, which uses four cam-actuated latching fingers to grip the underside of the fuel assembly top nozzle. The operating handle for actuating the fingers is located at the top of the tool. When the fingers are latched, a pin is inserted into the operating handle, which prevents the fingers from being accidentally unlatched during fuel handling operations.

F. New Fuel Assembly Handling Tool

The new fuel assembly handling tool (figure 9.1.4-7) is used to lift and transfer fuel assemblies from the new fuel shipping containers to the new fuel storage racks or new fuel elevator. A manually actuated tool, suspended from the cask crane or fuel handling machine, it uses four cam-actuated latching fingers to grip the underside of the fuel assembly top nozzle. The operating handle which actuates the fingers is located at the side of the tool. When the fingers are latched, the safety screw is turned in to prevent the accidental unlatching of the fingers.

G. Integrated Head Package

The integrated head package is a system which combines the head lifting rig, seismic platform, lift columns, reactor vessel missile shield, control rod drive mechanism (CRDM) forced air-cooling system, and electrical and instrumentation cable routing into an efficient, one-package reactor vessel head design. A permanent reactor vessel head radiation shield (PHS) is installed on the integrated head package. The PHS protects refueling and maintenance personnel from the major sources of radiation emanating from the reactor vessel head area and the CRDM coil stacks and is designed to allow access for maintenance and inspection activities.

1. Cooling Shroud Structure

The cooling shroud structure provides support for the CRDM cooling system fans and the stud tensioner hoists. Cooling air is directed through openings in the shroud, down along the mechanisms, back up the shroud through the CRDM cooling fans; it is finally exhausted upward into the containment atmosphere. Four fans are provided: two provide the design flowrate, while the other two are held in reserve. The shroud structure is bolted to a support

ring on the reactor vessel head and is also attached to the three lift columns. The shroud also provides support for the CRDM power and instrumentation (reactor protection instrumentation and thermocouple) cables. Cables are routed from the mechanisms to the connector plate which is attached to the shroud. Connectors are provided on the connector plate so that the cable tray bridge with the cables may be easily removable. Access is also provided through the shroud for use of a thermocouple (T/C) column loading tool.

2. Missile Shield

The reactor vessel missile shield is used to prevent any postulated missiles from the reactor vessel head appendages from penetrating other reactor coolant system pressure boundaries and/or containment structures. In addition to this function, the missile shield also transfers the reactor vessel head load to the lifting rig. The missile shield also provides seismic support for the CRDMs. Attached to the three lift rods during plant operation, the missile shield can be properly leveled for the lift operation and can be easily detached from the lift rods to provide access to the CRDMs.

3. Cable Tray Bridge

The cable tray bridge is a structure which is attached to the cooling shroud and pivots on the steam generator wall or another appropriate support structure. The cable tray bridge serves to support the power and instrumentation cables from the shroud to the terminal boxes. It also provides a method of easily disassembling and storing the cables in preparation for head removal.

4. Stud Handling System

By providing the capability of handling studs independently of the main polar crane, the stud handling system permits more efficient and smoother stud handling. Studs and stud tensioners are handled by the hoists supported from a monorail on the shroud structure. Radial travel of studs and stud tensioners is also provided through transfer beam assemblies to improve the flexibility of stud movement. The stud handling hoists are only installed for stud handling activities.

H. Reactor Vessel Head Assembly Lifting Device

The reactor vessel head assembly lifting device consists of a welded and bolted structural steel frame with suitable rigging to enable the crane operator to lift the head and store it during refueling operations. The lifting device is permanently attached to the reactor vessel head.

I. Reactor Internals Lifting Device

The reactor internals lifting device (figure 9.1.4-8) is a structural frame suspended from the overhead crane. The frame is lowered onto the guide tube support plate of the internals and is mechanically connected to the support plate by three breech-lock- type connectors. Bushings on the frame engage guide studs in the vessel flange to provide guidance during removal and replacement of the internals package.

J. Reactor Vessel Stud Tensioner

The quick-acting stud tensioners (figure 9.1.4-9) are employed to secure the head closure joint at every refueling. The stud tensioner is a hydraulically operated device that uses oil as the working fluid. The device permits preloading and unloading of the reactor vessel closure studs at cold shutdown conditions. Stud tensioners minimize the time required for the tensioning or unloading operation. Tensioners are provided and are applied simultaneously to reactor vessel closure studs. A single hydraulic pumping unit operates the tensioners, which are hydraulically connected in series. The studs are tensioned to their operational load in two steps to prevent high stresses in the flange region and unequal loadings in the studs. Relief valves on each tensioner prevent overtensioning of the studs due to excessive pressure.

K. Rod Control Cluster Assembly (RCCA) Change Tool

The rod control cluster assembly (RCCA) change tool is a device used to remove an RCCA from one assembly and transfer it to another assembly in the spent fuel pit or to an insert fixture in the spent fuel racks. The RCCA change tool is portable and is lowered by the fuel handling machine bridge hoist until it rests on the nozzle of the desired fuel assembly. The gripper actuator is then lowered and latched onto the RCCA spider which allows the entire RCCA to be drawn up inside the guide tube of the tool. Once this operation is completed, the tool may be repositioned over another fuel assembly. The above process is then reversed for reinsertion of the RCCA.

L. Thimble Plug Change Tool

The thimble plug change tool is a device used to remove a thimble plug from a fuel assembly, and transfer it to another assembly in the spent fuel pit or to an insert fixture in the spent fuel racks. The thimble plug change tool is portable and is lowered by the fuel handling machine bridge hoist until it rests on top of the desired fuel assembly. The gripper actuator is then lowered and latched onto a thimble plug. The thimble plug is then drawn up into the tool, and the tool may be repositioned over another fuel assembly.

The above process is then reversed for reinsertion of the thimble plug.

M. Burnable Poison Rod Assembly (BPRA) Handling Tool

The BPRA handling tool is used to transfer BPRA between fuel assemblies or to or from a fuel assembly, and a rack insert fixture in the spent fuel pit. The BPRA handling tool is portable and is lowered by the fuel handling machine bridge hoist until it rests on the top of the desired fuel assembly. The gripper actuator is then lowered and latched onto a BPRA, and the BPRA is drawn up inside the tool. The tool may then be repositioned over the location to which it is to be transferred and the process is reversed to reinsert the BPRA.

N. Wet Annular Burnable Absorber (WABA) Handling Tool

The WABA handling tool is used to transfer WABA between fuel assemblies or to or from a fuel assembly and a rack insert fixture in the spent fuel pit. The WABA handling tool is portable and is lowered by the fuel handling machine bridge hoist until it rests on the top of the desired fuel assembly. The tool employs a gripper sleeve and the WABA is drawn up inside the handling tool. The tool may then be repositioned over the location to which it is to be transferred and the process is reversed to reinsert the WABA.

9.1.4.2.5 Applicable Design Codes

The design codes and standards used for the LLHS are given in table 3.2.2-1 and paragraph 9.1.4.3.

9.1.4.3 Safety Evaluation

9.1.4.3.1 Safe Handling

Design criteria for the LLHS are as follows:

A. The primary design requirement of the equipment is reliability. A conservative design approach is used for all load bearing parts. Where possible, components are used that have a proven record of reliable service. Throughout the design, consideration has been given to the fact that the equipment spends long idle periods stored in an atmosphere of 120°F and high humidity.

B. Except as otherwise specified, the refueling machine and fuel handling machine are designed and constructed in accordance with Crane Manufacturers Association of America, Inc. (CMAA), Specification 70 for Class A-1 service.

C. The static design loads for the crane structures and all lifting components are normal dead and live loads plus three times the fuel assembly weight with an RCCA.

D. The allowable stresses for the refueling machine and fuel handling machine structures supporting the weight of a fuel assembly are as specified in the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code Section III, Appendix XVII, Subarticle 2200.

E. The design load on the wire rope hoisting cables does not exceed 0.20 times the average breaking strength. Two independent cables are used, and each is assumed to carry one half the load.

F. All components critical to the operation of the equipment or located so that parts can fall into the reactor are assembled with the fasteners restrained from loosening under vibration.

Industrial codes and standards used in the design of the fuel handling equipment are as follows:

A. The refueling machine and fuel handling machine: Applicable sections of CMAA Specification 70.

B. Structural equipment: ASME B&PV Code, Section III, Appendix XVII, Subarticle 2200.

C. Fuel transfer tube: ASME Code, Section III, Class MC.

D. Electrical equipment: Applicable standards and requirements of the National Electric Code, and National Fire Protection Association (NFPA) 70 for design, installation, and manufacturing.

E. Materials: Main load bearing materials conform to the specifications of the American Society of Testing Materials (ASTM) standards.

F. Safety: Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1910 and 1926, including load testing requirements, the requirements of American National Standards Institute (ANSI) N18.2, Nuclear Regulatory Commission (NRC) Regulatory Guide 1.29, and General Design Criteria 61 and 62.

9.1.4.3.1.1 Refueling Machine. The refueling machine design includes the following provisions to ensure safe handling of fuel assemblies:

A. Safety Interlocks

Operations which could endanger the operator or damage the fuel or RCCA, designated below by an asterisk (*), are prohibited by mechanical or fail-safe electrical interlocks or by redundant electrical interlocks. All other interlocks are intended to provide equipment protection and may be implemented either mechanically or by electrical interlock, not necessarily fail-safe. Fail-safe electrical design of a control system interlock is applied according to the following rules:

- Fail-safe operation of an electrically operated brake is such that the brake engages on loss of power.
- Fail-safe operation of an electrically operated clutch is such that the clutch engages on loss of power.
- Fail-safe operation of a relay is such that the de-energized state of the relay inhibits unsafe operation.
- Fail-safe operation of a switch, termination, or wire is such that breakage or high resistance of the circuit inhibits unsafe operation. The dominant failure mode of the mechanical operation of a cam-operated limit switch is sticking of the plunger in its depressed position. Therefore, use of the plunger-extended position (on the lower part of the operating cam) to energize a relay is consistent with fail-safe operation.
- Fail-safe operation of an electrical comparator or impedance bridge is not defined.

Those parts of a control system interlock required to be fail-safe which are not or cannot be operated in a fail-safe mode as defined in these rules are supplemented by a redundant component or components to provide the requisite protection.

* 1. The refueling machine can only place a fuel assembly in the core or FTS.

* 2. When the refueling machine gripper is supporting a fuel assembly, the machine can traverse in the run mode after the fuel assembly is withdrawn into the stationary mast.

* 3. When the refueling machine gripper is not supporting a fuel assembly, the machine can traverse in the run mode after the gripper is withdrawn to a safe height above the fuel assembly.

* 4. Simultaneous traversing and hoisting operations are prevented.

* 5. The refueling machine is restricted to raising a fuel assembly or core component to a height at which the water provides a safe radiation shield.

* 6. When a fuel assembly is raised or lowered, interlocks ensure that the refueling machine can only apply loads which are within safe operating limits.

* 7. The fuel gripper is monitored by limit switches to confirm operation to the fully engaged or fully disengaged position. An audible and visual alarm is actuated if both engage and disengage switches are actuated at the same time or if neither is actuated.

8. Lowering of the guide tube is not permitted if slack cable exists in the hoist.

9. The guide tube is prevented from lowering completely out of the mast.

10. Before the fuel gripper can release a fuel assembly, the fuel gripper must be in its down position in the core or in the FTS.

* 11. The weight of the fuel assembly must be off the gripper before the fuel gripper can release a fuel assembly.

12. The FTS container is prevented from moving unless the engaged gripper is in the full up position or the disengaged gripper is withdrawn into the mast or unless the refueling machine is out of the fuel transfer zone. An interlock is provided from the refueling machine to the FTS to accomplish this.

B. Bridge and Trolley Hold-Down Devices

Both refueling machine bridge and trolley are horizontally restrained on the rails by two pairs of guide rollers, one pair at each wheel location on one truck only. The rollers are attached to the bridge truck and contact the vertical faces on either side of the rail to prevent horizontal movement. Vertical restraint is accomplished by antirotation bars located at each of the four wheels for both the bridge and trolley. The antirotation bars are bolted to the trucks and extend under the rail head. Both horizontal and vertical restraints are adequately designed to withstand the forces and overturning moments resulting from the SSE.

C. Main Hoist Braking System

The main hoists are equipped with two independent braking systems. A solenoid release, spring-set electric brake is mounted on the motor shaft. This brake operates in the normal manner to release upon application of current to the motor and to set when current is interrupted. The second brake is a mechanically actuated load brake internal to the hoist gear box that sets if the load starts to overhaul the hoist. It is necessary to apply torque from the motor to raise or lower the load. In raising, this motor cams the brake open; in lowering, the motor slips the brake allowing the load to lower. This brake actuates upon loss of torque from the motor for any reason and is not dependent on any electrical circuits. Both brakes are rated at 150% of the hoist design load.

D. Fuel Assembly Support System

The main hoist system is supplied with redundant paths of load support such that failure of any one component will not result in free fall of the fuel assembly. Two wire ropes are anchored to the winch drum and carried to a load equalizing mechanism on the top of the gripper tube.

The working load capacity of fuel assembly gripper is approximately 3000 lb. The gripper itself has four fingers gripping the fuel, any two of which will support the fuel assembly weight.

During each refueling outage and prior to removing fuel, the gripper and hoist system are routinely load tested to 125% of the maximum setting on the hoist load limit switch.

9.1.4.3.1.2 Fuel Transfer System. The following safety features are provided for in the FTS:

9.1.4.3.1.2.1 Fuel Transfer System. The FTS is a programmable logic controller (PLC) based control system that uses a combination of inputs from limit switch, proximity switch, position encoder, and load cell devices to provide control and interlock functions. The following safety features are provided for the FTS:

A. Transfer Car Emergency-Stop (E-Stop) Switch

The transfer car controls are located in both the fuel building and the containment building. Remote control stations are also located on the refueling machine in containment and on the north spent fuel pool (SFP) wall in close proximity to the fuel handling machine. Transfer car movement can be manually initiated from either console or initiated via an autorun sequence from either console or from the remote stations.

The transfer car E-Stop switch allows an operator at either the containment or fuel building control consoles or the remote stations to stop car movement quickly if conditions warrant such control. Transfer car operation is possible only when both lifting arms are in the down position as indicated by the proximity limit switches.

B. Lifting Arm - Transfer Car Position

Two redundant interlocks allow lifting arm operation only when the transfer car is at the end of its travel and therefore can withstand a single failure. Of the two redundant interlocks which allow lifting arm operation only when the transfer car is at the end of its travel, one interlock is a position limit signal in the PLC control circuit. The backup interlock is a mechanical latch device on the lifting arm that is opened by the car moving into position.

C. Transfer Car - Valve Open

An interlock on the transfer tube valve permits transfer car operation only when the transfer tube valve position switch indicates the valve is fully open and therefore can withstand single failure.

D. Transfer Car - Lifting Arm

The transfer car lifting arm is primarily designed to protect the equipment from overload and possible damage if an attempt is made to move the car while the fuel container is in the vertical position. This interlock is redundant and can withstand a single failure. The basic interlock is a position limit switch in the control circuit. The backup interlock is a mechanical latch device that is opened by the weight of the fuel container when in the horizontal position.

E. Lifting Arm - Refueling Machine

The containment side lifting arm is interlocked with the refueling machine. Whenever the transfer car is located in the refueling canal, the lifting arm cannot be operated unless the refueling machine mast is inside the stationary mast, the

refueling machine is over the core, or the gripper is released and inside the stationary mast.

F. Lifting Arm - Fuel Handling Machine

On the spent fuel pool side, the lifting arm is interlocked with the fuel handling machine. The lifting arm cannot be operated unless the fuel handling machine is not over the lifting arm area.

9.1.4.3.1.3 Fuel Handling Machine. The fuel handling machine includes the following safety features:

A. The fuel handling machine controls are interlocked to prevent simultaneous operation of bridge drive and hoist.

B. Bridge drive operation is prevented except when the hoist is in the full up position when supporting a fuel assembly.

C. An overload protection device is included on the hoist to limit the uplift force which could be applied to the fuel storage racks.

D. The static design load on the hoist is the weight of one fuel assembly (1600 lb) and the weight of the tool (400 lb), which gives it a total weight of approximately 2000 lb.

E. Restraining bars are provided on each truck to prevent the bridge from overturning.

9.1.4.3.1.4 Fuel Handling Tools and Equipment. All fuel handling tools and equipment handled over an open reactor vessel are designed to prevent inadvertent decoupling from machine hooks; i.e., lifting rigs are pinned to the machine hook, and safety latches are provided on hooks supporting tools.

Tools required for handling internal reactor components are designed with fail-safe features that prevent disengagement of the component in the event of operating mechanism malfunction. These safety features apply to the following tools:

A. Control Rod Drive Shaft Unlatching Tool

The air cylinders actuating the gripper mechanism are equipped with backup springs which close the gripper in the event of loss of air to the cylinder. Air-operated valves are equipped with safety locking rings to prevent inadvertent actuation.

B. Spent Fuel Handling Tool

When the fingers are latched, a pin is inserted into the operating handle that prevents inadvertent actuation. The tool weighs approximately 400 lb and is preoperationally tested at 125% of the weight of one fuel assembly.

C. New Fuel Assembly Handling Tool

When the fingers are latched, a safety screw is screwed in, preventing inadvertent actuations. The tool weighs approximately 100 lb and is preoperationally tested at 125% of the weight of one fuel assembly.

D. RCCA Change Tool

The gripper assembly for the RCCA change tool will only operate when the gripper is in the full-down position. Failure of the air supply to the gripper locks the gripper mechanism in the latched position.

E. Thimble Plug Change Tool

Once the gripper mechanism is engaged, it is securely locked in place with a manual lock. This will prevent the thimble plug from being accidentally released during transfer.

F. BPRA Handling Tool

The slotted gripper sleeve assembly can only be latched and unlatched when the lower latch tube is in the full down position and is securely locked in place with a manual lock. This prevents the BPRA from being accidentally released while it is being transferred.

G. WABA Handling Tool

The tool is guided into the two large guide holes of a fuel assembly top nozzle or rack insert. The tool employs a gripper sleeve to engage the hold-down bar at the top of the WABA. The gripper shaft telescopes in and out of the cage of the tool as the WABA is raised and lowered. The gripper shaft interacts with the four comb assemblies by means of cables which raise and lower in opposing motion to the gripper shaft. The gripper shaft locks into the outer upper shaft of the tool. This prevents the WABA from being accidentally released while it is being transferred.

9.1.4.3.2 Seismic Considerations

The safety classifications for all fuel handling and storage equipment are listed in section 3.2. These safety classes provide criteria for the seismic design of the various components. Safety-related equipment is designed to withstand the forces of the operating basis earthquake (OBE) and SSE. For normal conditions plus OBE loadings, the resulting stresses are limited to allowable working stresses as defined in the ASME B&PV Code, Section III, Appendix XVII, for normal and upset conditions. For normal conditions plus SSE loadings, the stresses are limited to within the allowable values given by Subarticle NA 2110 for critical parts of the equipment which are required to maintain the capability of the equipment to perform its safety function. Permanent deformation is allowed for the loading combination, which includes the SSE to the extent that there is no loss of safety function.

For Safety Class 3 fuel handling and storage equipment, consideration is given to the OBE only insofar as failure of the Safety Class 3 equipment might adversely affect other safety-related equipment.

For nonnuclear safety equipment, design for the SSE is considered if failure might adversely affect safety-related equipment. Design for the OBE is considered if failure of the nonnuclear safety component might adversely affect safety-related equipment.

9.1.4.3.3 Containment Pressure Boundary Integrity

The fuel transfer tube which connects the refueling canal (inside the reactor containment) and the fuel storage area (outside the containment) is closed on the refueling canal side by a blind

flange at all times except during refueling operations. Two seals are located around the periphery of the blind flange with leak-check provisions between them.

9.1.4.3.4 Radiation Shielding

During all phases of spent fuel transfer, the gamma dose rate at the surface of the water is 2.5 mrem/h or less. This is accomplished by maintaining a nominal 10 ft of water above the top of the active fuel height during all handling operations.

The two fuel handling devices used to lift spent fuel assemblies are the refueling machine and the fuel handling machine. The refueling machine contains positive stops which prevent the fuel assembly from being raised above a safe shielding height. The hoist on the fuel handling machine and the containment fuel storage area crane moves spent fuel assemblies with a long-handled tool. Hoist travel and tool length likewise limit the maximum lift of a fuel assembly to within this safe shielding height. In the event that fuel is damaged and fuel fragments or pellets are collected on filters or other devices, the shielding requirements for the movement of the filters govern rather than the requirements on the submergence of spent fuel.

9.1.4.4 Inspection and Testing Requirements[a]

The test and inspection requirements for the equipment in the LLHS are as follows:

A. Fuel Handling Machine, Refueling Machine, and New Fuel Elevator

The minimum acceptable tests at the shop include the following:

1. Hoist and cable are load tested at 125% of the rated load.

2. The equipment is assembled and checked for proper functional and running operation.

The following maintenance and checkout tests will be performed prior to use of the equipment:

1. Visual inspection for loose or foreign parts; maintenance to keep free of dirt and grease.
2. Lubrication of exposed gears with proper lubricant.
3. Inspection of hoist cables for worn or broken strands.
4. Visual inspection of all limit switches and limit switch actuators for any sign of damaged or broken parts.
5. Inspection of the equipment for proper functional and running operation.

B. Head Lifting Rig and Internals Lifting Rig

The minimum acceptable tests at the shop include the following:

1. The rigs are load tested to 125% of the rated load.
2. The rigs are assembled to ensure proper component fit-up.

[a] Inspections credited for license renewal are summarized in the Overhead and Refueling Crane Inspection Program description in subsection 19.2.20.

The following maintenance and checkout tests are recommended to be performed prior to use of the tools:

1. Visual inspection for loose or foreign parts or damaged surfaces.
2. Visual inspection of all engagement surfaces and lubrication with proper lubricant.
3. Inspection on the internals lifting rig for the proper functioning of the engagement and protective rig operators.

C. New Fuel Assembly Handling Tool and Spent Fuel Assembly Handling Tool

The minimum acceptable tests at the shop include the following:

1. The tools shall be load tested to 125% of the rated load.
2. The tools are assembled and checked for proper functional operation.

The following maintenance and checkout tests are recommended to be performed prior to use of the tools:

1. Visual inspection of the tools for dirt and loose hardware and for any signs of damage such as nicks and burrs.
2. Check of tools for proper functional operation.

D. Fuel Transfer System

The minimum acceptable test at the shop is that the system is assembled and checked for proper functional and running operation.

The following maintenance and checkout tests will be performed prior to use of the tools:

1. Visual inspection for loose or foreign parts; maintenance to keep free of dirt and grease.
2. Lubrication of exposed gears with proper lubricant.
3. Visual inspection of all limit switches and limit switch actuators for any sign of damaged or broken parts.
4. Check of system for proper functional and running operation.

E. Reactor Vessel Stud Tensioner

The minimum acceptable test at the shop is that the tensioner be assembled and checked for proper functional and running operation.

The following maintenance and checkout tests are recommended to be performed prior to use of the equipment:

1. Visual inspection for loose or foreign parts.
2. Inspection of hydraulic lines for wear or damage.
3. Check of the hydraulic unit for proper pressurization and for any leaks occurring at operating pressure.

9.1.4.5 Instrumentation Requirements

The control systems for the refueling and fuel handling machines and FTS are discussed in paragraph 9.1.4.2.4. Additional electrical controls, such as the interlocks and main hoist braking system for the LLHS, are discussed in paragraph 9.1.4.3.

9.1.4.6 Standard Review Plan Evaluation

Kinetic energy of a dropped fuel handling tool lifted to the maximum height exceeds the kinetic energy of the tool and an assembly lifted to the normal height.

It has been demonstrated by analysis that this causes no adverse safety impact.

9.1.5 OVERHEAD HEAVY LOAD HANDLING SYSTEMS

Overhead heavy load handling systems (OHLHS) are those systems which lift loads whose weight is greater than the combined weight of a single spent fuel assembly and its handling tool. For VEGP, the weight of a fuel assembly is approximately 1600 lb, and the weight of a handling tool is approximately 400 lb; therefore, for the purpose of the heavy loads evaluation, a heavy load is defined as one which is greater than 2000 lb.

The OHLHS are located throughout the plant. The principal OHLHS are the spent fuel cask bridge crane and containment polar crane. Other OHLHS include miscellaneous monorail mounted hoists and bridge cranes, jib cranes, ceiling hook mounted hoists, and floor-mounted tripod hoists.

9.1.5.1 Design Bases

9.1.5.1.1 Safety Design Bases

A. The spent fuel cask bridge crane and the polar crane are designed to withstand the effects of earthquakes in compliance with General Design Criterion (GDC) 2.

B. The spent fuel cask bridge crane is designed to prevent a load from being dropped, in the event of a single failure, in compliance with GDC 4.

C. The sharing of the spent fuel cask bridge crane between Units 1 and 2 does not impair the safety of the plant in compliance with GDC 5.

D. The design of the spent fuel cask bridge crane complies with GDC 61 regarding safety of fuel handling and storage under normal and postulated accident conditions.

E. The recommended guidelines of NUREG-0612, section 5.1, are followed for the OHLHS. Table 9.1.5-6 tabulates the specific guidelines of NUREG-0612 and the specific sections where compliance is discussed.

F. OHLHS conform to the applicable sections of the Crane Manufacturer's Association of America (CMAA) Specification 70 and 74, American National Standards Institute (ANSI) B30.2-1976, and Hoist Manufactures Institute (HMI)

100-1974. Administrative controls applicable to OHLHS will be specified in the load handling procedures.

G. OHLHS are designed to minimize the potential for heavy load drops on spent fuel and systems required for safe shutdown and decay heat removal.

9.1.5.1.2 Power Generation Design Bases

The following power generation design bases are applied to OHLHS

A. The OHLHS are used for a variety of lifts during construction, refueling, and maintenance.

B. The OHLHS are designed with adequate lifting capacity to perform identified routine maintenance activities.

9.1.5.2 <u>System Description</u>

9.1.5.2.1 General Description

Principal codes and standards applicable to the OHLHS are identified in tables 9.1.5-1 through 9.1.5-4.

9.1.5.2.2 Spent Fuel Cask Bridge Crane

The spent fuel cask bridge crane (SFCBC) is used to transfer new fuel containers and the spent fuel cask from the shipping/receiving area to the cask loading pit and back. In addition, the crane is used for equipment movement in the auxiliary building as required. The loads expected to be lifted by the spent fuel cask bridge crane are listed in table 9.1.5-4. By means of a laser positioning system, weigh scale system, and a programmable logic controller, the crane is restricted from traveling near or over the spent fuel pools when the main hoist is handling loads in excess of 15 tons, as shown on drawing AX4DE501. The SFCBC has a main hoist with a design rated load (DRL) capacity and a maximum critical load (MCL) capacity of 125 tons. The SFCBC is designed to be single failure proof in accordance with NUREG-0554; therefore, a spent fuel cask drop is not evaluated. A 15-ton auxiliary hoist is provided on the same trolley, and a 2-ton monorail hoist is provided on the bridge. The auxiliary hoist and the monorail hoist are used in new fuel handling and maintenance tasks and are not involved with handling of the spent fuel cask. The path of the crane does not pass over either of the spent fuel storage pools. A section view of the spent fuel cask bridge crane hook travel is shown on drawing AX4DE502. Positive restraints are provided on the crane to prevent the bridge, trolley, or any other part from becoming dislodged and falling on structures or equipment situated below the crane in the event of a safe shutdown earthquake (SSE). The crane is capable of retaining the maximum design load during an SSE, although the crane is not qualified to operate after the SSE. The spent fuel cask bridge crane is an all steel constructed, electric overhead, top running, double box girder, motorized dual drive bridge crane with a 42-ft 6-in. span. The crane is mounted on two parallel 175-lb runway rails traversing between the auxiliary and fuel handling buildings. The bridge consists of two identical welded plate box girders with full-depth diaphragms. The bridge girders are held together by structural end tie girders. Supporting each end tie girder are two dual-wheeled trucks (drive truck and idler truck) that travel on top of the runway rail and

drive the bridge. The bridge drive consists of two 5-hp, 460-V, 3-phase, 1800-rpm induction motors; each motor is powered by a separate variable frequency drive (VFD) unit with integrally mounted disc brakes rated at 125% of motor full-load torque and a reducer (ratio 254.4 to 1) which is coupled to each drive motor. A 2-ton monorail hoist with festoon is mounted on the bridge. A seismic restraint is mounted at each corner of the bridge to prevent the bridge from derailing during an earthquake. The crane is shown in figure 9.1.5-1.

The trolley provides the structural frame support for the crane main hoist, auxiliary hoist, and trolley drive machinery. The trolley travels on a single set of rails (22-ft 3-in. span) secured to the top of the bridge girders. Two wheels with an 11-ft 8-in. wheel base are mounted on each trolley end truck. The trolley drive consists of a two 3-hp, 460-V, 3-phase, 1800-rpm induction motors; each motor is powered by a separate VFD unit with integrally mounted disc brakes rated at 125% of motor full-load torque and a reducer (ratio 317 to 1) which are connected to the drive wheels at each trolley end truck. The main hoist design capacity is 125 tons and the auxiliary hoist design capacity is 15 tons. The main hoist is single failure proof. The main hoist is equipped with one drive unit. The single drive unit consists of a 60-hp, 460-V, 3-phase, 1200-rpm induction motor powered by a single VFD unit coupled to a spiral bevel gear box (ratio 1 to 1), with two independent self adjusting electric holding brakes rated at 125% of full-load torque at the point of brake application, two hydraulic holding brakes per drum with a total combined capacity of 125% full hoisting load, and a dynamic electric brake rated at 150% motor full-load. The spiral bevel gear box is coupled to two independent right angle gear boxes (ratio 438 to 1) that attach to the main hoist drums. The auxiliary hoist is equipped with a 20-hp, 460-V, 3-phase, 1200-rpm induction motor powered by a single VFD unit with an integrally mounted self-adjusted holding brake rated at 125% of full-load torque coupled to a reducer (ratio 370 to 1) with two self-adjusting electric holding brakes rated at 125% full-load torque, and a dynamic electric brake at 150% of motor full load torque.

Seismic restraints are provided at the trolley end trucks to prevent the trolley from becoming dislodged during an earthquake. The electric motor-driven hoists raise and lower their loads via wire rope cable that is reeved through upper and lower sheaves. The main hoist dual reeving system uses two drums with two ropes and the auxiliary hoist dual reeving system has a single drum with two ropes. The lower sheaves are an integral part of the load block. Each hoist includes a hook that is attached to the load block. The design parameters for the spent fuel cask bridge crane are listed in table 9.1.5-1.

The spent fuel cask bridge crane includes the features described below.

9.1.5.2.2.1 Structural Components. All of the structural components of the crane are designed for a full capacity of 125 tons. Structural members are designed in accordance with ANSI B30.2.0., American Institute of Steel Construction (AISC) specifications, and CMAA Specification No. 70. Load carrying structural steel is impact-tested at or below 40°F by the Charpy V-notch method according to paragraph ND-2300 of the American Society of Mechanical Engineers (ASME) Code, Section III, 1977 edition with addenda through summer 1978. The structural members are designed for dead load plus live load plus impact load plus longitudinal and horizontal forces, with an allowable stress of 0.5 yield for the base material and the weld joints. The cross-girts on the trolley are designed with an allowable stress of 0.4 yield. Structural design of the crane conforms with the following seismic loading combinations and criteria:

A. Dead load plus live load plus impact load plus horizontal loads in two directions and vertical load due to an SSE. With all of these loads acting simultaneously, the allowable stress is 0.9 yield for the base material and weld joints.

B. Dead load plus live load plus impact load plus seismic loads due to an operating basis earthquake (OBE). With these loads acting simultaneously, the allowable stress is in accordance with AISC specifications.

The earthquake motion considered consists of two horizontal and one vertical component. The total structural response is predicted by combining the applicable maximum codirectional responses, calculated from the three (two horizontal and one vertical) analyses, using the square root of the sum of the squares method. Damping values used for seismic analyses are 4% for SSE and 2% for OBE. The crane is classified as a moderate duty Class C crane in accordance with CMAA Specification No. 70. The structural members of the crane are designed for a fatigue loading of 100,000 to 500,000 cycles, with each completed lift representing one cycle. The rotating machinery is designed for a fatigue life expectancy of 2,000,000 cycles, with each rotating component cycle represented by one revolution. The estimated number of lifts remaining in the plant life[a] is 11,000 for the main and auxiliary hoists and 40,000 for the monorail hoist.

9.1.5.2.2.2 Mechanical Components. The main hoist consists of two balanced, eight-part reeving systems to provide redundancy. The arrangement consists of two separate and redundant wire rope cables on two separate drums reeved through the upper and lower sheaves. Each cable passes through an equalizer unit that adjusts for unequal cable length and to equalize cable load in the total 16-part system. In the event of the failure of one reeving system, the full hoisted load is transferred to the second reeving system. The kinetic energy created during the load transfer is absorbed by the buffer system that is mounted within the main hoist upper block with the equalizer unit. Also, the hoisted load does not swing during the load transfer because each cable is reeved to both sides of the upper and lower sheaves. The main hoist cable is a 1 1/8-in. diameter, 9 x 25 extra improved plow steel with independent wire rope core (IPS-IWRC). The cable is rated 97.9 tons minimum breaking strength.

The auxiliary hoist mechanical drive components are designed for a DRL of 15 tons. The auxiliary hoist consists of a single drum and two ropes that are balanced by a dual reeving system to provide redundancy. The arrangement consists of two separate and redundant wire rope cables reeved through a lower sheave and terminates at the equalizer. The equalizer unit adjusts for unequal cable length and to equalize cable load in the system. The auxiliary hoist cable is a 7/8-in. diameter, 9 x 25 IPS-IWRC that is rated 49.2-tons minimum breaking strength.

The primary functions of the main hoist equalizer system are to continually adjust the hook load so that any load under normal operation is shared equally by the redundant reeving systems and to transfer the lifted load from one reeving system to the other in the event of a cable break. The shock of a cable break is absorbed by the buffer system. The main hoist uses a dual load path equalizer system; each is designed to support the full load in the event that either one should fail. If there is an excessive displacement due to either a broken cable or unequal cable length, a limit switch for the unbalanced load will cut off power to the hoist motor and set the hoist brakes, thus stopping the hoisting motion. This safety protection system prevents the broken cable from becoming entangled with the other reeving system and also prevents hoist operation with unequal cable length. Before making a series of lifts, the equalizer assembly can be visually inspected and adjusted, if necessary, so that an unnecessary power shutoff does not

[a] The operating licenses for both VEGP units have been renewed and the original licensed operating terms have been extended by 20 years. Since the spent fuel cask bridge crane bridge and trolley have been replaced, the additional years of operation remain much less than the design capabilities of the spent fuel cask bridge crane. In accordance with 10 CFR Part 54, appropriate aging management programs and activities have been initiated to manage the detrimental effects of aging to maintain functionality during the period of extended operation (see chapter 19).

occur. If the equalizer assembly needs to be adjusted during a lift, the load can be lowered and the adjustment made at the cable drum anchors. If the equalizer assembly reaches the limits of its travel, which should occur only if one of the cables had already failed, the load can be safely lowered with the remaining cable so that the broken cable can be replaced.

The main hook is a two-pronged single load path sister hook and pin hole with a safety latch and a cored bail hole provided for each prong. The main hook is designed to meet the 10-to-1 safety factor on the average ultimate strength of the material consistent with NUREG 0612 Appendix C. The sister hook is supported by the crosshead and bearings that are supported by the side plate of the load block. The sister hook is load tested at twice its rated load with each side equally loaded at rated load. The hook cannot show any deformation after the load test and must pass the magnetic particle or liquid penetrant examination in accordance with American Society of Testing Materials (ASTM) A-275, E709, or E165.

The auxiliary hook is a single-pronged hook with a safety latch. The hook is designed for a rated capacity of 15 tons. The hook and attachment points are designed to support the static load of 15 tons based upon a 10-to-1 safety factor on the average ultimate strength of the material consistent with NUREG 0612 Appendix C. The auxiliary hook is load tested similarly to the main hook. Both the main hook and auxiliary hook are of forged steel construction. Each hook is equipped with a roller thrust bearing with dust ring and grease fitting. Both hooks are capable of 360° rotation.

The main hoist is equipped with two holding brakes and two redundant holding brakes (one redundant brake on each drum). The main hoist load control brake is a dynamic control brake. The dynamic control brake regulates load lowering and raising speed of the hoist. The holding brakes are electric, self-adjusting, shoe-type. The main hoist redundant brakes are hydraulic and can allow manual lowering of the load. The dynamic brakes are used to stop the hoisting motion and then the holding brakes are applied. The holding brakes for the main hoist are automatically applied when electric power is interrupted or the control is in neutral. The brakes are automatically released when the dynamic control brake is energized. Each holding brake is provided with a manual release that permits controlled brake release in the event of power failure.

The auxiliary hoist has three holding brakes and a dynamic brake. The dynamic brake regulates load lowering and raising speed of the hoists. The holding brakes are electric, self-adjusting, shoe-type. The dynamic control brake is used to stop the hoisting motion and then the holding brakes are applied. The holding brakes on the auxiliary hook are automatically and sequentially applied when electric power is interrupted or the control is in neutral. The brakes are automatically released when the dynamic load brake is energized. Each holding brake is provided with a manual release that permits controlled brake release in the event of power failure.

The following features highlight the mechanical equipment design incorporated in the main hoist system.

A. Hook

The sister hook and pin hole provide a 10-to-1 safety load factor for the attachment points, either of which is designed to support the rated load.

B. Trunnion

The trunnion supports the hook thrust bearing and nut. In the event of failure, the trunnion is supported by lugs on the hook block side plates. Redundant side plate construction is used in the hook block.

C. Hook Block Sheaves

The sheaves are contained by a structural housing over the sheaves. The structural housing and sheave pin have been designed with a 10-to-1 safety factor which holds the sheaves in place.

D. Crown Sheaves

The crown sheaves are supported above the trolley load girt, and the load girt itself will support the crown sheaves in the event of failure of the crown sheave pin.

E. Reeving

The main hoist consists of two drums and two ropes. Reeving system to reeving system equalization is provided by fully equalized rope loads in the 16-part system. In the event of the failure of one reeving system, the full hoisted load is transferred to the second reeving system with only a slight settling of the load. The kinetic energy created during the load transfer is absorbed by the buffer system.

F. Drum

In the event of failure of the drum shaft, bearings, or pillow blocks, drum bearing stands are provided to support the drum and to maintain the drum gear meshes.

G. Gearing

Two gear trains are provided, with each gear train designed for the rated load. Each gear train is provided with a self-adjusting electric holding brake rated at 125% of the full-load torque.

9.1.5.2.2.3 Crane Controls. Two separate control systems are provided for controlling the crane motors. One is a pendant control unit and the other is a portable radio remote control unit. The pendant control system is equipped with a fixed cable length that is manually lowered from the bridge to ground level when required. The pushbutton pendant station is supported in such a manner as to be readily handled by a single operator. The pushbutton pendant station provides control for all bridge, trolley, main hoist, auxiliary hoist, and monorail hoist/trolley functions. Power on-off selector switch and push-pull emergency stop switch are also provided at the pushbutton pendant station. The pushbutton pendant station has a watertight, heavy-duty enclosure with oiltight, heavy-duty switches. All pushbuttons are spring-return to the "off" position when released.

The radio remote control unit is a battery-powered, three-channel solid-state transmitter which is capable of operating any of the three frequencies. The maximum control range is 300 ft and can be adjusted down to 50 ft. The radio remote control unit provides control for all bridge, trolley, main hoist, auxiliary hoist, and monorail hoist/trolley functions. The radio control unit performs a battery test upon startup which precludes the operation of the crane with a low battery. The switches provided in the radio remote control unit are:

- Frequency selector switch.
- Main hoist/auxiliary hoist selector switch.
- Main hoist inching selector switch.
- Push-pull emergency stop switch.

- Key-operated on-off switch with key removable in off position.
- Gong silencer switch.

The radio remote control receiver/decoder electronics, interface relays, and power supply are housed in a National Electrical Manufacturers Association (NEMA) 12 cabinet mounted on the crane. The cabinet is equipped with thermostatically controlled heaters. One receiver is provided to permit reception on three different radio frequency carrier frequencies. The radio remote control system is designed so that it will not interfere with other systems in the plant or be interfered with by electrical noise or extraneous radio signals.

9.1.5.2.2.4 Safety Limit Devices. The extent of travel for both the main hoist and the auxiliary hoist is limited for both the raising and lowering directions by a combination of limit switches. Redundant limit switches are provided for both hoists in the raising and lowering direction. Contacts on a rotary limit switch will trip at the normal upper stop position and at the extreme lowered position of the hook. A block-operated overhoist limit switch, which serves as a backup to the rotary limit switch, will trip at uppermost hook position. Both the main hoist and the auxiliary hoist are equipped with an overspeed limit switch set to trip at 110% of the hoisting speed. Tripping of any one of the above limit switches will interrupt power to the respective hoist motor and set the corresponding brakes. The limit switch and control system are designed so that the motor can only be used in the reverse direction after the limit switch has been tripped. A load sensing system is provided for the main hoist, using a weigh scale mounted in the equalizer sheave assembly. The weight of the load is displayed on a readout display unit mounted on one of the crane's bridge side girders. Overload protection is provided by automatic tripping of the hoist motors and setting the holding brakes. Each cable and drum is equipped with a photo eye that monitors misspooling of the hoisting cable. Overload tripping is set at 110% of the rated load.

The bridge and trolley are equipped with a programmable logic controller that limits travel. The design of the programmable logic controller prohibits movement of loads in excess of 15 tons on the main hook outside of the shaded area, as shown on drawing AX4DE501. A selector switch is provided to allow for the movement of reactor coolant pumps, stands, and shielding in the auxiliary building between column lines A_c and A_f and A_9 and A_{10} for maintenance, temporary storage, and shipping. This switch allows the operator to bypass the trolley programmable logic controller limits, which restricts movement of loads greater than 15 tons toward the west wall in the auxiliary building. If any travel limit is activated, the programmable logic controller will interrupt power to the respective drive motors and set the brake. The programmable logic control is designed in such a way that the motors can only be energized in the reverse direction after the limit has been exceeded. End of travel limit switches are also provided for the bridge and trolley. End of travel limit switches are set to trip just before the bridge or trolley comes into contact with their respective bumper stops. The bridge and trolley bumpers are designed with sufficient energy absorbing capacity to stop the crane or the trolley in an unloaded condition when traveling at 40% of full-load rated speed. The bumper stops are backups for the end-of-travel limit switches.

The main hoist motor and the auxiliary hoist motor are each equipped with two temperature sensors. The temperature sensors are used to protect hoist motors from thermal overload. Once the temperature sensor limit is achieved, the normally closed sensor is opened. When open, the power to the motor will be interrupted and set the holding brakes. The main hoist, auxiliary hoist, trolley drive, and bridge-drive motors are provided with thermal overload protection and space heaters to prevent condensation inside the motors. These motors are a totally enclosed, nonventilated type and are rated for 60-min duty.

Phase loss, phase reversal, undervoltage, and imbalance load protection is provided for the main power supply to the crane. This protection system is provided to protect the main hoist, the auxiliary hoist, the trolley drive, and the bridge drive motors.

9.1.5.2.2.5 Monorail Hoist. The monorail hoist is a 2-ton capacity standard commercial, electric, wire rope, close- headroom hoist with motorized trolley mounted on a runway rail installed on the underside of the crane bridge girder. The wire rope is 1/4-in. diameter steel with a design safety factor of 5. The reeving is two-part double with true vertical lift. The monorail hoist has an induction motor powered by a single VFD unit, mechanical load brakes, variable dynamic braking, hoist limit switches, trolley track limit switches, motor space heaters, and motor thermal overload protection. The monorail hoist is equipped with an overload cutoff switch which protects the load, hoist, and operator by interrupting the hoisting circuit when an overload occurs. The monorail hoist and trolley motors are rated for 60-min duty. The monorail hoist and trolley movements are controlled from the main pushbutton pendant station.

9.1.5.2.2.6 Special Lifting Devices. As identified in table 9.1.5-4, there are three lifting devices associated with the use of the OHLHS in the fuel handling systems. The cask lifting device will meet the requirements of NUREG 0612 and ANSI N14.6. The VEGP design allows for the use of the HOLTEC HI-TRAC 125D transfer cask which employs a single load path lift yoke to protect against cask-drop accidents and has a safety factor of 6 as required by Section 4.6 of NUREG 0554.

9.1.5.2.3 Containment Polar Crane

The containment building polar bridge crane is an all steel constructed, electric, overhead, top running, double box girder, motorized bridge crane with a 134-ft span. The crane is mounted on a circular 175-lb runway rail that is supported by the containment building superstructure. The bridge consists of two asymmetrical, welded plate box girders with full-depth diaphragms. The bridge girders are held together by structural end tie girders. Four-wheeled, box-section, bogie-end trucks that travel on top of the runway rail support each end of the bridge girders and drive the bridge. The bridge drive consists of four drive trains, one for each end truck. Each drive train is equipped with one 15-hp wound rotor motor, one 1/3-hp gear-type microdrive motor, one self-adjusting, dc magnet-operated, electric shoe-type holding brake, and one hydraulic-operated shoe-type control brake. The holding brake is rated at 125% of motor full-load torque. A pendant hoist frame is mounted on the bridge supporting the pendant tractor drive, the pendant cable reel, and the pendant festooned cable. The pendant control system was abandoned in place and replaced by a radio remote control system. An enclosed operator's cab is located at one corner of the crane and is mounted beneath one of the bridge girders. The trolley provides the structural frame support for the crane main hoist, auxiliary hoist, and trolley-driven machinery. The trolley travels on a single set of rails (29-ft 6-in. span) secured to the top of the bridge girders. Two wheels with a 45-in. wheel base are mounted at each corner of the trolley end trucks. The trolley drive consists of one 15-hp, 460-V, 3-phase, 1200-rpm wound rotor motor and one 1/3-hp, gearhead-type microdrive motor. The main hoist drive consists of a 100-hp, 460-V, 3-phase, 1200-rpm wound rotor motor and a 7 1/2-hp gear-type microdrive motor. The auxiliary hoist is driven by a 100-hp, 460-V, 3-phase, 1200 rpm wound rotor motor. Both the main hoist and the auxiliary hoist are equipped with two self-adjusting, dc electric magnet-operated, shoe-type holding brakes and one dc-actuated, eddycurrent, control-type brake. The main hoist and the auxiliary hoist holding brakes are rated at 200% of motor full-load torque each. The two holding brakes on each hoist are automatically and sequentially

applied with a 2-s time delay when electric power is interrupted or the control is in neutral. They are automatically released when the eddycurrent load brake is energized or when power is available. Each holding brake is provided with a manual release lever that permits controlled brake release in the event of power failure. The electric motor-driven hoists raise and lower their loads via wire rope cable that is reeved through upper and lower sheaves. The main hoist is capable of rigging for a 225-ton normal plant operation lift. The main hoist cable is a 1 1/4-in. diameter, 6 x 37 IPS-IWRC. The cable is rated at 87.9 tons minimum breaking strength. For 225-ton normal operation, the main hoist has a single 16-part reeving. The auxiliary hoist cable is 5/8-in. diameter, 6 x 37 IPS-IWRC. The cable is rated at 22.7 tons minimum breaking strength. The auxiliary hoist has a single eight-part reeving. The lower sheaves are an integral part of the load block for both the main hoist and the auxiliary hoist. The main hook is a two-pronged sister hook with a safety latch and a cored bail hole provided for each prong. The sister hook is bored out to accommodate a lifting shaft for additional attachment points for the load. The auxiliary hook is a single-pronged hook with a safety latch. The main hook and the auxiliary hook are attached to their respective load block. The 25-ton auxiliary hook is equipped with a roller thrust bearing with dust ring and grease fitting. It is capable of 360° rotation. The 225-ton sister hook is equipped with a 1/4-hp hook rotation drive motor, timing belt, pulleys, roller thrust bearing, reducers, and grease fittings. The hook is capable of 360° rotation at a speed of 1/4 rpm. The design parameters for the containment polar bridge crane are listed in table 9.1.5-1.

9.1.5.2.3.1 Structural Components. All the structural components of the crane are designed in accordance with ANSI B30.2.0, AISC, and CMAA Specification No. 70. The following maximum hoist loads are considered in the design of the 225-ton capacity crane for normal plant operation.

Seismic forces are included with the design operational load. The seismic forces in combination with other loads are as follows:

1. Dead load plus live load plus seismic loads due to an SSE. With all of these loads acting simultaneously, the allowable stresses will not exceed 0.9 yield for tension and compression and 0.5 yield for shear.
2. Dead load plus live load plus seismic loads due to an OBE. With all of these loads acting simultaneously, the allowable stresses will not exceed 0.66 yield and 0.6 yield for tension and compression for compact sections and noncompact sections, respectively, and 0.4 yield for shear.

The earthquake motion considered consists of two horizontal and one vertical component. The total structural response is predicted by combining the applicable maximum co-directional responses, calculated from the three (two horizontal and one vertical) dynamic analyses, using the square root of the sum of the squares method.

The crane design includes fatigue considerations based on the plant operation duty requirements.

The estimated variety of lifts for plant operation are indicated in the following schedule:

	Total Crane Operating Time over 40 Years[a]
Reactor head - 225 tons	800 h
Upper internals - 70 tons	800 h
Lower internals - 175 tons	250 h
Miscellaneous lifts - 50 tons and less	5000 h

The crane structural welding is in accordance with American Welding Society (AWS) DI.1 applicable requirements. Preheat and interpass temperatures are in accordance with AWS DI.1, table 4.2. Load-carrying structural steel welds and finished hooks are magnetic particle inspected. Butt type splice welds of the main bridge girder bottom cover plates are radiographic inspected. Machinery components such as shafts, gears, etc., which support the hook load, are liquid penetrant examined. The acceptance criteria for magnetic particle inspection of hooks is in accordance with ASTM A-654, paragraph 18.1.3.

9.1.5.2.3.2 Crane Controls. The crane is controlled either from the operator's cab or from the radio remote control. The pendant control function was replaced by a portable radio control transmitter. The cab and radio controls have a singularly selective interlock, such that only one method of control, either from the cab or radio remote, is operable at a time. The crane can be operated by the radio remote control, from the operating deck at el 220 ft. The following functions are provided at the radio remote control:

- Power "on"/”Battery Monitor” indicating light (red).
- Key selector power on-off switch.
- Start pushbutton.
- On-off selector switch.
- Auxiliary hoist up and down joystick.
- Bridge clockwise and counterclockwise joystick.
- Crane light on-off selector switch.
- Main hoist restricted mode bypass selector switch.
- Horn button.

[a] The operating licenses for both VEGP units have been renewed and the original licensed operating terms have been extended by 20 years. An evaluation determined that for a conservative number of lifts and crane operating time for the heaviest lifts estimated for 60 years of operation are low enough to preclude fatigue concerns for the Containment Polar Crane. In accordance with 10 CFR Part 54, appropriate aging management programs and activities have been initiated to manage the detrimental effects of aging to maintain functionality during the period of extended operation (see chapter 19).

- Main hoist, bridge, and trolley fast-slow selector switch.
- Main hoist up and down joystick.
- Trolley in and out joystick.
- Main hook clockwise and counter clockwise selector switch.

In addition to the control functions provided at the radio remote control, the operator's cab is provided with the following functions:

- Dead-man foot switch.
- Foot-operated brake pedal.
- Cab-floor selector switch.
- Horn silencing switch.
- Main hook clockwise and counter clockwise push buttons.
- Manual main line power disconnect.
- Two brake bleeder pushbuttons.
- Telephone jack.

The ac static stepless nonspeed regulated control is provided for the bridge and trolley normal speed drive. Single-speed reversing continuous duty-clutch coupled microdrive is provided for the main hoist, bridge, and trolley. The ac static stepless regulated thyrister control is provided for the main hoist normal speed drive and for the auxiliary hoist.

9.1.5.2.3.3 Safety Limit Devices. The extent of travel for both the main hoist and the auxiliary hoist is limited for both the raising and lowering directions by a combination of limit switches. Redundant limit switches are provided for both hoists in the raising direction and a single limit switch is provided for each hoist in the lowering direction. Contacts on a screw-type limit switch, coupled to the hoist drum, will trip at the normal upper stop position and at the extreme lowered position of the hook. A block-operated overhoist weight-type limit switch, which serves as a backup to the screw limit switch, will trip at the uppermost hook position. Both the main hoist and the auxiliary hoist are equipped with an overspeed limit switch. Tripping of any one of the above limit switches will interrupt power to the respective hoist motor and set the corresponding brakes. Each limit switch is wired so that the motor can be manually energized in the reverse direction after the limit switch has been tripped.

For critical lifts (reactor integrated head and internals), a portable load cell is used to monitor crane loading and load hang up.

Overspeed limit switches are provided for the bridge and trolley. Tripping of the overspeed limit switch will interrupt power to the respective driving motor and set the brake. Each limit switch is wired so that the motor can be manually energized in the reverse direction after the limit switch has been tripped.

Temperature detectors are provided for the main hoist motors, the auxiliary hoist motor, the bridge drive motors, and the trolley motors. When an overtemperature condition exists, the power to the motor will be interrupted and the holding brakes will be set. The condition also causes the motor overheat warning indicator to light at the cab.

The main hoist, auxiliary hoist, trolley drive, and bridge drive motors are provided with thermal overload protection, undervoltage protection, and space heaters. These motors, except for the microdrive motors, are totally enclosed, nonventilated-type wound rotor motors rated for 60-min duty. The microdrive motors are totally enclosed, fan-cooled type squirrel-cage motors rated for continuous duty.

Phase loss protection is provided for the main power supply to the crane. Crane structural box sections are provided with pressure vents with splash shields.

The crane and its components are capable of withstanding the containment internal test pressure without damage with the exception of some components in the radio control receiver. These components will be removed during ILRT testing. The general arrangement of the containment polar crane is provided in figure 9.1.5-2.

9.1.5.2.3.4 Special Lifting Devices. As identified in table 9.1.5-3, there are nine lifting devices associated with the polar crane. The head lifting rig and internals lifting rig are supplied by the NSSS vendor and were designed prior to the issuance of NUREG 0612 and the requirement to meet ANSI N14.6-1978 "Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More for Nuclear Materials." These devices were designed to the requirement that the resulting stress in the load-carrying members when subjected to the total combined lifting weight would not exceed the allowable stresses specified in the AISC code. Table 9.1.5-7 provides a discussion on the detailed comparison of the lifting devices to the requirements of ANSI N14.6 as supplemented by NUREG 0612. The reactor coolant pump motor lifting device, the refueling machine maintenance lifting device, and heat exchanger lift rigs will meet the intent of NUREG 0612 and ANSI N14.6-1978. The refueling machine gripper mast is an integral part of the refueling machine which is discussed in paragraph 9.1.4.2.4A. The lifting devices associated with the stud turnout tool and stud tensioner are integral to the turnout tool and tensioner. A failure of these lifting devices would lead to the same acceptable consequences as a hoist failure.

9.1.5.2.3.4.1 Integrated Head Package Lifting Rig. The integrated head package lifting rig is a three-legged carbon steel structure, approximately 42-ft high and 15 ft in diameter, weighing approximately 12,000 lb. It is used to handle the assembled reactor vessel head. The lift assembly consists of a tripod-shaped steel structure that attaches to the missile shields and lift rods which attach to the reactor vessel head.

9.1.5.2.3.4.2 Internals Lifting Rig. The internals lift rig is a three-legged carbon and stainless steel structure, approximately 30 ft high and 14 ft in diameter, weighing approximately 17,850 lb. It is used to handle the upper and lower reactor vessel internals packages. It is attached to the main crane hook for all internals lifting, lowering, and traversing operations. A load cell linkage is connected between the main crane hook and the rig to monitor loads during all operations. When not in use, the rig is stored on the upper internals storage stand. The rig may be temporarily stored on the operating deck or the structural steel at el 261 ft during maintenance activities.

The internals lift rig attaches to the internals package by means of three rotolock studs which engage three rotolock inserts located in the internals flange. These rotolocks studs are manually operated from the internals lift rig platform using a handling tool which is an integral

part of the rig. The studs are normally spring retracted upward and are depressed to engage the inserts. Rotating the mechanism locks it in both positions.

9.1.5.2.3.4.3 Load Cell and Load Cell Linkage. The load cell is used to monitor the load during lifting and lowering of the integrated head package or internals to ensure that no excessive loadings are occurring. The unit is a load-sensing clevis type, rated at 500,000 lb.

This load cell is a part of the load cell linkage, which is an assembly of pins, plates, and bolts that connect the polar crane main hook to the lifting blocks of both the reactor vessel head and the internals lift rigs.

9.1.5.2.3.4.4 Other Cranes Inside Containment. Table 9.1.5-3 lists the OHLHS housed inside containment. The system description and safety evaluation of the refueling machine is discussed as a part of the light load handling system in paragraphs 9.1.4.2.4 and 9.1.4.3.1.1. The radial arm stud tensioner hoist assemblies are provided as a part of the integrated head package and are discussed in paragraph 9.1.4.2.4.G. Only the assemblies are part of the integrated head package. The hoists are not permanently installed plant equipment. A 2-ton monorail with hoist is provided to remove the steel hatch plugs which provide access to the fuel transfer blind flange. A 3-ton, wall-mounted, cantilever jib crane is provided above the operating deck in the vicinity of each reactor coolant pump to remove the grating and perform any miscellaneous maintenance activities associated with the reactor coolant pumps. Two 3-ton, wall-mounted, cable bridge winches are provided for each of the integrated head cable bridges. Paragraph 9.1.4.2.4.G.3 provides a discussion of the cable bridge. A 1-ton "6" shaped monorail is provided in the pressurizer compartment to remove the pressurizer relief valves. A 20-ton hoist is provided for opening and closing the equipment hatch cover.

9.1.5.2.4 Miscellaneous Cranes and Hoists

Miscellaneous cranes and hoists are provided to service and maintain mechanical equipment. Hoists and cranes have adequate capacity to perform lifting of components necessary for maintenance and are designed to industry standards as listed in table 9.1.5-2. The associated monorails are designed per the applicable AISC specifications.

Table 9.1.5-2 lists equipment that may be lifted and includes hoist/crane capacity, load weight, maximum lift height, and reference to figures showing the load paths.

9.1.5.2.5 Lifting Devices Not Specifically Designed

The slings associated with the OHLHS will be selected based on the criteria established by NUREG 0612 and ANSI B30.9 with the clarification that the dynamic loadings associated with the acceleration and deceleration of the load (based on maximum hoisting speeds) are a small fraction of the static load and that revising the selection criteria stated in ANSI B30.9 to accommodate them would not have a substantial effect on the load handling reliability. The slings will be marked in accordance with ANSI B30.9 requirements. Load handling procedures will specify the slings and other devices used with the slings to make a complete lifting device, that are required for handling the load.

9.1.5.3 Safety Evaluation

A. The spent fuel cask bridge crane and the polar crane are designed as Seismic Category I to ensure they withstand the effect of an SSE.

B. The spent fuel cask bridge crane is designed to be single failure proof to prevent a load from being dropped in the event of a single failure.

C. The spent fuel cask bridge crane is shared between Units 1 and 2 to the extent that spent fuel cask handling is performed in a common area of the fuel handling building. The sharing of the spent fuel cask bridge crane does not impair the safety of the plant.

D. The safety-related Seismic Category I spent fuel cask bridge crane and fuel handling building ensures that fuel handling and storage systems, structures, and components are designed for adequate safety during normal and accident conditions.

E. The design and operation of the OHLHS is such that the design features of the OHLHS; i.e, single failure proof, or the consequences of a failure are acceptable to ensure the capability to safely shut down the plant, remove decay heat, and maintain doses within prescribed limits.

F. The OHLHS conforms with the applicable portions of codes and standards invoked for the OHLHS design, operation, inspection, testing, and maintenance.

G. For the purposes of operator qualification, a heavy load is a load whose weight is greater than the combined weight of a single spent fuel assembly and its handling tool.

   Heavy load crane operators shall be trained and qualified and conduct themselves in accordance with Chapter 2 and 3 of ANSI B30.2 1976 "Overhead and Gantry Cranes."

H. Spent fuel, safe shutdown equipment, and decay heat removal equipment are separated and evaluated to ensure that potential load drops from OHLHS will not jeopardize the safety of the plant. Sufficient redundancy has been designed into safety-related systems to ensure that potential load drops will not preclude safe shutdown or decay heat removal.

A review of OHLHS was performed in accordance with NUREG-0612 and following the guidelines of enclosure 3 to the Nuclear Regulatory Commission generic letter dated December 22, 1980, as amended on February 3, 1981. The OHLHS in the following buildings were reviewed:

- Auxiliary building.
- Fuel handling building.
- Containment building.
- Control building.
- Diesel generator building.
- Auxiliary feedwater pumphouse.

- Nuclear service cooling water pumphouse.
- Alternate radwaste building.

The turbine and radwaste transfer buildings do not house spent fuel, safe shutdown equipment, or decay heat removal equipment and therefore was not reviewed.

A review of plant arrangements was performed to evaluate load drops from OHLHS. The results of the review are shown in tables 9.1.5-2 through 9.1.5-4. Table 9.1.5-2 provides an evaluation of OHLHS with the exception of those used in the containment and fuel handling systems. Table 9.1.5-3 provides a listing of containment building overhead load handling systems. The fuel handling building spent fuel cask bridge crane and fuel handling systems are listed in table 9.1.5-4. The location and envelope of load handling devices are shown on drawings 1X4DE502, 1X4DE503, 1X4DE504, 1X4DE505, 1X4DE506, 1X4DE507, 1X4DE508, 1X4DE509, 1X4DE510, 1X4DE511, 1X4DE512, 1X4DE513, 1X4DE514, 1X4DE515, 1X4DE516, 1X4DE517, 1X4DE518, 1X4DE519, 1X4DE520, 1X4DE521, 1X4DE522, 2X4DE502, 2X4DE503, 2X4DE504, 2X4DE505, 2X4DE506, 2X4DE507, 2X4DE508, 2X4DE509, 2X4DE510, 2X4DE511, 2X4DE512, 2X4DE514, 2X4DE515, 2X4DE516, 2X4DE517, 2X4DE518, 2X4DE519, 2X4DE520, 2X4DE521, 2X4DE522, AX4DE500, AX4DE503, AX4DE504-1, AX4DE504-2, and AX4DE504-3.

The OHLHS were evaluated to identify interactions which could damage safety-related equipment. For those loads that do not pass over safety-related equipment, no further evaluation is performed. Other loads are excluded based on separation of safety-related equipment. In addition, selected load drops were excluded from further evaluation based on certain lifts being performed only during plant operating modes which, if the load were dropped, would not affect decay heat removal.

For those OHLHS where interactions could unacceptably damage fuel or affect safe shutdown equipment, as defined in tables 9.1.5-2 through 9.1.5-4, safe load paths and heights have been defined and will be under administrative controls as discussed in paragraph 9.1.5.6. Drawings 1X4DE600, 1X4DE601, 1X4DE602, 1X4DE603, 1X4DE604, 1X4DE605, 1X4DE606, 1X4DE607, 2X4DE600, and 2X4DE601 define each of the safe load paths and load heights (as applicable) specifically for the OHLHS where an unacceptable interaction was found. The specified safe load heights were obtained by analysis and, by administratively controlling the height, a postulated drop will not cause unacceptable interactions.

9.1.5.3.1 Postulated Loads Inside Containment

The effects of heavy load drops inside containment have been evaluated. Table 9.1.5-3 lists each of the loads and the basis for satisfying the NUREG 0612 criteria.

9.1.5.3.1.1 Polar Crane Postulated Loads. When in use, the polar crane is under administrative controls. During cold shutdown, polar crane heavy load drop outside of the secondary shield wall would not affect the safe shutdown or continued decay heat removal due to the physical separation of the RHR system and its power supplies. Should the operating RHR supply or return lines be ruptured, RCS fluid would discharge to the containment floor; however, it would be a nonflashing break, and adequate ECCS would be available to maintain decay heat removal. Any break could be remotely isolated.

Heavy load drops inside of the secondary shield walls could potentially impact a Class I branch line. Should the impacted line break, the RCS fluid would be nonflashing. Since the RHR

would already be in operation, core cooling would not be affected unless the operating RHR line was the one impacted. Switchover of the RHR suction from the RWST to the containment sump could be required during the long-term recovery period and would be done manually.

During hot standby and hot shutdown, it is anticipated that the polar crane will be used to minimize critical path outage times for cold shutdowns and refuelings, and to assist with maintenance that can be performed in a hot plant condition. Planned usage includes activities such as crane inspections, operability checks, and movement of tools and equipment required for the cold shutdown/refueling outage. The anticipated loads would not be required to be lifted in the vicinity of the reactor vessel.

The significance of crane operation and the restricted load movement around the reactor vessel will be stressed to those involved with heavy load lifts. Anticipated heavy load movements have been analyzed (as required by NUREG 0612) and safe load paths defined. However, all specific loads and load paths cannot be defined prior to the operations. For these cases, safe load path considerations will be based on comparison with analyzed cases, previously defined safe movement areas, and previously defined restricted areas and reviewed by the plant review board as discussed in paragraph 9.1.5.6. The particular analyzed cases are discussed in the following sections. The analyses are in accordance with Appendix A of NUREG 0612. See paragraph 9.1.5.3.1.1.4 for discussion of concurrent refueling operations and use of the polar crane.

9.1.5.3.1.1.1 Upper Internals. The most limiting scenario for the postulated drop of the upper internals assembly, lifting device, and crane load block was determined to be the lift of the upper internals assembly from the reactor vessel to the point that the upper support plate reaches the height of water level in the refueling cavity and dropped concentrically onto the vessel flange. It is assumed that the bushings engage the vessel guide studs. The concentric drop configuration is the limiting condition for loading the reactor vessel nozzles and supports because in a nonconcentric drop most of the impact would be taken by the refueling cavity floor liner plate. The assembly weight of 174,000 lb_f falls 24.5 ft through water and impacts on the top of the core hold-down spring and core barrel flange assembly which is supported at the vessel ledge. The idealized spring-mass system of the struck body (i.e., core hold-down spring, barrel flange, vessel and nozzle supports) is able to absorb all the kinetic energy of the dropped assembly without overstressing the system. The calculated impact load at each nozzle is 5.967 x 10^6 lb, resulting in vessel nozzle pad bearing stress to be 20,435 psi, which is well below the code allowable of 2 s_y = 100,000 psi.

The reactor upper internals will follow the safe load path defined on drawing 1X4DE600.

9.1.5.3.1.1.2 Reactor Vessel Head. The vessel head drop accident in the dry cavity lift method is postulated to occur during refueling when the head is manipulated over the reactor vessel. The polar crane is postulated to fail resulting in a direct, concentric drop of the head (including polar crane load block) onto the reactor vessel, which analysis has shown is the most limiting scenario for the head impact on the vessel. The limiting drop distance assumed in the analysis is 31 ft through air.

The total dropped weight assumed in the analysis was 450,000 lbs, which includes the integrated head package with the permanent head shield. The vessel studs, nuts, washers, and collars are not included in the assumed weight. The results of the analysis indicate that permanent deformation would occur in the reactor vessel support structures, but the stresses in the nozzles are below the allowable faulted stress of 1.05 S_u which is within the ASME Code allowable values. The results indicated that the vessel supports would deform vertically a total of 1.3934 in. under these loadings. This deflection corresponds to a material strain of about 5.5%. This strain is within the ultimate capability of the material, i.e. 18%. Shield wall concrete

response to the impact loading remains elastic. The reactor vessel head will follow the safe load path defined on drawing 1X4DE601.

The results of the reactor vessel head drop analysis with the stated assumptions demonstrate that vessel integrity and the capability to cool the core will be maintained in the event of a drop of the reactor vessel head. Because of these acceptable results, the head can be raised promptly upon removal of studs, nuts, washers, and collars, which allows the duration for which the reactor vessel is vulnerable to a polar crane failure to be minimized.

For the alternative method of raising the head slowly as the cavity is filled, maintaining the head just above the water for the duration of the fill (cavity fill/slow lift method), a reactor vessel head drop has been postulated to occur during refueling when the head is manipulated over the reactor vessel. Engineering analysis has been performed to support the acceptability of this alternative method. The polar crane is postulated to fail resulting in a concentric drop of the head (including polar crane load block) onto the reactor vessel. The drop distance found to be most limiting for this evaluation was a 6.5-ft drop through air followed by a 24.4-ft drop through water. The total dropped weight assumed in the analysis for the alternative method was 440,000 lbs.

The results of the analyses indicate that the reactor vessel nozzles would not be stressed above allowable limits. The reactor vessel supports, however, would experience a load in excess of the faulted condition allowable load. A detailed support evaluation was performed. The results indicated that the vessel supports would deform vertically a total of 0.90 in. under these loadings. The total allowable deformation of these supports, considering plastic deformation and strain hardening, was found to be 0.92 in. This indicates that under loadings from a head drop accident in which the alternative method for head lift was being used, the supports would be damaged, but would not fail. The subsequent effects of the reactor vessel head drop on the primary shield wall was evaluated, and it was determined that the primary shield wall would deform elastically. The reactor vessel head will follow the safe load path defined on drawing 1X4DE601.

In response to industry initiative NEI 08-051, an analysis was performed with similar methods to evaluate the 35-ft drop of a reactor vessel head weighing 410,000 lbs through air and impacting the reactor vessel flange. The purpose of the analysis is to provide additional assurance regarding the ability of the reactor vessel, nozzles, and loop piping to provide cooling to fuel in the reactor in the unlikely event of a reactor vessel head drop event.

In the NEI 08-05 analysis, the mass of the impacted system was modeled conservatively low by neglecting the vessel mass below the nozzles and modeling only the RV flange, upper shell and nozzles. The response of the impacted system with assumed reduced mass results in increased system response which conservatively increases the calculated nozzle stresses. The resulting stress intensities in the RV nozzles were determined to be within the allowable ASME limit. Therefore, the previous conclusion that vessel integrity and the capability to cool the core will be maintained in the event of a head drop determined in accordance with the methods and assumptions of NUREG-0612 described above, remains valid.

It should be noted that the assumptions contained in NEI 08-05 are not consistent with NUREG-0612. For example, the NEI 08-05 analysis is based on the weight of the vessel head package without inclusion of the weight of the lifting device as required by NUREG-0612. Accordingly, administrative controls for movement of the reactor vessel head are based on the NUREG-0612 analysis described above.

9.1.5.3.1.1.3 Crane Load Block Drop onto the Core. The worst case scenario for the postulated drop of the load block was determined to be a drop through 102.5 ft in air and then

35.5 ft in water flat into the core. Based on the load block projected area, a 6 x 6 array of fuel assemblies could be impacted. Administrative controls prohibit load block travel over the exposed core except during removal or installation of the vessel head or upper internals.

9.1.5.3.1.1.4 Reactor Coolant Pump. Normal maintenance of the reactor coolant pump and motor does not require movement of the motor to the operating deck. However, it is postulated that the pump motor is lifted to the operating deck approximately once every 5 years. Since a drop from less than the maximum required lift height could cause a significant impact on the pump casing with a potential for structural deformation of the pump supports and loop piping, these lifts are under strict administrative controls and follow a specific load handling procedure. RCP motor load lift can be performed in the following manner based on the plant operating mode:

A. Mode 5 (cold shutdown with loops filled) requires that one RHR train shall be operable and in operation, and either one additional RHR train shall be operable or at least two steam generators shall be capable of being used for decay-heat removal. The RCP motor load could travel within the RCP safe load path to the north-south center line of the reactor over an inoperable RHR train as long as the alternate RHR train is operable and in operation, or over an operating RHR train as long as the other train is operable and in standby.

B. Mode 5 (cold shutdown with loops not filled), requires that two RHR trains shall be operable and at least one RHR train shall be in operation. Under these conditions, there are no additional restrictions on the movement of the RCP motor load within the designated RCP safe load path.

C. Mode 6 (refueling mode when the water level above the reactor vessel flange is greater than or equal to 23 ft) requires that one RHR train shall be operable and in operation. The RCP motor load could travel within the RCP safe load path to the north-south center line of the reactor over an inoperable RHR train (or other project class 111 large bore pipe) as long as the alternate RHR train is operable and in operation, or over an operating RHR train as long as the other train is operable and in standby. During the lift, there shall not be any fuel movement in progress.

D. Mode 6 (refueling mode when the water level above the reactor vessel flange is less than 23 ft) requires that two RHR trains shall be operable and one RHR train in operation. The RCP motor load may be moved anywhere within the designated RCP safe load path as long as no fuel movement is in progress.

The specific load path is defined on drawing 1X4DE602.

During refueling operations a postulated load drop in the vicinity of the reactor coolant pump hatches could result in water leakage from the RCS that could uncover in-transit fuel in the refueling canal or spent fuel pool (via the transfer tube). To preclude this occurrence, the restrictions described below shall be placed on using the reactor coolant pump jib cranes and/or the polar crane above the reactor coolant pump hatches while irradiated fuel is being moved inside containment, or while the transfer tube isolation valve is open and irradiated fuel is being moved in the fuel handling building:

A. Maximum lift weights and heights shall be limited to the values given in figure 9.1.5-3 for lifted loads traveling over the reactor coolant pump hatches with the grating for the platform at el 220 ft 0 in. in place.

B. The reactor coolant pump jib crane and the polar crane shall not be used directly above or inside the reactor coolant pump hatches when the grating at el 220 ft 0 in. is removed.

9.1.5.3.1.1.5 Internals Lifting Rig. Anticipated heavy load movements have been analyzed and safe load paths defined, as discussed in paragraph 9.1.5.3.1.1.1. When not in use, the rig is normally stored on the upper internals storage stand. However, movement of the rig to the operating deck or el 261 ft structural steel floor is required for temporary storage during maintenance activities. For these temporary storage cases, safe load path considerations are based on administrative controls and comparison with analyzed cases, previously defined safe movement areas, and previously defined restricted areas.

The specific load path for the temporary storage location is defined on drawing 1X4DE604.

9.1.5.3.1.1.6 Carbon Bed Containers. It is expected that the carbon in the containment building pre-access filtration units will need to be replaced several times over the life of the plant. As part of this activity, two special temporary containers will be brought into containment, lifted and placed on the floor at el 261 ft-0 in. with the polar crane. Each container weighs approximately 18,000 lb when filled with carbon. When the carbon bed replacement is completed, the containers will be removed from containment. For the temporary placement of these containers, safe load considerations are based on administrative controls and comparison with analyzed cases, previously defined safe load movement areas, and previously defined restricted areas.

The specific load path for these temporary containers is defined on drawing 1X4DE608.

9.1.5.3.1.2 Other Cranes Inside Containment. The safety evaluation of the refueling machine is discussed in paragraph 9.1.4.3.1.1. The effect of dropping a load from the reactor coolant pump maintenance jib crane onto the pump motor stand was evaluated. A drop from 37 ft will not cause buckling of the pump support columns nor yielding of the primary coolant piping. A load drop from the radial arm stud tensioner hoist assemblies could occur only when the integrated head is in place. When in its fully extended position on the radial arm, a postulated drop would land on the seal ring and would not damage the reactor vessel or decay heat removal capability. As shown in table 9.1.5-3, the postulated load drops from the remaining monorails will not preclude decay heat removal capability or damage fuel. See paragraph 9.1.5.3.1.1.4 for discussion of concurrent refueling operations and use of the reactor coolant pump maintenance jib crane.

9.1.5.3.2 Postulated Loads Inside Fuel Handling Building

There are two OHLHS associated with the fuel handling building: the cask lifting device jib crane and the spent fuel cask bridge crane (SFCBC). A drop from the cask lifting device jib crane from its maximum possible height was analyzed and determined not to impact safety-related equipment or compromise the integrity of the spent fuel pool. Because of the 8-ft proximity of the jib crane to the spent fuel pool, minimum lift heights will be utilized for the use of the jib crane to preclude the potential for a load to tip or roll into the spent fuel pool.

The spent fuel cask bridge crane operates in the fuel handling and railroad car bay of the auxiliary building. It is anticipated that the number of lifts made by the spent fuel cask bridge crane associated with the spent fuel cask, new fuel shipping containers, and new fuel assemblies will be small compared to the miscellaneous equipment and maintenance lifts that will occur in the auxiliary building. For those SFCBC loads which are handled in the fuel

handling building, specific procedures will be utilized. The SFCBC main hoist conformance with NUREG 0554 is shown in table 9.1.5-5.

A postulated load drop of 5 tons from the auxiliary hoist of the SFCBC has been analyzed and determined not to compromise the integrity of the spent fuel pool. The movement of the new fuel containers is governed by a specific procedure that defines the safe load path in the fuel handling building (drawing 1X4DE603) to maximize the distance between the load and the spent fuel pool. The analysis of a postulated load drop from the monorail hoist of the SFCBC is enveloped by the auxiliary hoist analysis discussed above. The movement of the new fuel assemblies from the new fuel containers does not qualify as a heavy load. If heavy loads other than those specified in table 9.1.5-4 are to be moved within the fuel handling building, the safe load paths to maintain maximum distance between the load path and the spent fuel pools will be reviewed and approved by the plant review board. In addition, if the safe load path is within 15 ft of the spent fuel pool, the review board will review any special equipment (safety cables, etc.) or geometric arguments that would preclude the load from rolling or tipping into the spent fuel pool. Periodically, it will be necessary to replace the seals associated with the spent fuel pool gates between the pool and the cask loading pit and the pool and the fuel transfer canal. The gate seal removal for both the transfer canal and cask loading pit seal will utilize the fuel handling machine to remove the seal and transport it to the cask loading pit. The seal will then be transferred to the monorail hoist of the SFCBC and placed in an acceptable work area. The seal frame weighs approximately 1500 lb, which classifies it as a light load. Administrative controls and safety cables will ensure that minimum lift heights will be followed and minimum drop heights would occur. Movement of the seal over fuel assemblies will be minimized whenever possible.

9.1.5.3.3 Postulated Loads Inside Other Buildings

The effects of postulated load drops in the auxiliary building, lower levels of the fuel handling building, diesel generator building, auxiliary feedwater pumphouse, and nuclear service cooling water pumphouse have been evaluated. Table 9.1.5-2 lists each of the loads and the bases for satisfying the NUREG 0612 criteria.

All loads, except nine, postulated in table 9.1.5-2 can be excluded from the NUREG 0612 requirements based on not compromising the ability of safety-related equipment to perform its safety function or preclude decay heat removal.

A postulated drop of 6000 lb and 18 ft from the backflushable filter/hatch covers/resin charging tank hoist on level B of the auxiliary building was analyzed. It was determined that a drop from this height could cause sufficient secondary missiles on level D that the ability to safely shut down could be compromised. The only safe shutdown equipment/components that would be affected are located under the mezzanine area. By analysis, a safe load height was determined such that a postulated drop would not compromise components on level D. The safe load height of 3 ft is incorporated into the safe load path shown on drawing 1X4DE605. This safe load path will be administratively controlled and will be a part of the load handling procedures described in paragraph 9.1.5.6.

A postulated load drop of a filter transfer cask (4890 lb) over an out-of-service CVCS seal injection filter during maintenance activities to replace the filter cartridge has been analyzed. The analysis concludes that a postulated load drop of the transfer cask from a height of 3 ft above the auxiliary building level B mezzanine slab will be contained within the filter's level B chamber and would not generate secondary missiles on level C. Load restrictions during CVCS seal injection filter cartridge replacement are administratively controlled and incorporated into the safe load path drawing 1X4DE605.

A postulated load drop of a filter transfer cask (4890 lb) over an out-of-service reactor coolant filter during maintenance activities to replace the filter cartridge has been analyzed. The analysis concludes that a postulated load drop of the transfer cask from a height of 3 ft above the auxiliary building level B mezzanine slab will be contained within the filter's level B chamber and would not generate secondary missiles on level C. Damage to the filter and piping resulting from a load drop may affect the seismic qualification of the upstream and downstream piping systems; however, the load drop itself will not cause a failure of the upstream and downstream piping that could affect safe shutdown or decay heat removal capabilities as long as the filter is bypassed and isolated. Load restrictions during a reactor coolant filter cartridge replacement are administratively controlled and incorporated into the safe load path drawing 1X4DE605.

The analysis of a postulated drop of 8000 lb and 9 ft 8 in. from the cartridge filter hatch cover and filter cask hoist on level D of the auxiliary building determined that a drop in the area of the boric acid filter on level D from a height greater than 1 ft would compromise the ability of the boric acid filter to function. The safe load path for the OHLHS is shown on drawings 1X4DE606 and 2X4DE601.

A postulated load drop of the residual heat removal (RHR) heat exchanger would compromise the redundant train of residual heat removal and the redundant train of the nuclear service cooling water system. In addition to crane operator qualification load handling procedures and conformance of lifting devices (sling and associated devices) with ANSI B30.9-1971, an inspection of the monorail, hoist, lifting device (sling and associated devices), and lifting lug attached to the heat exchanger will be performed prior to the lift.

The analysis of a postulated drop of the equipment hatch cover (4000 lbs) on the 6-inch slab at the roof of Unit 2 control building, level 3, determined that a drop from a height greater than 6 feet could cause the roof to collapse and compromise the ability to shut down Unit 2. The safe load path for the OHLHS is shown on drawing 2X4DE600.

The analysis of a postulated drop of the auxiliary feedwater pumphouse sump pump hatch cover (approximately 25,000 lbs), on the auxiliary feedwater pumphouse roof, determined that a drop in this area from a height greater than 2 feet might cause the roof to collapse and compromise the ability to safely shut down. The safe load path for the OHLHS is shown on drawing 1X4DE607.

The analysis of a postulated drop of 3100 lb at a maximum height of 7 ft from the floor plugs on the level A corridor of the auxiliary building determined that a drop in the area of the waste decay tanks on level B from a drop height greater than 6 inches may affect decay heat removal and radiological release exceeding 10 CFR 100 limits. The safe load path for the OHLHS is denoted on drawings 1X4DE503 and 2X4DE503.

The analysis of a postulated load drop of the floor plug (approximately 5000 lb) on the level A concrete floor determined that a drop in the area of the seal water heat exchanger greater than 6 inches may cause the floor to collapse and compromise the ability to safely shutdown Unit 1. The safe load path for the OHLHS is denoted on drawing 1X4DE503.

9.1.5.4 Tests and Inspections[a]

Selected load carrying mechanical components subject to repeated stress undergo nondestructive examination in the shop.

[a] Inspections credited for license renewal are summarized in the Overhead and Refueling Crane Inspection Program description in subsection 19.2.20.

Preoperational testing is performed in the field to demonstrate acceptable performance of mechanical and electrical components. The cask crane and polar crane main hook and auxiliary hook are load tested to 125% of hoist rating in accordance with ANSI B30.2. The ability of these cranes to handle loads smoothly within the design speed range is demonstrated by testing in accordance with Occupational Safety and Health Administration (OSHA) P 1910.

Prior to use, components and interfacing portions of the components are checked to ensure proper matchup and verify they are free of foreign or loose parts.

Test, inspection, and maintenance of OHLHS are performed in accordance with the manufacturer recommendations and will be consistent with ANSI B30.2 or with appropriate ANSI standards with the clarification that when the crane use frequency is less than the specified test or inspection frequency, the test or inspection will be done prior to crane use.

9.1.5.5 Instrumentation Applications

Mechanical and electrical interlocks are provided when required to ensure the proper and safe operations of OHLHS.

The OHLHS are equipped with limit switches as appropriate to prevent improper travel and ensure safe operation of OHLHS. Specific details and descriptions of OHLHS are provided in paragraph 9.1.5.2.

9.1.5.6 Load Handling Procedures

Load handling operations for heavy loads that are or could be handled over or in proximity to irradiated fuel or safe shutdown equipment are controlled by written procedures. As a minimum, procedures will be used for handling loads with spent fuel cask bridge crane and polar crane, and for those loads listed in table 3-1 of NUREG 0612. Each procedure will address:

- The specific equipment required to handle load (e.g., special lifting device, slings, shackles, turnbuckles, clevises, load cell, etc.).
- The requirements for crane operator and riggers qualification.
- The requirements for inspection prior to load movement and acceptance criteria for inspection.
- The defined safe load path and provisions to provide visual reference to the crane operator and/or signal person of the safe load path envelope.
- Specific steps and proper sequence to be followed for handling load.
- Precautions, limitations, prerequisites, and/or initial conditions associated with movement of the load.

Slings and other devices used with the sling to make a complete lifting device that are specified in the load handling procedures will conform to NUREG 0612 and ANSI B30.9 as described in paragraph 9.1.5.2.5.

Equipment layout drawings showing the safe load path will be used to define safe load paths in load handling procedures. Deviation from defined safe load paths will require a written alternative procedure approved by the Plant Review Board.

9.1.6 DRY SPENT FUEL STORAGE

In order to provide additional temporary spent fuel storage capacity, Southern Nuclear Operating Company (SNC) has chosen to exercise the general license provisions 10 CFR Part 72, Subpart K, for temporary storage of spent fuel in an ISFSI pending removal from the site by the U.S. Department of Energy. As described in 10 CFR 72.212, the general license is limited to storage of spent fuel which SNC is authorized to possess at the site under its Part 50 specific license and is restricted to use of spent fuel casks that have been revised and approved by the NRC for use under the general license provisions of Part 72. Operation of the ISFSI and corresponding analyses is described in the Vogtle 10 CFR 72.212 Report.

9.1.6.1 Facility Description

The ISFSI is located south of the auxiliary building inside the protected area as described in paragraph 1.2.10.6. The ISFSI consists of two concrete storage pads designed to accommodate 36 spent fuel casks and support equipment. Security fencing and radiological postings are provided consistent with the VEGP physical security plan and radiation protection program, respectively. A list of acceptable spent fuel casks for use at VEGP and an evaluation for each is provided in table 2.2-1 of the Vogtle 10 CFR 72.212 Report.

SNC selected the HI-STORM 100 cask system by HOLTEC International and granted Certificate of Compliance (CoC) 1014 by the NRC, for dry storage of spent fuel under the general license provisions of 10 CFR 72, Subpart K, at Vogtle. The HI-STORM 100 cask system is a canister-based system with a capacity of up to 32 pressurized water reactor fuel assemblies for temporary onsite storage pending removal to a federal repository and consists of the following:

- Storage overpack (HI-STORM 100S, Version B).
- Multipurpose canister (MPC-32).
- Transfer overpack (HI-TRAC 125D).

The HI-STORM 100 cask system utilizes a transfer cask for the purpose of placing an empty canister into the cask loading pit, shielding during canister closure operations, and transfer of the canister to the storage overpack. The HI-TRAC 125D carrying a loaded MPC-32 canister weighs approximately 125 tons during removal from the spent fuel cask loading pit and represents the heaviest load associated with spent fuel cask loading operations. Water is removed from the canister as necessary to assure the lifted weight remains less than the 125-ton maximum critical load of the spent fuel cask bridge crane. Handling of heavy loads associated with spent fuel cask loading operations is described in subsection 9.1.5.

To facilitate transfer of the canister from the transfer cask to the storage overpack, and ultimately transfer of the canister to a transportation cask for shipment offsite, a cask transfer facility (CTF) is provided in the existing protected area in close proximity to the ISFSI. A vertical cask transporter is used for transporting the loaded transfer cask from the auxiliary building to the CTF and the loaded storage overpack to the ISFSI. The vertical cask transporter is also used at the CTF as the lifting mechanism for transfer of the MPC from the transfer cask to the

storage overpack as part of loading operations and the storage overpack to the transfer cask should recovery and unloading be required.

TABLE 9.1.3-1 (SHEET 1 OF 3)

SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM
COMPONENT DESIGN PARAMETERS

Spent Fuel Pool Pump	
Number	2
Design pressure (psig)	150
Design temperature (°F)	200
Design flow (gal/min)	2300
Material	Stainless steel
Spent Fuel Pool Skimmer Pump	
Number	1
Design pressure (psig)	150
Design temperature (°F)	200
Design flow (gal/min)	100
Material	Stainless steel
Refueling Water Purification Pumps	
Number	1
Design pressure (psig)	120
Design temperature (°F)	140
Design flow (gal/min)	250
Material	Stainless steel
Spent Fuel Pool Heat Exchangers[a]	
Number	2
Type	Shell and U tube
Design heat transfer (Btu/h)	17.38×10^6
Required capacity (Btu/h/°F)	2.0×10^6

TABLE 9.1.3-1 (SHEET 2 OF 3)

	Shell	Tube
Design pressure (psig)	150	150
Design temperature (°F)	200	200
Design flow (lb/h)	1.98×10^6	1.14×10^6
Inlet temperature (°F)	105	128
Outlet temperature (°F)	114	113

	Shell	Tube
Fluid circulated	Component cooling water	Spent fuel pool water
Material	Carbon steel	Stainless steel

Spent Fuel Pool Demineralizer

Number	1
Type	Flushable
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	100
Resin volume (ft^3)	30[(b)]
Material	Stainless steel

Spent Fuel Pool Cartridge Filter

Number	1
Design pressure (psig)	350
Design temperature (°F)	200
Design flow (gal/min)	250
Filtration requirement	98% retention of particles above 5 μm
Material, vessel	Stainless steel

Spent Fuel Pool Skimmer Filter

Number	1
Internal design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	100
Filtration requirement	98% retention of particles above 5 μm
Material, vessel	Stainless steel

TABLE 9.1.3-1 (SHEET 3 OF 3)

Spent Fuel Pool Strainer

Number	2
Design temperature (°F)	200
Rated flow (gal/min)	2300
Perforation (in.)	Approximately 0.2
Material	Stainless steel

Spent Fuel Pool Skimmer/Strainer

Number	2
Design temperature (°F)	200
Design flow (gal/min)	68
Perforation (in.)	1/2 x 1/2
Material	Stainless steel

(a) The heat exchanger design and sizing is based on the parameters as shown. The spent fuel pool temperature analyses utilize the same physical parameters for the heat exchanger. However, the heat exchanger performance is calculated based on the maximum heat load for each case and the overall performance of the heat removal systems that transfer the heat from the spent fuel pool to the ultimate heat sink.

(b) This is the design maximum loading. Smaller volumes may be used based on operational needs and type of resin used. Media loaded into demineralizer is evaluated through the VEGP Chemical Control Program.

TABLE 9.1.3-2 (SHEET 1 OF 8)

FAILURE MODE AND EFFECTS ANALYSIS FOR COOLING PORTION OF SFPCPS[b]

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
1	Spent fuel pit pump P6-002 (train A)	Circulates spent fuel pit water through heat exchanger to maintain below 170°F for normal refueling case. (note a)	All except loss of offsite power (see general remarks)	Stops running due to electrical protection	Pump trip alarm in control room, local amber indication on HS-10627, and low local pump discharge pressure indication on PI-0627A. If condition persists for extended time (see general remarks), high spent fuel pit temperature alarm from TISH-626 in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	Activation of redundant train is manual. For normal refueling case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5°F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus within 40 s after the loss of power.
				Fails to start upon command or spurious stop	Same as above, except no pump trip alarm and no amber light in control room. Pump status light on HS-10627 is green.	Same as above	
2	Spent fuel pit pump P6-005 (train B)	Circulates spent fuel pit water through heat exchanger to maintain below 170°F for normal refueling case. (note a)	All except loss of offsite power (see general remarks)	Stops running due to electrical protection.	Pump trip alarm in control room, local amber indication on HS-10628, and low local pump discharge pressure indication on PI-0627B. If condition persists for extended time (see general remarks), high spent fuel pit temperature alarm from TISH-626 in control room.	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	Activation of redundant train is manual. For maximum normal refuel ing case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5°F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus within 40 s after the loss of power.
				Fails to start upon command or spurious stop	Same as above, except no pump trip alarm and no amber light in control room. Pump status light on HS-10628 is green.	Same as above	

TABLE 9.1.3-2 (SHEET 2 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
3	Spent fuel pit heat exchanger E6-001 (train A)	Transfers spent fuel pit heat load to component cooling water system 1203	All	Tube leakage from spent fuel pit into component cooling water (shell) side	Low spent fuel pit level alarm LSHL-625, high component cooling water surge tank level alarm LIT-1846, and high component cooling water return flow radiation alarm RE-017A in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence there is ample time for the operator to actuate the redundant pump.	Activation of redundant train is manual. For normal refueling case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5°F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus within 40 s after the loss of power. Also, spent fuel can never be uncovered since the suction line connections are located 4 ft below the normal water level. Siphoning of spent fuel pit water is precluded by small holes in the water return lines. During normal operation, component cooling water pressure in the spent fuel pit heat exchanger is higher than that of the spent fuel pit water.
				Tube leakage from component cooling water into spent fuel pit water (see general remarks)	Component cooling water surge tank low level alarm LIT-1846 and/or operation of makeup valve LV-1850; also, rise in heat exchanger outlet temperature TI-628A, small spent fuel pit level rise, and possible alarm LSHL-625 in control room.	Same as above	
				External shell (component cooling water) side leakage	Component cooling water surge tank low level alarm LIT-1846 and/or operation of makeup valve LV-1850 plus flood alarms in the control room from spent fuel pit heat exchanger room sump and/or wall-mounted level switches LSH-9802 and/or LSH-9798 in control room; small rise in spent fuel pit temperature, possible alarm TISH-626, and small rise in heat exchanger discharge temperature TI-628A.	Same as above	

TABLE 9.1.3-2 (SHEET 3 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
				Tube (spent fuel pit) side blockage	Rise in spent fuel pit temperature and possible alarm TISH-626 plus rise in heat exchanger outlet temperature TI-628A.	Same as above	
4	Spent fuel pit heat exchanger E6-002 (train B)	Transfers spent fuel pit heat load to component cooling water system 1203	All	Tube leakage from spent fuel pit into component cooling water (shell) side	Low spent fuel pit level alarm LSHL-625, high component cooling water surge tank level alarm LIT-1847, and high component cooling water return flow radiation alarm RE-017B in control room.	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling function for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	Activation of redundant train is manual. For normal refueling case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5°F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus with 40 s after the loss of power. Also, spent fuel can never be uncovered since the suction line connections are located 4 ft below the normal water level. Siphoning of spent fuel pit water is precluded by small holes in the water return lines. During normal operation, component cooling water pressure in the spent fuel pit heat exchanger is higher than that of the spent fuel pit water.
				Tube leakage from component cooling water into spent fuel pit water (see general remarks)	Component cooling water surge tank low level alarm LIT-1847 and/or operation of makeup valve LV-1851; also, rise in heat exchanger outlet temperature TI-628B, small spent fuel pit level rise, and possible alarm LSHL-625 in control room.	Same as above	
				External shell (component cooling water) side leakage	Component cooling water surge tank low level alarm LIT-1847 and/or operation of makeup valve LV-1851 plus flood alarms in the control room from spent fuel pit heat exchanger room sump and/or wall-mounted level switches LSH-9803 and/or LSH-9799 in control room; small rise in spent fuel pit	Same as above	

TABLE 9.1.3-2 (SHEET 4 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
					temperature, possible alarm TISH-626, and small rise in heat exchanger discharge temperature TI-628B.		
				Tube (spent fuel pit) side blockage	Rise in spent fuel pit temperature and possible alarm TISH-626 plus rise in heat exchanger outlet temperature TI-628B.	Same as above	
5	Manual valve U6-001, normally open gate valve (train A)	Isolates suction of pump P6-002 for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10627, and low local pump discharge pressure indication on PI-0627A. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	
6	Manual valve U6-003, normally open gate valve (train B)	Isolates suction of pump P6-005 for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10628, and low local pump discharge pressure indication on PI-0627B. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	

TABLE 9.1.3-2 (SHEET 5 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
7	Manual valve U6-005, locked open gate valve (train A)	Isolates pump P6-002 from heat exchanger E6-001 for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10627, and local pump shutoff pressure indication on PI-0627A. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	
8	Manual valve U6-007, locked open gate valve (train B)	Isolates pump P6-005 from heat exchanger E6-002 for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10628, and local pump shutoff pressure indication on PI-0627B. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	
9	Manual valve U6-009, locked open gate valve (train A)	Isolates heat exchanger E6-001 from spent fuel pit for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10627, and local pump shutoff pressure indication on PI-0627A. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	

TABLE 9.1.3-2 (SHEET 6 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
10	Manual valve U6-010, locked open gate valve (train B)	Isolates heat exchanger E6-002 from spent fuel pit for maintenance	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10628, and local pump shutoff pressure indication on PI-0627B. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
				External (stem) leakage	Visual inspection	Same as above	
11	Manual valve HV-8754A, normally open butterfly valve (train A)	Provides manual flow control and flow balancing in train A spent fuel pit cooling loop	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10627, and local pump shutoff pressure indication on PI-0627A. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks of item 1.
12	Manual valve HV-8754B, normally open butterfly valve (train B)	Provides manual flow control and flow balancing in train B spent fuel pit cooling loop	All	Inadvertent closure	Pump trip alarm in control room, local amber indication on HS-10628, and local pump shutoff pressure indication on PI-0627B. If condition persists for extended time, high spent fuel pit temperature alarm from TISH-626 in control room	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	For valve closure cases, it is presumed that pump in same train is operating and will trip if valve is closed. Also, see general remarks on item 1.
13	Check valve U6-004	Prevents backflow of spent fuel pit	All	Fails open with line break in non-Q	Loss of spent fuel pit water with low level	None; break in non-Q piping can be isolated with valves U6-57, U6-	Activation of redundant train is manual. For normal

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
		water through purification loop, if latter fails		purification loop	alarm LSHL-625 in control room.	058, and U6-053.	refueling case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5° F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power but within 40 s after the loss of power.
14	Manual valve U6-028, normally open diaphragm valve (train A); valve normally closed if train B in service.	Isolates pump P6-002 discharge from non-Q purification loop	All	Fails or left open with faulted purification loop	Low spent fuel pit level alarm LSHL-0625 in control room plus spent fuel pit temperature rise and possible high temperature alarm TISH-26.	None; train B available to provide 100 percent of required cooling capacity. In the most limiting case, it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	Activation of redundant train is manual. For normal refueling case, spent fuel pit temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5° F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus within 40 s after the loss of power. Also, spent fuel can never be uncovered since the suction line connections are located 4 ft below the normal water level. Siphoning of spent fuel pit water is precluded by small holes in the water return lines. During normal operation, component cooling water pressure in the spent fuel pit heat exchanger is higher than that of the spent fuel pit water.
				External (stem) leakage	Visual inspection	Same as above	
15	Manual valve U6-030, normally	Isolates pump P6-005 discharge from non-Q	All	Fails of left open with faulted purification loop	Low spent fuel pit level alarm LSHL-0625 in control room plus spent	None; train A available to provide 100 percent of required cooling capacity. In the most limiting case,	Activation of redundant train is manual. For normal refueling case, spent fuel pit

TABLE 9.1.3-2 (SHEET 8 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
	closed diaphragm valve (train B); valve normally open if train A in service.	purification loop			fuel pit temperature rise and possible high temperature alarm TISH-626.	it takes 2.9 h after the loss of spent fuel pit cooling functions for the water to reach the boiling point; hence, there is ample time for the operator to actuate the redundant pump.	temperature is 170°F with one train operating. The heatup rate for no cooling is 14.5°F/h. The spent fuel pit pump is shed automatically upon loss of offsite power but can be manually loaded onto the emergency ac power bus within 40 s after the loss of power. Also, spent fuel can never be uncovered since the suction line connections are located 4 ft below the normal water level. Siphoning of spent fuel pit water is precluded by small holes in the water return lines. During normal operation, component cooling water pressure in the spent fuel pit heat exchanger is higher than that of the spent fuel pit water.

a. During emergency core unloading case, the spent fuel pool temperature is below 182°F with one train of spent fuel pool cooling in operation even though a single failure is not required to be postulated for this case per NUREG 0800 (SRP 9.1.3)..

b. These values represent power uprate conditions.

TABLE 9.1.5-1 (SHEET 1 OF 3)

SPENT FUEL CASK BRIDGE CRANE
AND POLAR CRANE DATA

Spent Fuel Cask Bridge Crane

Main hoist	
Maximum full-load capacity (outside restricted area) [a]	15 tons
Maximum full-load capacity (inside restricted area)	125 tons
Full-load hoisting speed (normal)(raising and lowering)	0.25-5.0 ft/min
Hook lift	70 ft
Main/auxiliary hoist trolley	
Traveling speed	1-30 ft/min
Trolley traverse	27 ft 10 in.
Auxiliary hoist	
Maximum full-load capacity	15 tons
Full-load hoisting speed	0.25-15 ft/min
Hook lift	140 ft
Bridge	
Traveling speed	1-40 ft/min
Maximum travel	153 ft 10 in.
Monorail hoist	
Maximum full-load capacity	2 tons
Full-load hoisting speed	0-22 ft/min
Hook lift	40 ft 6 5/8 in.
Monorail trolley	
Trolley speed	30 ft/min
Trolley traverse	33 ft

a. Restricted area is the shaded portion of drawing AX4DE501.

TABLE 9.1.5-1 (SHEET 2 OF 3)

Pendant	
Fixed cable length	45 ft
Design standards	
General	CMAA No. 70 (1975) ANSI B30.2.0 (1976)
Electrical	NFPA Vol. 5, Article 610 (1978)
Others	
OSHA Section	1910.179 (2010)

Containment Polar Crane

Main hoist	
Maximum full-load capacity	225 tons
Full-load hoisting speed (normal)	0-5.3 ft/min
Full-load hoisting speed (inching)	4 in./min (max.)
Hook lift	150 ft
Main/auxiliary hoist trolley	
Traveling speed (normal)	0-55 ft/min
Traveling speed (inching)	12 in./min
Trolley traverse	106 ft 6 in.
Auxiliary hoist	
Maximum full-load capacity	25 tons
Full-load hoisting speed	0-43 ft/min
Hook lift	150 ft
Bridge	
Traveling speed (normal)	0-150 ft/min
Traveling speed (inching)	40 in./min (max.)

TABLE 9.1.5-1 (SHEET 3 OF 3)

Design standards	
General	CMAA No. 70 (1975), AISC ANSI B30.2 (1976)
Electrical	NFPA Vol. 5, Article 610 (1978)
Others	OSHA Section 1910.170 (1971)

TABLE 9.1.5-2 (SHEET 1 OF 11)

EVALUATION OF OVERHEAD HEAVY LOAD HANDLING SYSTEMS

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
				Auxiliary Building - Level D					
RHR pump A	6,000	3	5,000	14	Yes	No	2	1X4DE521 2X4DE521	
RHR pump B	6,000	3	5,000	14	Yes	No	2	1X4DE521 2X4DE521	
Cartridge filter hatch covers and filter cask	8,000	3,4	6,000	14	Yes	No	6	1X4DE521 2X4DE521 1X4DE606 2X4DE601	
Containment spray pumps A and B (2)	6,000	3	4,280	8	Yes	No	2	1X4DE521 2X4DE521	
				Auxiliary Building - Level C					
Centrifugal charging pump A	12,000	3	7,500	12	Yes	Yes	3	1X4DE522 2X4DE522	
Centrifugal charging pump B	12,000	3	7,500	12	Yes	Yes	2	1X4DE522 2X4DE522	
Normal charging pump	12,000	3	12,000	12	Yes	Yes	2	1X4DE522 2X4DE522	
RHR and containment spray valve encapsulation vessels and concrete hatch covers (2)	12,000	3	10,600, 6,670	8	Yes	Yes	3	1X4DE522 2X4DE522	
Steam generator blowdown heat exchangers (2)	3,000	3	2,200	8	No	Yes	3	1X4DE522 2X4DE522	

TABLE 9.1.5-2 (SHEET 2 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Boron recycle (6) holdup tank diaphragm	2,000	3	1,320	12	No	No	1	1X4DE522 2X4DE522	
Boric acid[h] batching tank	2,000	2,3,4	150	8	No	No	1	1X4DE522	
Boron recycle[h,j] evaporator package components	3,000	2,3	2,200	19	No	No	1	1X4DE522 2X4DE522	
Waste evaporator package components[j]	3,000	2,3	2,200	19	No	No	1	1X4DE522 2X4DE522	
Auxiliary Building - Level B									
Auxiliary component cooling water (ACCW) pumps (2)	6,000	3	5,730	8	Yes	Yes	3	1X4DE502 2X4DE502	
Safety injection pump A	8,000	3	6,100	8	Yes	Yes	3	1X4DE502 2X4DE502	
Safety injection pump B	8,000	3	6,100	8	Yes	Yes	3	1X4DE502 2X4DE502	
Backflushable filters/hatch covers/resin charging tank/ cartridge filter cask	6,000	3,4	5,600	18	Yes	Yes	6	1X4DE502 2X4DE502 1X4DE605	
Filter valve gallery (2)	6,000	3,4	5,400	8	Yes	No	2	1X4DE502 2X4DE502	
Seal water heat exchanger	2,000	3	1,315	6	Yes	Yes	3	1X4DE502 2X4DE502	
Access hatch cover	6,000	3	4,650	12	No	No	1	1X4DE502 2X4DE502	
Auxiliary Building - Level A									

TABLE 9.1.5-2 (SHEET 3 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Spent fuel pit pump	4,000	7	2,150	8	Yes	No	2	1X4DE503 2X4DE503	
Letdown heat exchanger tube bundle	4,000	3	2,350	8	Yes	No	2	1X4DE503 2X4DE503 also shows the letdown reheat heat exchanger tube bundle crane pathway. This crane capacity is < 1 ton.	
Spent fuel pit heat exchanger tube bundle (2)	16,000	3	13,220	8	Yes	No	2	1X4DE503 2X4DE503	
Component cooling water pumps (2)	4,000	3	2,800	8	Yes	Yes	3	1X4DE503 2X4DE503	
Feedwater regulating valves (2)	4,000	3	4,000	8	Yes	Yes	5	1X4DE503 2X4DE503	
Steam generator[h] blowdown filters hatch covers and filter cask	6,000	2,3,4	6,000	14	No	No	1	1X4DE503 2X4DE503	
Sample transport[h] cask from post accident sampling	2,000	2,3	560	8	No	No	1	1X4DE503	
RHR heat exchanger	30,000	3,4	29,500	55	Yes	Yes	7	1X4DE504 2X4DE504	Vertical lift.
RHR hot leg injection valve HV-8840	4,000	7	4,000	5	No	Yes	2,5	1X4DE503 2X4DE503	Vertical lift.
Floor plugs (corridor R-A30 & R-A69 to decay tank room & utility chase)	4,000	7	3,100	7	No	Yes	10	1X4DE503 2X4DE503	Safe load path defined on reference drawings.

TABLE 9.1.5-2 (SHEET 4 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Floor plugs (CCW pump room R-A05 to seal water heat exchanger R-B20)	6,000	7	5,000	8	No	Yes	10	1X4DE503	Safe load path defined on reference drawing.
				Auxiliary Building - Level 1					
RHR heat exchanger	30,000	3,4	29,500	44	Yes	Yes	7	1X4DE504 2X4DE504	Removal lift in horizontal position
Equipment hatches/misc equipment from lower levels (2)	12,000	3,4	12,000	150	Yes	No	2	1X4DE504 2X4DE504	
RHR heat exchanger room hatch covers	30,000	3,4	12,700	40	Yes	Yes	3	1X4DE504 2X4DE504	Hatches are on level A and are Lifted by RHR heat exchanger hoist on level 1.
Drum storage[h] area equipment spent filter cartridge	20,000	3,4	14,000	8	No	Yes	3	1X4DE504	
Hot machine [h] shop equipment ACCW heat exchangers	4,000	2,4,6	4,000	15	No	Yes	3	2X4DE504	
		(Heat exchangers are not lifted until they have been rolled outside of the auxiliary building, where they are lifted by a truck crane.)						1X4DE504 2X4DE504	
Demineralizer hatch/resin charging tank	8,000	2,4	3,830	15	Yes	Yes	3	1X4DE504 2X4DE504	

TABLE 9.1.5-2 (SHEET 5 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
				Auxiliary Building - Level 2					
Main steam safety and isolation valves (3)	8,000	3	6,850	15	Yes	Yes	5	1X4DE505 2X4DE505	
Atmospheric relief valves (2)	4,000	3	3,500	20	Yes	Yes	5	1X4DE505 2X4DE505	
Atmospheric Relief Valve Actuators	4,000	3	700	20	Yes	Yes	11	1X4DE505 2X4DE505	
Equipment hatches/ misc equipment from lower levels	10,000	3,4	10,000	35	No	No	2	1X4DE505 2X4DE505	
Equipment hatches/ misc equipment from lower levels	6,000	3,4	6,000	35	No	No	2	1X4DE505 2X4DE505	
Component cooling water heat exchangers		(Heat exchangers are not lifted until they have been rolled outside of the auxiliary building, where they are lifted by a truck crane)						1X4DE505 2X4DE505	
Equipment hatch cover	4,000	3,4	4,000	12	No	No	1	1X4DE505 2X4DE505	
Auxiliary building/stairwell jib crane	4,000	2,3	4,000	127	No	No	1	2X4DE505	
				Auxiliary Building - Roof					
Tendon surveillance equipment (test weights, ram, etc.)	>4,000	3	4,000	8	No	Yes	1	AX4DE503 1X4DE505 2X4DE505	
				Auxiliary Building - Ceiling					
Spent fuel cask bridge crane (parts service; gear box etc.)	5,000	3	5,000	60	No	Yes	4	1X4DE505 2X4DE505	Hansen Reducer (3000 - 5000 lbs.)

TABLE 9.1.5-2 (SHEET 6 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
				Fuel Handling Building - Level C					
RHR encapsulation vessel	12,000	3	10,600	8	Yes	No	2	1X4DE522 2X4DE522	
Containment spray encapsulation vessel	12,000	3	6,670	8	Yes	No	2	1X4DE522 2X4DE522	
Drain sump pumps (2)	4,000	3	1,135	11	No	No	1	1X4DE522 2X4DE522	
				Fuel Handling Building - Level A					
Spent fuel pit heat exchanger tube bundle	16,000	3	13,220	8	Yes	No	2	1X4DE506 2X4DE506	
Spent fuel pit pump	4,000	7	2,220	8	Yes	No	2	1X4DE506 2X4DE506	
Fuel transfer tube hatch	8,000	3	6,500	18	Yes	No	2	1X4DE506 2X4DE506	
				Fuel Handling Building - Level 1					
Cask lifting device jib crane					(Refer to table 9.1.5-4.)				
Fuel handling[h] machine					(Refer to table 9.1.5-4.)				
				Fuel Handling Building - Level 2					
Sample chase concrete hatch cover	8,000	2,3	5,000	8	Yes	Yes	2	1X4DE509 2X4DE509	
				Fuel Handling Building - Level 3					
Equipment hatch cover	4,000	3,4	4,000	12	No	Yes	1	1X4DE510 2X4DE510	
Spent fuel cask bridge crane					(Refer to table 9.1.5-4.)				
				Diesel Generator Building					
Diesel generator A components	10,000	2,4,6	10,000	27	Yes	No	2	1X4DE511 2X4DE511	

TABLE 9.1.5-2 (SHEET 7 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Diesel generator B components	10,000	2,4,6	10,000	27	Yes	No	2	1X4DE511 2X4DE511	
Diesel generator A components	6,000	2,4	6,000	27	Yes	No	2	1X4DE511 2X4DE511	Load path enveloped by 10,000-lb hoist/crane
Diesel generator B components	6000	2,4	6000	27	Yes	No	2	1X4DE511 2X4DE511	Load path enveloped by 10,000-lb hoist/crane
Auxiliary Feedwater Pumphouse									
Motor-driven pump A motor	6000	3	5000	18	Yes	No	2	1X4DE512 2X4DE512	
Motor-driven pump B motor	6000	3	5000	18	Yes	No	2	1X4DE512 2X4DE512	
Turbine-driven pump turbine	6000	3	4000	18	Yes	No	2	1X4DE512 2X4DE512	
Auxiliary feedwater pumphouse sump pumps	3000	7	300	12	Yes	No	2	1X4DE512 2X4DE512	Load weight for Nagle pump was 1446 lb
Auxiliary feedwater pumphouse sump pump hatch	-	-	-	-	Yes	No	9	1X4DE512 2X4DE512	Installed lifting equipment is not provided. Truck crane required to move this hatch. The weight of the hatch is approx. 25,000 lb.

TABLE 9.1.5-2 (SHEET 8 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
				Nuclear Service Cooling Water Pumphouse					
Nuclear service cooling water pumps/hatches, fan with gear reducers, fan motors	-	-	-	120	Yes	No	2	1X4DE518, 1X4DE519, 2X4DE518, 2X4DE519 AX4DE504-3 AX4DE504-2 AX4DE504-1	Installed-lifting equipment is not provided. A truck crane would be required to move these pumps/hatches. The actual weight of the pump, driver, and motor is 27,600 lb. The lift height identified is the lift necessary to remove the pump. The weight of the hatch is 11,000 lb.
				Control Building - Level B					
Control building sump pumps	3,000	7	220	34 (Unit 1) 5 (Unit 2)	No	No	1	1X4DE520 2X4DE520	
				Control Building - Level A					
Feedwater (2) regulating valves	6,000	3	4,000	8	Yes	Yes	5	1X4DE517 2X4DE517	
				Control Building - Level 1					
Feedwater regulating valves	6,000	3	4,000	36	Yes	Yes	5	1X4DE515 1X4DE516, 2X4DE515, 2X4DE516,	This hoist is used to lift the valves from level A to level 1.
Main steam safety & isolation valves (2)	8,000	3	6,850	15	Yes	Yes	5	1X4DE515, 1X4DE516, 2X4DE515, 2X4DE516	Monorail is located-on level 2.

TABLE 9.1.5-2 (SHEET 9 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Atmospheric relief valves	8,000	3	3,500	20	Yes	Yes	5	1X4DE515, 1X4DE516, 2X4DE515, 2X4DE516	
Atmospheric Relief Valve Actuators	8,000	3	700	20	Yes	Yes	11	1X4DE515 1X4DE516 2X4DE515 2X4DE516	
Feedwater isolation valves	3,000	2,3	3,000	16	Yes	Yes	5	1X4DE517 2X4DE517	
				Control Building - Level 2					
Equipment hatch cover (Unit 1 only)	4,000	3,4	4,000	12	No	No	1	1X4DE509	
				Control Building - Level 3					
ESF chilled water chillers	4,000	7	3,500	8	Yes	Yes	2	1X4DE514 2X4DE514	
Equipment hatch cover (Unit 2 only)	4,000	3,4	4,000	12	No	Yes	8	2X4DE510	
				Control Building - Level 4					
Normal chilled[h] water chillers	8,000	3	7,000	8	No	Yes	4	1X4DE513	
Normal chilled[h] water pumps	8,000	3	6,900	8	No	Yes	4	1X4DE513	
				Control/Fuel Handling-Building - Roof					
Tendon surveillance equipment (test weights, ram, etc.)	>4,000	3	4,000	8	No	Yes	1	AX4DE503 1X4DE509 1X4DE510 2X4DE510	
				Alternate Radwaste Building					
Alternate radwaste building bridge crane	80,000	1	79,000	25	No	Yes	3	AX4DE500	
				Radwaste Processing Facility					
Radwaste processing facility bridge crane	80,000	1	79,000	27	No	No	1	AX1AR29-00002	

TABLE 9.1.5-2 (SHEET 10 OF 11)

Equipment[a]	Hoist/Crane[b] Capacity (lb)	Design[i] Standard	Load Weight (lb)	Maximum[c] Vertical Lift (ft)	Safety-[d] Related Item in Load Path	Safety-[e] Related Item on Lower Elevation	Basis[f] for Conformance/ Exclusion	Reference[g] Drawings	Remarks
Ground Surface Area Above NSCW Tunnels (1T2A and 1T5A)									
Tendon surveillance equipment (test weights, ram, etc.)	>4,000	3	4,000	44 or 2 above parapet	No	Yes	4	AX4DE503	
Ground Surface Area Above AFW Tunnels (1T6A and 2T6A)									
Tendon surveillance equipment (test weights, ram, etc.)	>8,500	3	8,500	6	No	Yes	4	AX4DE503	
Tendon Buttress 1 Area - With Lifted Load Below Tendon Platform									
Tendon surveillance equipment (test weights, ram, etc.)	>8,500	3	8,500	100	No	No	1	AX4DE503	

a. The equipment being serviced by the hoist/crane is identified. Number of cranes associated with the load shown in parenthesis.

b. The load lifting capacity of the hoist/crane (in pounds) is provided. The load lifting capacity is provided rather than the load weight for conservatism, unless noted otherwise. Administrative controls ensure that hoist/cranes are not modified to lift loads greater than the weight specified.

c. The maximum vertical lift travel (in feet) of the hoist/crane is provided. The maximum vertical lift travel is provided for conservatism. In actuality, most loads would only be lifted a few feet to allow placement on a dolly. Administrative controls ensure that hoists/cranes are not modified to lift loads higher than the distance specified.

d. Yes - A safety-related item is located in the load path of the hoist/crane.

No - A safety-related item is not located in the load path of the hoist/crane.

e. Yes - A safety-related item is located on level(s) below which a load is handled by a hoist/crane.

No - A safety-related item is not located on level(s) below which a load is handled by a hoist/crane.

f. The basis for conformance/exclusion of an overhead handling system from which a load drop may result in damage to safety-related equipment is as follows. Bases 1 through 5 are exclusions, while bases 6 through 11 provide bases for conformance.

1. The equipment lifted by this hoist/crane is nonsafety related. Load paths are designed unique to the associated load handling equipment. A load drop will not result in damage to safety-related equipment.

2. The equipment lifted by this hoist/crane is safety related or passes over safety-related equipment. The equipment is physically separated from redundant safety-related equipment or is located in its own reinforced concrete room. Load paths are designed unique to the associated load handling equipment. A load drop will not result in damage to a separate train of safety-related equipment required for safe shutdown.

TABLE 9.1.5-2 (SHEET 11 OF 11)

3. The equipment lifted by this hoist/crane is located on a floor above safety-related equipment. If this load was dropped and fell through the floor, only equipment from a single train would be damaged. The redundant train would be available. Alternately, if equipment from the redundant train is damaged, the system function is maintained using portions of both trains.

4. The equipment lifted by this hoist/crane is located on a floor above safety-related equipment. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop will not prevent safe shutdown or decay heat removal or cause unacceptable radiation releases.

5. The equipment lifted by this device is lifted only during plant shutdown. Damage to safety-related equipment will not preclude decay heat removal.

6. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop from the maximum height could prevent safe shutdown or decay heat removal capability. The safe load path and load height is defined on drawings 1X4DE605, 1X4DE606, and 2X4DE601.

7. See paragraph 9.1.5.3.3 for discussion of the administrative controls associated with the RHR heat exchanger.

8. The equipment lifted by this crane is nonsafety related. Analysis has demonstrated that the height is designed unique to the associated handling equipment for this level. The safe load path and load height is defined on drawing 2X4DE600.

9. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop from the maximum height could prevent safe shutdown or decay heat removal capability. The safe load path and load height are defined on drawing 1X4DE607.

10. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop from the maximum height could prevent safe shutdown or decay heat removal capability. The safe load path and load height are defined on drawings 1X4DE503 and 2X4DE503.

11. A single-failure-proof handling system described in NUREG-0612 is used in the ARV actuator lifts to preclude an impact on safety-related structures, equipment, or components along the path. To satisfy NUREG-0612 criteria for single-failure-proof handling systems, the following requirements must be met for loads handled over inservice safety-related equipment: (1) Use the 4-ton trolley or equal provided on the 4-ton monorail systems in the MSIV valve rooms with up to 800 pounds of rigging including an electric hoist. (2) Use the 2-ton trolley or equal provided on the 2-ton monorails over ARVs 1/2PV-3000, -3010, and -3030 with up to 300 pounds of rigging. (3) A hoist with a minimum 2-ton working load limit. (3) Shackle(s) with a minimum 2-ton working limit. (4) A sling configuration with a minimum 2-ton working limit. When the single-failure-proof handling system is used, the ARV actuators can be lifted along the monorails shown on the referenced drawings during plant operation. The actuator for ARV 1/2PV3020 will travel upstream of the MSIVs.

g. The identified load is shown on these drawings.

h. This OHLHS is common to both units.

i. Design Standards

(1) ANSI B 30.2.0 Overhead and Gantry Cranes (Multiple Girder)

(2) ANSI B 30.11 Monorail Systems and Underhung Cranes

(3) ANSI B 30.16 Overhead Hoists

(4) HMI 100 Electric Wire Rope Hoists

(5) CMAA 70 Electric Overhead Traveling Cranes

(6) CMAA 74 Top Running and Under Running Single Girder Electric Overhead Traveling Cranes

(7) The hand hoists utilized will be designed to industry standards (e.g., HMI 100 and ANSI B 30.16).

j. The evaporator has been abandoned in place, but the equipment remains physically located in the plant.

TABLE 9.1.5-3 (SHEET 1 OF 3)

CONTAINMENT BUILDING OVERHEAD LOAD HANDLING SYSTEMS

Heavy Load Handling System	Equipment Designator No.	Design[a] Standard	Load Identification	Load Weight (lb)	Lifting Device	Basis[b] for Conformance/ Exclusion	References Drawings
Polar crane (225/25 ton)	1 and 2 - 2101R4001	1,5	Integrated head package	450,000[c] 440,000[d]	Head lifting ring (4800 lb)	7	1X4DE507, 1X4DE508 2X4DE507, 2X4DE508
			Reactor coolant pump	94,400	Sling	11	
			Reactor coolant pump motor	97,600	Reactor coolant pump motor lifting device	11	
			Refueling machine component (maintenance)	55,473	Refueling machine maintenance lifting device	12	
			Reactor coolant drain tank pump	360		1	
			Reactor cavity filtratration system				
			- Filter unit	375		1	
			- Pump and motor	250		1	
			Upper internals	132,000	Internals lifting rig (17,850 lb)	8	
			Lower internals	260,000	Internals lifting rig (17,850 lb)	4	
			Regenerative heat exchanger	4200	Regenerative heat exchanger lift rig	10	
			Excess letdown heat exchanger	1350	Excess letdown lift rig	1	
			Miscellaneous equipment from level B (e.g., small pumps, heat exchanger bundles, etc.)	2000		1	
			Crane load block	18,000		7	

TABLE 9.1.5-3 (SHEET 2 OF 3)

Heavy Load Handling System	Equipment Designator No.	Design[a] Standard	Load Identification	Load Weight (lb)	Lifting Device	Basis [b] for Conformance/ Exclusion	References Drawings
			Internals lifting rig	17,850		14	
			Containment building pre-access filtration unit carbon bed containers	18,000		1	
			Reactor coolant system vacuum refill pump skid	2,500		1, 5, 9	
Refueling Machine (1.5 ton)	1 and 2 - 2101R6003	5	Fuel assembly	1600	Refueling machine gripper mast (1080 lb)	13	1X4DE507 2X4DE507
Radial arm stud tensioner hoist assembly	A -2148R2001 through 006	3,7	Reactor stud turnout tool	(Hoist capacity is 4000 lb)	Weight compensation device	9	1X4DE507 2X4DE507
			Quick grip stud tensioner		Tensioner lifting arm	9	
Monorail with hoist (2-ton capacity)	1 and 2 - 2101R4011	3,4	Steel hatch plugs	1,500	Hoist and trolley	2	1X4DE506 2X4DE506 at node E; also see 1X4DE508 2X4DE508
Wall-mounted cantilever jib cranes (3-ton capacity)	1 and 2 - 2101R4003 1 and 2 - 2101R4004 1 and 2 - 2101R4005 1 and 2 - 2101R4006	2,3,4	Misc. maintenance activities	(Crane capacity is 6000 lb)	Hoist and trolley	3	1X4DE507 2X4DE507
Wall-mounted cable bridge winch (3-ton capacity)	1 and 2 - 2101R4007 1 and 2 - 2101R4008 1 and 2 - 2101R4009 1 and 2 - 2101R4010	4	Cable bridge	7,320	Winch (2 per cable bridge)	6	1X4DE507 2X4DE507
Monorail with hoist (1-ton capacity)	1 and 2 - 2101R4012	3,4	Pressurizer relief valves	900	Hoist and trolley	5	1X4DE510 2X4DE510
Underhung hoist (20-ton capacity)	1 and 2 - 2101R4017	3,4	Equipment hatch cover	32,000	Hoist	5	1X4DE507 2X4DE507
Pole-mounted cantilever arm jib crane (500-lb. capacity)	1 and 2 - 2101R4018	3,4	Misc. polar crane maintenance activities	500	Electric Hoist Tag No. 1 and 2 - 2101R4018M01	5	1X4DE507 1X4DE508 2X4DE507 2X4DE508

TABLE 9.1.5-3 (SHEET 3 OF 3)

a. Design Standards

1. ANSI B 30.2.0 Overhead and Gantry Cranes (Multiple Girder)
2. ANSI B 30.11 Monorail System and Underhung Cranes
3. ANSI B 30.16 Overhead Hoists
4. HMI 100 Electric Wire Rope Hoists
5. CMAA 70 Electric Overhead Traveling Cranes
6. CMAA 74 Top Running and Underrunning Single Girder Electric Overhead Traveling Cranes
7. HMI 400

b. The basis for excluding an overhead handling system from which a load drop may result in damage to safety-related equipment is as follows:

1. Administrative controls will restrict movement of these loads so as not to pass over the reactor coolant pumps or the vessel.

2. The identified load is lifted prior to and after refueling only. A load drop will not impact safety-related equipment required for decay heat removal or maintenance of cold shutdown.

3. A postulated drop from the jib crane onto the reactor coolant pump has been analyzed. See paragraph 9.1.5.3.1.2.

4. The postulated load is lifted when fuel is removed from the vessel only. Damage to fuel or safe shutdown equipment is not credible.

5. The equipment lifted by this device is lifted only during plant shutdown. Damage to safety-related equipment will not preclude decay heat removal.

6. The cable bridge is lifted only with the integrated head in place. Once lifted in the vertical position, the cable bridge is positively attached to the wall. A postulated load drop will not damage fuel or safety-related equipment required for decay heat removal or maintenance of cold shutdown.

7. The postulated load drop has been analyzed, and the results indicated that damage to the reactor vessel and supports is limited so as not to result in water leakage that could uncover the fuel or cause unacceptable releases.

8. The postulated load drop has been analyzed, and the results indicate that the deformations and stresses at impact are within the acceptable limits; the integrity of fuel cladding, reactor vessel nozzles, vessel supports, and the core cooling capability is maintained.

9. A postulated drop from these devices will not impair decay heat removal or maintenance of cold shutdown.

10. The regenerative heat exchanger would be taken from its position on level B to the equipment hoistway in the west end (Unit 1), east end (Unit 2) of the building. The worst case scenario for a postulated drop of the heat exchanger during movement from the hoistway to the equipment hatch would be a dropped onto the integrated head/vessel. The consequences of such a drop would be less than the consequences of the integrated head package drop which by analysis was determined to be acceptable.

11. See paragraph 9.1.5.3.1.1.4 for discussion of the administrative controls and safe load paths associated with the reactor coolant pump and motor.

12. Maintenance of the refueling machine will take place only while in the stored position. Any removal of large components from containment will be administratively controlled not to pass over the vessel.

13. The consequences of a postulated load drop from this device would be less than the consequences of the load block drop which by analysis was determined to be acceptable.

14. See paragraph 9.1.5.3.1.1.5 for discussion of administrative controls and safe load paths associated with temporary storage of the internals lifting rig during maintenance.

c. Assumed weight for the analysis for a head drop in a dry cavity lift.

d. Assumed weight for the analysis for a head drop in a cavity fill/slow lift.

TABLE 9.1.5-4 (SHEET 1 OF 2)

FUEL BUILDING CASK AND FUEL HANDLING SYSTEMS

Heavy Load Handling System	Equipment Designator No.	Design Standard	Load Identification	Load Weight (lb)	Lifting Device	Basis for Conformance/ Exclusion	References Drawings
			Fuel Handling Building - Level 1				
Fuel handling machine (2 tons)	A - 2109R6009	5	Spent fuel assembly	1,600	Spent fuel assembly handling tool (400 lb)	1	1X4DE507 2X4DE507
			New fuel assembly		New fuel assembly handling tool (100 lb)		
			Rod cluster control assembly	<1,600	RCCA change tool (1100 lb)		
			Thimble plug	<1,600	Thimble plug change tool (350 lb)		
			Burnable poison rod assembly	<1,600	BPRA handling tool (650 lb)		
			Wet Annular Burnable Absorber	<1,600	WABA handling tool (1200 lb)		
			Spent fuel pool gate seals	<1,500	Sling		
Cask lifting device jib crane	A - 2109R4002	2,3,4	Cask crash structure, cask lifting device and cask head	(5 ton capacity)	Hoist and trolley	3	1X4DE507
			Fuel Handling Building/Auxiliary Building - Level 3				
Spent fuel cask bridge crane	A - 2109R4001	1,5					
Main hoist (125 tons)			Spent fuel cask and components	250,000	Cask lifting device	4	1X4DE510 2X4DE510
			Miscellaneous equipment (in auxiliary building only)	>30,000		4	
Auxiliary (15 tons)			New fuel shipping containers	<8,000	Sling	5	1X4DE510 2X4DE510
			Miscellaneous equipment (in auxiliary building only)	30,000		7	
Monorail hoist (2 tons)			New fuel assemblies	1,600	New fuel assembly handling tool (100 lb)	6	1X4DE510 2X4DE510
			Miscellaneous equipment (in auxiliary building only)	4,000		7	

TABLE 9.1.5-4 (SHEET 2 OF 2)

a. Design Standards

1. ANSI B 30.2.0 Overhead and Gantry Cranes (Multiple Girder)

2. ANSI B 30.11 Monorail Systems and Underhung Cranes

3. ANSI B 30.16 Overhead Hoist

4. HMI 100 Electric Wire Rope Hoists

5. CMAA 70 Electric Overhead Traveling Cranes

6. Deleted.

b. The basis for excluding an overhead handling system from which a load drop may result in damage to safety-related equipment is as follows:

1. This hoist/crane is discussed in paragraph 9.1.4.3.1.4 and is associated with the light loads handling systems.

2. Deleted.

3. The equipment lifted by the hoist/crane passes in the proximity of the spent fuel pools. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop would not compromise the integrity of the spent fuel pool. Minimum load heights will be utilized to preclude a postulated load from rolling or tipping in the spent fuel pools.

4. This OHLHS is designed in accordance NUREG 0554 for Single Failure Proof Cranes. A load drop is not required to be postulated.

5. The equipment lifted by the hoist/crane passes in the proximity of the spent fuel pools. Analysis has demonstrated that a failure of the OHLHS and subsequent load drop would not compromise the integrity of the spent fuel pool. The safe load path to preclude movement in the vicinity of the spent fuel pool is defined on drawing 1X4DE603.

6. The identified load is classified as a light load.

7. The miscellaneous equipment lifted in the auxiliary building by the spent fuel cask bridge crane will be under administrative controls and will utilize minimum lift heights.

TABLE 9.1.5-5 (SHEET 1 OF 8)

SINGLE FAILURE PROOF CRANE CONFORMANCE TO NUREG-0554

NUREG-0554	VEGP Position
Section 2.1	The spent fuel cask bridge crane will not be used during construction; therefore, no separate specifications were prepared.
Section 2.2	The spent fuel cask bridge crane is designed with a maximum critical load and design rated load of 125 tons. The wearing components in the main hoist including the wire ropes, sister hook, brakes, reducers, and bearings have been designed with an increased design margin of at least 15% above the maximum critical load.[a]
Section 2.3	All identified parameters, except maximum rate of pressure increase and emergency corrosive conditions, were specified. A maximum rate of pressure increase was not specified because it was judged not to be significant to safe design of the crane. Because it is located outside of containment, the crane will not be subjected to the high accident pressure possible inside containment. Emergency corrosive conditions were not specified because none were identified that would prevent safe crane operation.
Section 2.4	The minimum specified operating temperature is 40°F. Materials for load carrying structural members essential to structural integrity are impact-tested at or below the minimum operating temperature by the charpy V-notch method according to paragraph ND-2300 of the ASME Code, Section III, 1977 edition, with addenda through summer 1978. The hoist drums are considered as members essential to structural integrity, and the drum barrel material is impact tested as required for load carrying structural members. Material traceability and certified material test reports are provided for the following components: • Main hoist reducer and gears. • Main hook, block plates, and shafting. • Drum and drum shaft. • Holding brakes, except electrical components. • Trolley structure, rope anchors, crown sheaves, uplift and lateral restraint structures.

TABLE 9.1.5-5 (SHEET 2 OF 8)

NUREG-0554	VEGP Position
	• Girders, end ties, uplift and longitudinal restraint structures. The crane is not subjected to coldproof testing because impact testing was performed for structural members essential to structural integrity. Cast iron was not used for any load bearing components. The use of cast iron is limited to parts of a nonstructural nature.
Section 2.5	The crane structures and components in the main load path are designed to the requirements of Seismic Category 1 equipment. The design rated load plus operational and seismically induced pendulum and swinging load effects are considered in the design of the trolley, and they are added to the trolley weight for the design of the bridge. The response spectra technique is used in the modal analysis to establish inertia forces as in NRC Regulatory Guide 1.92, Combining Modal Responses and Spatial Components in Seismic Response Analysis. The crane is designed to withstand loads and load combinations so that it is able to retain the maximum lifted load and preserve the structural integrity during and following an SSE or an OBE. Positive seismic restraints are provided on the crane to prevent bridge, trolley, or any other part from falling on structures or equipment situated below the crane in the event of an earthquake.
Section 2.6	Appropriate nondestructive examinations, such as ultrasonic testing, radiographic testing, liquid penetration testing, and magnetic particle testing are performed to qualify all critical weld joints whose failure could cause the dropping of a critical load or the degradation of the integrity of the crane structure. The design of the crane eliminates lamellar tearing since heavy plates were not used. Structural welding requirements for the crane are in accordance with AWS Structural Welding Code D1.1.
Section 2.7	A structural fatigue analysis is not part of the design requirements for the spent fuel cask bridge crane due to the low number of lifts expected for the crane. The structural fatigue design requirements are in accordance with CMAA Specification No. 70. The crane is classified as a moderate duty Class C crane per CMAA classification.
Section 2.8	All trolley and bridge preheat temperature and post-weld heat treatment is per AWS D1.1.
Section 3.1	Quality inspections and checks for the primary or principle load bearing components have been defined and performed during the manufacturing of the trolley and bridge.

TABLE 9.1.5-5 (SHEET 3 OF 8)

NUREG-0554	VEGP Position
Section 3.2	Only the main hoist is used to handle the spent fuel cask. The main hoist is designed so that failure of the main hoist components will not cause the load to drop. The auxiliary hoist and the monorail hoist are used for normal plant maintenance only and are not single failure proof.
Section 3.3	A push-pull emergency stop switch is provided on the radio remote control unit and pendant control unit. Pendant control pushbuttons ar momentary-contact type that return to the off position when released. Motion switches on the radio remote control transmitter are sealed spring lever switches that return to the off position when released. Release of the pushbutton or lever switch will stop the particular controlled motion and set the corresponding braking mechanism. When the emergency stop switch is pushed in, it will stop power to all motors. Power shutoff will automatically set the holding brakes.
Section 3.4	Manual operation of the holding brakes is provided for the main hoist and auxiliary hoist so that the lifted load can be lowered in a safe manner in an emergency situation. Trolley and bridge are made with attachment points for manual operation and movement.
Section 4.1	A dual rope reeving system, with load balance on the upper and lower blocks, is provided for the main hoist. In the event of main hoist rope failure, the resulting stresses due to load transfer to the redundant rope will not exceed 34% of the manufacturer's published breaking strength. Under seismic loads, the maximum load in the rope will not exceed 90% of the manufacturer's published breaking strength, with one of the redundant ropes carrying the load. Under normal operation, the maximum load in the ropes in the dual reeving system is less than 10% of the manufacturer's published breaking strength. Fleet angles of 3-1/2° or less will be maintained when the load block is 10 ft below its highest point.
Section 4.2	The drum bearing stands are steel structures which ensure that a shaft or bearing failure will not allow the main drums to disengage from the brakes.
Section 4.3	The head and load blocks are designed to use a dual reeving design to maintain a vertical load balanced about the center of the lift. The design provides an equivalent margin of safety by providing a single load path and attachment points with a 10-to-1 safety factor on ultimate strength. The sister hook is load tested at twice its rated load with each side equally loaded at rated load.

TABLE 9.1.5-5 (SHEET 4 OF 8)

NUREG-0554	VEGP Position
Section 4.4	The main hoist and the auxiliary hoist are each provided with induction motors; each motor is powered by a single variable frequency drive unit. The maximum speed of the main hoist is 5 ft/min (raising or lowering), and the auxiliary hoist speed is 15 ft/min. Both the main hoist and the auxiliary hoist are provided with overspeed limit switches. The maximum line speed of the main and auxiliary hoist is less than 50 fit/min.
Section 4.5	Redundant limit switches are provided for both the main hoist and the auxiliary hoist in the raising and lowering direction. A rotary limit switch is mounted on each drum shaft which senses both the upper and lower positions of the load block and stops the motion by deenergizing the hoist controls. The secondary lever-operated power limit switch is tripped by the load block making contact with the switch which directly breaks the power to the hoist motor at the uppermost load block position. A load sensing system is provided for the main hoist. Hoist overload will automatically trip the hoist motor and set the brakes. Each limit switch allows the hoist motor to be operated in reverse after it has tripped.
Section 4.6	See paragraph 9.1.5.2.2.6.
Section 4.7	The crane will not be used for hoisting loads at angles. In the event of an excessive off-center lift with the main hoist, an unbalanced load limit will be tripped and the hoisting motion will be stopped.
Section 4.8	The main hoist design used dual gear trains between the holding brakes and hoisting drum, but also includes additional hydraulic drum brakes. The redundancy provides assurance that the load will be safely held in case of a single failure. In addition, drum retaining stands are provided to support the drum and to maintain the drum gear meshes in the event of failure of the drum shaft, bearings, or pillow blocks. Also, deflection calculations were performed under load to confirm the frame deflection does not affect machinery alignment.
Section 4.9	The main hoist braking systems are fail-safe. There are two main hoist brakes designed with a minimum capacity of 125% developed during the hoisting operation. The main hoist is also controlled with a dynamic braking through the flux vector drive. The holding brakes are activated when power is off and are automatically set when any one of the following abnormal conditions exist: • Broken hoisting cable or unequal cable length. • Upper and lower overtravel of the load block.

TABLE 9.1.5-5 (SHEET 5 OF 8)

NUREG-0554	VEGP Position
	• Drive motor overspeed. • Lifting load exceeds 110% of the rated load. In addition to the two hoisting brakes, each drum has an emergency brake that can be used through a controlled brake release and safely lower a lifted load during an emergency situation.
Section 5.1	The bridge and trolley drive consists of two identical induction motors; each motor is powered by a single variable frequency drive unit with integrally mounted disc brakes rated at 125% of motor full-load torque and a reducer which is coupled to each bridge drive wheel located at each end of the bridge. The bridge and trolley are equipped with travel limit switches. The bridge and trolley motors are provided with spring set, electrically released holding brakes that are automatically applied when power is interrupted. For an overspeed situation, the frequency drives will sense any overvoltage condition and transverse brakes would be set and prevent further travel. The programmable logic controller prohibits movement of loads in excess of 15 tons on the main hook outside of the predesignated area for additional safety operation of the crane. End-stop compression bumpers are provided for the bridge and trolley as backups for the bridge and trolley end-of-travel limit switches. Both the bridge and trolley drives are equipped with variable frequency drives. Maximum bridge travel speed is 40 ft/min. Maximum trolley travel speed is 30 ft/min. Tripping of travel limit switches and end-of-travel limit switches will interrupt power to the respective drive motors and set the brakes.
Section 5.2	In the event of tripping of the limit switches mentioned in Section 5.1, the particular movement of the bridge or trolley will stop. The programmable logic controller will prevent all movement in that direction and only allow movement in the opposite direction.

TABLE 9.1.5-5 (SHEET 6 OF 8)

NUREG-0554	VEGP Position
Section 6.1	Both the main hoist and the auxiliary hoist are equipped with overspeed limit switches, upper travel limit switches, and lower travel limit switches. Hoist driving motors are selected so that they are compatible with other components in the hoisting system. The main hoist speed is 0.25 ft/min to 5 ft/min. The auxiliary hoist maximum speed is 15 ft/min. The electric brakes provided for the main hoist and the auxiliary hoist will set at 115% of the maximum hoisting speed. A load sensing system is provided that is independent from a weigh scale system to stop the hoist motion in the event of a sustained overload. Tripping of overtravel, overspeed, or overload devices will interrupt power to the driving motors and set the brakes. An emergency stop switch is provided at the pendant and at the radio remote control to shut off power to the crane and set the brakes. In addition, an emergency circuit breaker is located at the operating floor (el 220 ft 0 in.) of the auxiliary building to cut off the power supply to the crane irrespective of the crane controls.
Section 6.2	The control system design consists of a combination of electrical and mechanical systems. The crane will not be used to lift spent fuel assemblies.
Section 6.3	Thermal overload devices, undervoltage devices, phase loss protection, and overtemperature detectors are included in the main hoist control circuit in addition to overspeed, overtravel, and overload protection. The auxiliary hoist has similar protection, as provided for the main hoist. Thermal overload and undervoltage devices are included in the bridge and trolley control circuits, in addition to overtravel protection.
Section 6.4	Frequency drives are provided for the main hoist, the auxiliary hoist, and the bridge and trolley. The frequency drives provide the crane motion, control acceleration and deceleration of the motor, and eliminate abrupt motion changes. Drift point is not provided for bridge or trolley movement.
Section 6.5	Safety devices and backup systems are provided for the crane to preclude any foreseeable inadvertent operator action.
Section 6.6	Crane motions are controlled either from the pendant unit or from the radio remote unit. No other operator stations are provided for the crane. An interlock switch is provided between the pendant control and radio remote control.
Section 7.1	Operating instruction and maintenance manuals prepared by the crane manufacturer are provided.
Section 7.2	The crane will not be used for construction.

TABLE 9.1.5-5 (SHEET 7 OF 8)

NUREG-0554	VEGP Position
Section 8.1	A preoperation test will be performed after the crane has been installed to verify proper installation of various components, including alignment, clearance, electrical wiring, and connections. In addition, a running test will be performed prior to putting the crane into a permanent operational status.
Section 8.2	Prior to completion of the preoperational and running testing of the crane, a load test is performed on the main hook and the auxiliary hook, which will be loaded to 125% of the hoist rating in accordance with ANSI B30.2. The deflection of the bridge at its center will be measured to confirm that it is within the limits stated in CMAA No. 70. However, manual lowering of the maximum critical load is included in the operational testing of the crane.
Section 8.3	The main hoist and the auxiliary hoist are provided with two redundant overhoist travel limit switches. In addition, the main hoist is equipped with load sensing for load hangup protection. Proper functioning of all these devices will be verified during the preoperational and running testing of the crane. Two blocking and load hangup tests are performed during preoperational testing.
Section 8.4	The integrity of all control, operating, and safety systems will be verified as to satisfaction of installation and design requirements.
Section 8.5	Recommended inspection and maintenance procedures for various components of the crane are furnished by the manufacturer in the maintenance manual. The inspections encompass the requirements necessary to assure degradation of the critical wearing components does not affect the crane's MCL rating. An operating manual is provided for the crane.
Section 9	The manufacturer provided a manual of information to use for checking, testing, and operating the crane. The manual also describes preventive maintenance program based upon the requirements of OSHA 1910.179 and ASME B30.2. The preventive maintenance program provided the information required to service, repair, and replace all major components.
Section 10	The crane is procured under a quality assurance program that conforms to 10 CFR 50 Appendix B. Field installation, testing, operator qualification, and crane operation will conform to ANSI B30.2 as appropriate.

TABLE 9.1.5-5 (SHEET 8 OF 8)

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[a]The operating licenses for both VEGP units have been renewed and the original licensed operating terms have been extended by 20 years. Since the spent fuel cask bridge crane bridge and trolley have been replaced, the additional years of operation remains much less than the design capabilities of the spent fuel cask bridge crane. In accordance with 10 CFR Part 54, appropriate aging management programs and activities have been initiated to manage the detrimental effects of aging to maintain functionality during the period of extended operation (see chapter 19).

TABLE 9.1.5-6

NUREG 0612 GUIDELINES AND LOCATION OF FSAR DESCRIPTION

NUREG 0612	EG&G	Enclosure 3 of Dec. 22, 1980, Letter	Description	FSAR Location
5.1.1 (1)	2.3.1 2.2.1	2.1.1, 2.1.2, 2.1.3a, 2.1.3.c	Definition of safe load paths	Tables 9.1.5-2 (Sheets 3 & 4), 9.1.5.3
5.1.1 (2)	2.3.2	2.1.3b	Procedures	9.1.5.6
5.1.1 (3)	2.3.3	2.1.3.g	Crane operators	9.1.5.3G
5.1.1 (4)	2.3.4	2.1.3d	Special lifting devices	9.1.5.2.2.6 9.1.5.2.3.4
5.1.1 (5)	2.3.5	2.1.3d	Lifting devices not specifically designed	9.1.5.2.5
5.1.1 (6)	2.3.6	2.1.3e	Crane inspection, testing, and maintenance	9.1.5.4
5.1.1 (7)	2.3.7	2.1.3f	Crane design	Tables 9.1.5-1 through 4
5.1.2	2.3.1	2.2	Spent fuel pool area cranes	9.1.4.2.4B 9.1.5.3.2 9.1.5.2.2
5.1.3	2.3.2	2.3	Containment polar crane	9.1.5.3.1 9.1.5.2.3
5.1.4			Not applicable to PWRs	
5.1.5	2.3.3	2.4	Cranes in other areas	9.1.5.3.3 9.1.5.2.5
5.1.6	2.3.4	Not applicable	Guidelines for single-failure-proof handling system	Table 9.1.5-5, paragraph 9.1.5.2.2

TABLE 9.1.5-7 (SHEET 1 OF 6)

INTEGRATED HEAD AND INTERNALS

Special Lifting Devices Conformance to ANSI N14.6

ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
1, 1.1 to 1.3, 2	Scope and Definitions 1. These sections define the scope of the document and include pertinent definitions of specific items	These sections are definitive and not requirements.	
3, 3.1, 3.1.1 to 3.1.4	Design, Designer's Responsibilities 2. This section contains requirements for preparing a design specification and its contents, stress reports, repair procedures, limitations on use with respect to environmental conditions, marking and nameplate information, and critical items list.	A. No design specification was written concerning these specific requirements. However, assembly and detailed manufacturing drawings and purchasing documents contained the following requirements: 1. Material specification for all the critical load path items to ASTM, ASME specifications, or special listed requirements. 2. All welding, weld procedures, and welds to be in accordance with ASME Boiler and Pressure Vessel Code - Section IX. 3. Special nondestructive testing for specific critical load path items to be performed to written and approved procedures in accordance with ASTM or specified requirements. 4. All coatings to be performed to strict compliance with specified requirements.	Though a specific design specification was not prepared, the drawings and purchasing documents contain sufficient requirements to assure a reliable lifting device. Though specific repair procedures were not identified, the quality assurance requirements include sufficient examination to ensure a reliable lifting device. The use of these lifting devices is not anticipated to be under adverse or rapidly changing environments. The normal temperatures inside containment will be between 60°F and 120°F.

TABLE 9.1.5-7 (SHEET 2 OF 6)

ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
		5. Letters of compliance for materials and specifications were required for verification with original specifications. B. A stress report was not originally required but has been prepared and demonstrates the adequacy of the lifting device. C. Repair procedures were not identified. D. No limitations were identified as to the use of these devices under adverse environments. E. Though not originally required, critical item lists have been prepared for each device that identifies load-carrying members and welds. F. Quality assurance program was specifically required.	
3.2, 3.2.1 to 3.2.6	Design Criteria, Stress Design Factors • These sections contain requirements for the use of stress design factors of 3 and 5 for allowable stresses of yield and ultimate respectively for maximum shear and tensile stresses, high strength material stress design factors, special pins, wire rope, and slings to meet ANSI B30.9-1971 and drop-weight tests and Charpy impact test requirements.	1. These devices were originally designed to the requirement that the resulting stress in the load-carrying members, when subjected to the total combined lifting weight, should not exceed the allowable stresses specified in the AISC code. Conservative stress analysis of the load carrying members of the lifting devices shows that all the tensile and shear stresses meet the criteria of ANSI N14.6 with the exception of the tensile stresses in the rod housing and guide sleeve of the internals lift rig. The rod housing and the guide sleeve do not meet the 3W criteria of ANSI N14.6 when analyzed for tension at the thread relief. However, these items do meet the AISC allowable tensile stress criteria of 0.6 times the yield strength; and this is considered acceptable from a design standpoint. 2. High strength materials are used in some of these devices (mostly for pins, load cell). Although the fracture toughness was not determined, the	NUREG 0612 section 5.1.1(4) requires that the stress design factor should be based on the maximum static and dynamic loads. Based on the use of the industry standard for impact loading of cranes specified in CMAA-70 and the normal hoisting speed of 5.3 ft/min, the dynamic loading is a small fraction of the static load, and inclusion would have a negligible impact on the reliability of the device.

TABLE 9.1.5-7 (SHEET 3 OF 6)

ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
		material was selected based on its fracture toughness characteristics. However, the stress design factors of ANSI N14.6 Section 3.2.1 of 3 and 5 were used in previous analyses, and the resulting stresses were acceptable. 3. Where necessary, the weight of pins was considered for handling. 4. For the integrated head package lifting rig, the material for the lift rods (item 8), the clevis (item 12), the clevis pin (item 13), and the missile shield (item 14) are in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Subsection NF.	As discussed above, it is not anticipated that the environment in which these devices are to be used will be adverse in nature. In addition, large temperature gradients are not anticipated.
3.3, 3.3.1 to 3.3.8	Design Considerations • These sections contain considerations for materials of construction, lamellar tearing, decontamination effects, remote engagement provisions, equal load distribution, lock devices, position indication of remote actuators, retrieval of device if disengaged, and nameplates.	Decontamination was not specifically addressed. Locking plates, pins, etc., are used throughout these special lifting devices. Remote actuation is used only when engaging the internals lift rig with the internals and position indication is provided from the operating platform. The lifting devices are designed to assure distribution of the load.	The lack of specific decontamination criteria does not directly affect the load handling reliability of the lifting device.
3.4, 3.4.1 to 3.4.6	Design Considerations To Minimize Decontamination Efforts in Special Lifting Device Use • These sections contain fabrication, welding, finishes, joint, and machining requirements to permit ease in decontamination.	Decontamination was not specifically identified.	The lack of specific decontamination criteria does not directly affect the load handling reliability of the lifting device.
3.5, 3.5.1 to 3.5.10	Coatings • These sections contain provisions for ensuring that proper methods are used in coating carbon steel surfaces and for ensuring noncontamination of stainless steel items.	The requirements for coating carbon steel surfaces are contained in a Westinghouse process specification referenced on the assembly and detail drawings when applicable. These specifications require a proven procedure, proper cleaning, preparation, application, and final inspection of the coating. These requirements meet the intent of 3.5.1 through 3.5.8. No provisions were included in these designs for ensuring noncontamination of stainless steel items.	

TABLE 9.1.5-7 (SHEET 4 OF 6)

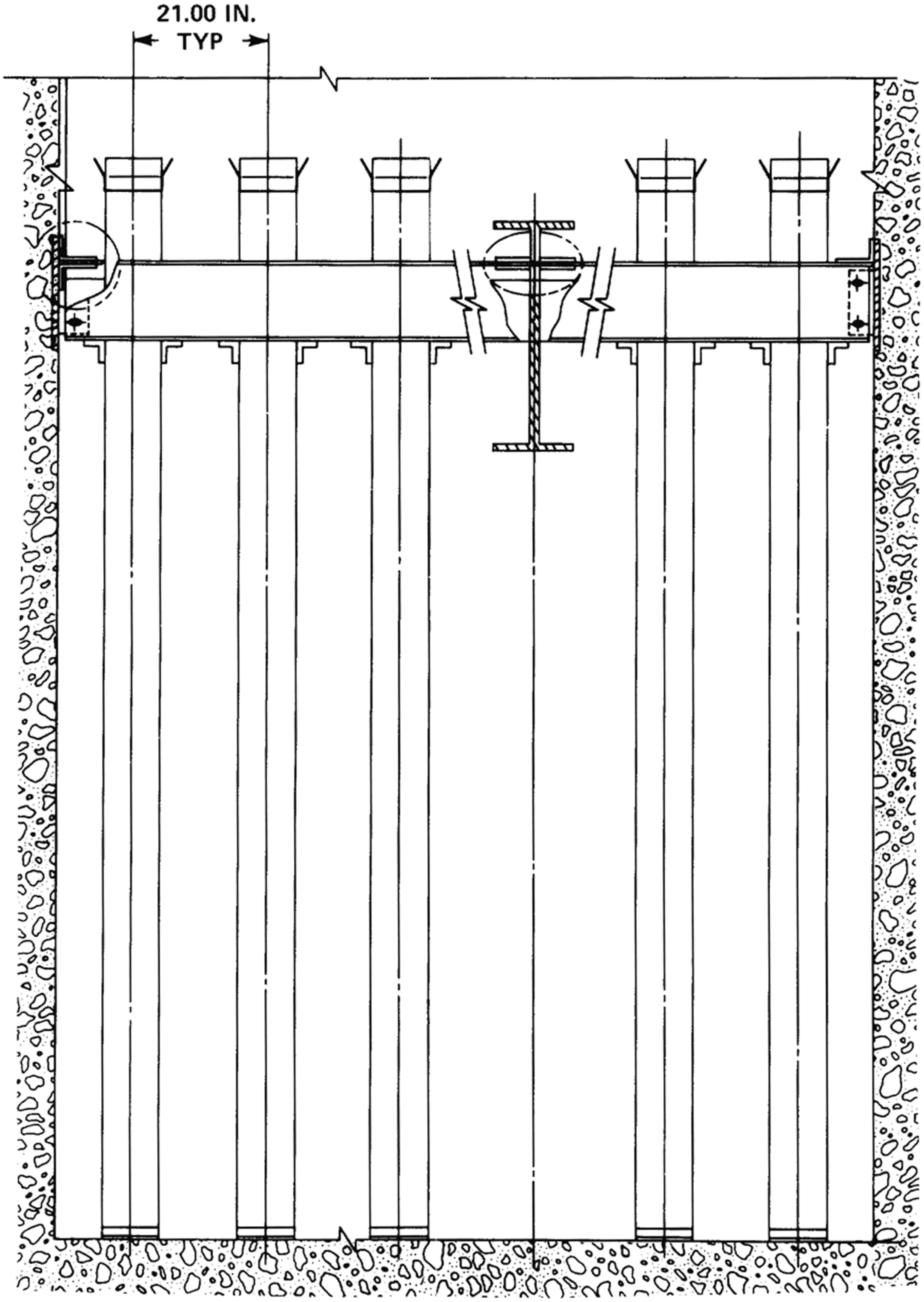
ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
3.6, 3.6.1 to 3.6.3	Lubricants • These sections contain requirements for special lubricants to minimize contamination and degradation of the lubricant and contacted surfaces or water pools.	On the integrated head package lifting rig, exposed threads and unpainted surfaces are coated with Never-Seez compound. On the internals lift device, threaded connections are coated with neolube. On the load cell linkage, silicone grease is used where applicable as indicated on the drawings.	
4, 4.1, 4.1.1 to 4.1.12	Fabrication, Fabricators Responsibilities • These sections contain specific requirements for proper quality assurance, document control, deviation control, procedure control, material identification, and certificate of compliance.	A formal quality assurance program for the manufacturer was specifically required. All the manufacturer's welding procedures and nondestructive testing procedures were reviewed by Westinghouse prior to use. All critical load-carrying members require certificates of compliance for material requirements. Westinghouse performed certain checks and inspections during various steps of manufacturing. Final Westinghouse review includes visual, dimensional, procedural, cleanliness, personnel qualification, etc., and issuance of a quality release to ensure conformance with drawing requirements.	
4.2, 4.2.1 to 4.2.5	Inspector's Responsibilities • These sections contain requirements for a nonsupplier inspector.	Westinghouse Quality Assurance personnel performed in-process and final inspections similar to those identified in these sections, and issued a Quality Release. (Also see comments to section 4.1 above.)	
4.3, 4.3.1 to 4.3.3	Fabrication Considerations • These sections contain special requirements for ease in decontamination or control of corrosion.	General good manufacturing processes were followed in the manufacture of these devices. However, the information defined in these sections was not specifically addressed.	See Section 3.3.
5, 5.1, 5.1.1 to 5.1.8	Acceptance Testing Maintenance, and Assurance of Continued Compliance Owner's Responsibilities • Sections 5.1.1 and 5.1.2 require the owner to verify that the special lifting devices meet the performance criteria of the design specification by reviewing records and witness of testing.	Both the integrated head package lifting rig and internals lift rig were proof tested upon completion. Upon the completion of the test, all parts, particularly welds, were visually inspected for cracks or obvious deformation. Critical welds were magnetic particle inspected. In addition, the	

TABLE 9.1.5-7 (SHEET 5 OF 6)

ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
		Westinghouse Quality Release verifies that the criteria for letters of compliance for materials and specifications required by the Westinghouse drawings and purchasing documents were satisfied.	
	Section 5.1.3 requires periodic functional testing.	See Section 5.3.	
	Section 5.1.4 requires operating procedure.	Operating instructions for the lifting devices are included as a part of the individual lift operating procedures.	
	Sections 5.1.5, 5.1.5.1, and 5.1.5.2 require special identification and marking to prevent misuse.	It is obvious from their design that these rigs are special lifting devices and can only be used for their intended purposes.	
	Sections 5.1.6 and 5.1.7 require the owner to provide written documentation on the maintenance, repair, testing, and use of these rigs.	Operating instructions and maintenance instructions for the special lifting devices will contain the requirements to address maintenance logs, repair and testing history, damage incidents, etc., and the load limitations of the devices.	
	Section 5.1.8 requires that any subleasees of the lifting device conform to practice of use of the lifting device.	This section is not applicable to the lifting devices described herein as the devices will be used only for Vogtle electric generating station.	
5.2 and 5.3, 5.2.1 to 5.2.3 5.3.1 to 5.3.8	Acceptance Testing and Testing to Verify Continuing Compliance • These paragraphs require the rigs to be initially tested at 150% maximum load followed by nondestructive testing of critical load bearing parts and welds and also annual 150% load tests or annual nondestructive tests and examinations; qualification of replacement parts.	The integrated head lifting rig and internals lift rig were proof tested upon completion with a load of approximately 1.25 times the design weight. Upon the completion of the test, all parts, particularly welds, were visually inspected for cracks or obvious deformation. Critical welds were magnetic particle inspected.	The lifting devices as described in paragraph 9.1.5.2.3.4 are uncomplicated in design, and the design stress margins are substantial. A proof test of 125% of design load demonstrates the proof of workmanship and satisfies the intent of the 150% load test.
5.2.2 and 5.2.3		Replacement parts for the lifting devices will be designed, fabricated, and tested to the same standards as the original equipment.	
5.3		The integrated head lifting device and the internal lift device are utilized during refueling operations, which may occur at a frequency from 1 year to 18 months. Prior	

TABLE 9.1.5-7 (SHEET 6 OF 6)

ANSI N14.6 Section	Description of ANSI N14.6 Requirement	Actual Special Lift Device Requirements	Effect on Load Handling Reliability
		to utilization, a visual examination of critical welds and bolted joints will be performed. Once the device is connected to the load, the load will be lifted slightly and held for 10 min, after which the welds connecting the sling block lugs to the sling block will be reinspected. If no problems are found, the lift will be continued, with the load cell readout being monitored at all times. A nondestructive surface examination of critical welds and parts will be performed once every 10 years as part of an ISI outage. In lieu of the nondestructive surface examination, a nondestructive volumetric examination using acoustic emission techniques may be used. After any major alteration or repair of the lifting device, any involved load bearing welds will be nondestructively examined, and any involved nonload bearing component will be functionally tested.	
5.4, 5.4.1 to 5.4.2	Maintenance and Repair • This section requires any maintenance and repair to be performed in accordance with original requirements, and no repairs are permitted for bolts, studs, and nuts.	Maintenance and repair procedures contain the requirements that were used in the original fabrication of the lifting devices. The critical items lists the original type of nondestructive testing. The procedures also defines bolts, studs, and nuts as nonrepairable items.	
5.5, 5.5.1 to 5.5.2	Nondestructive Testing Procedures, Personnel Qualifications, and Acceptance Criteria • This section requires nondestructive testing to be performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code.	When NDE was performed, liquid penetrant, magnetic particle, ultrasonic, and radiograph inspections were performed in accordance with ASTM specifications, process specifications, or as noted on detailed drawings, and provide similar results to the requirement of the ASME Code.	
6, 6.1, 6.2, 6.3	Special Lifting Devices for Critical Loads • These sections contain special requirements for items handling critical loads.	The loads associated with these devices are not defined as critical loads, and the consequences of a postulated drop are discussed in paragraph 9.1.5.3.1.	



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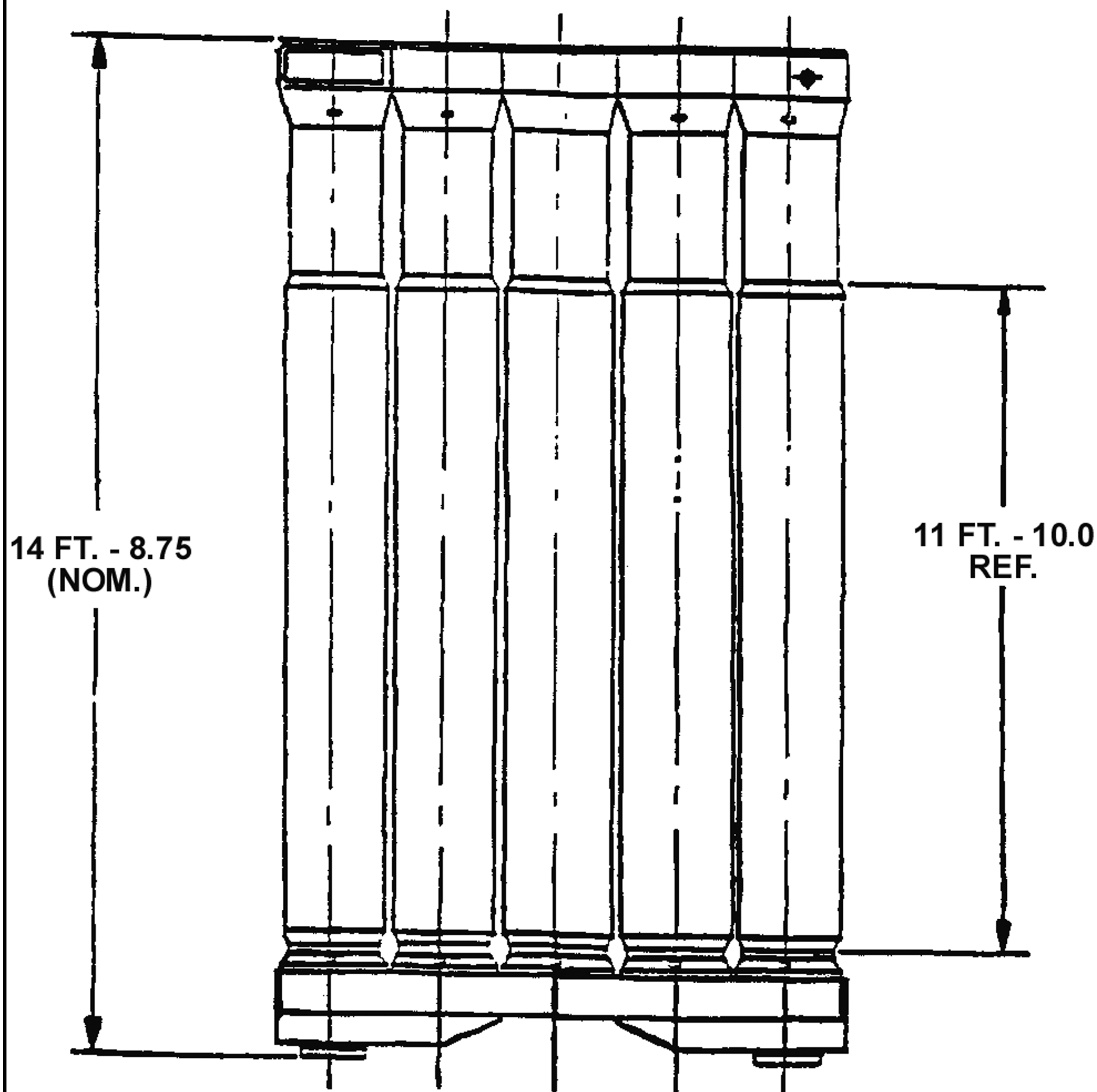
UNIT 1 AND UNIT 2

NEW FUEL RACK

FIGURE 9.1.1–1



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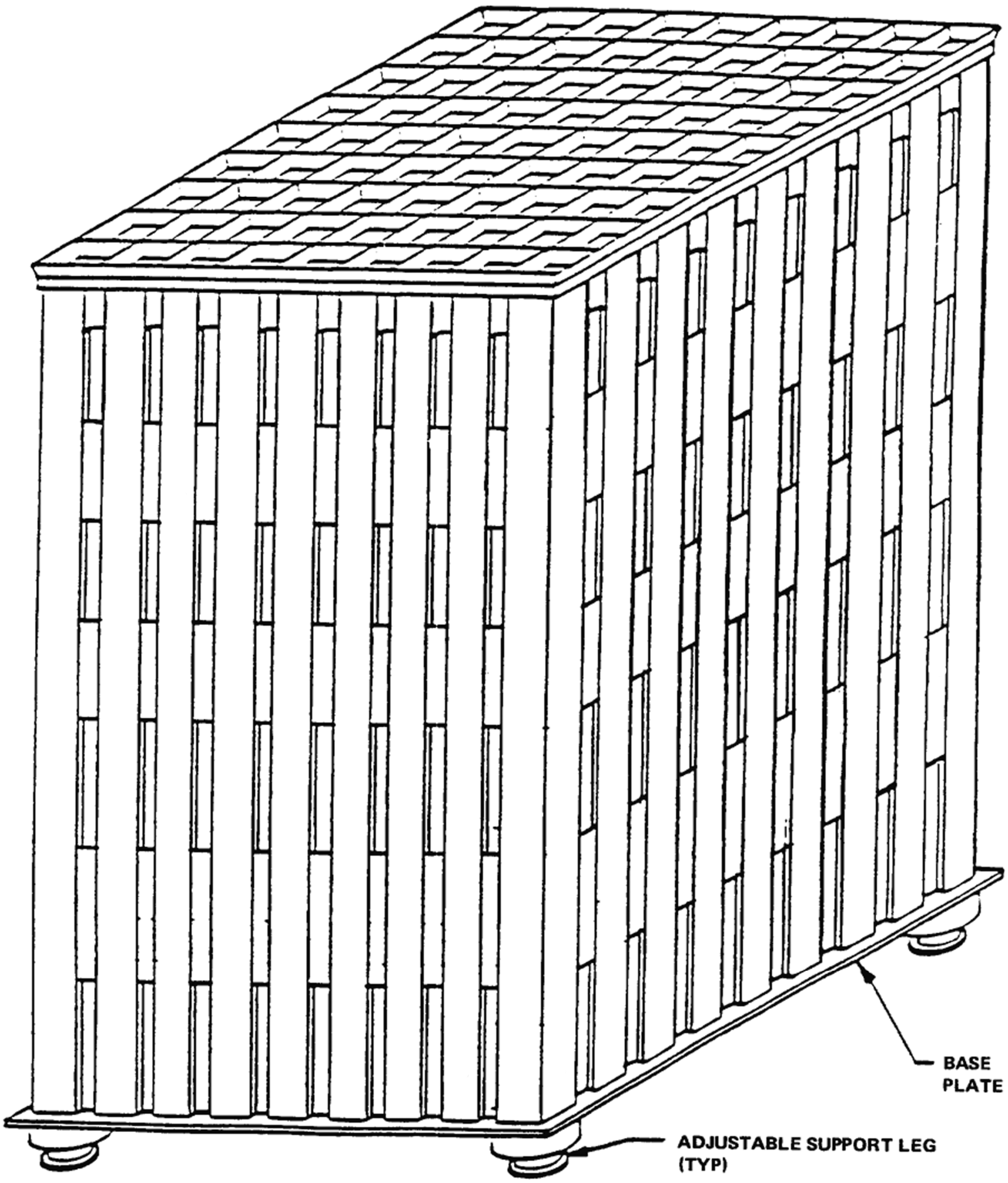
UNIT 1 AND UNIT 2

SPENT FUEL POOL STORAGE
RACK ARRAY, SIDE VIEW (UNIT 1)

FIGURE 9.1.2-1 (SHEET 1 OF 2)



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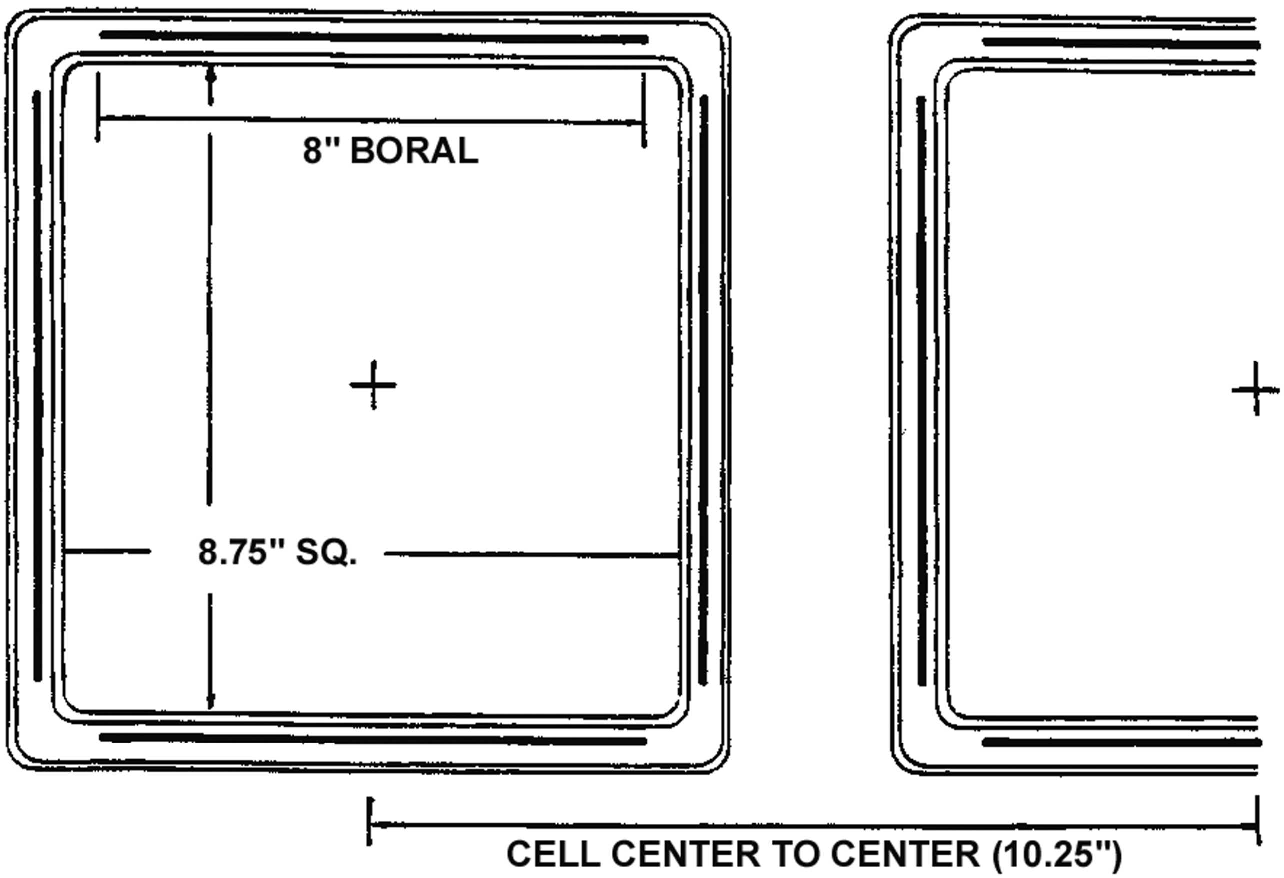
SOUTHERN COMPANY Energy to Serve Your World®	VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	SPENT FUEL POOL STORAGE RACK ARRAY (UNIT 2), ISOMETRIC VIEW
		FIGURE 9.1.2–1 (SHEET 2 OF 2)



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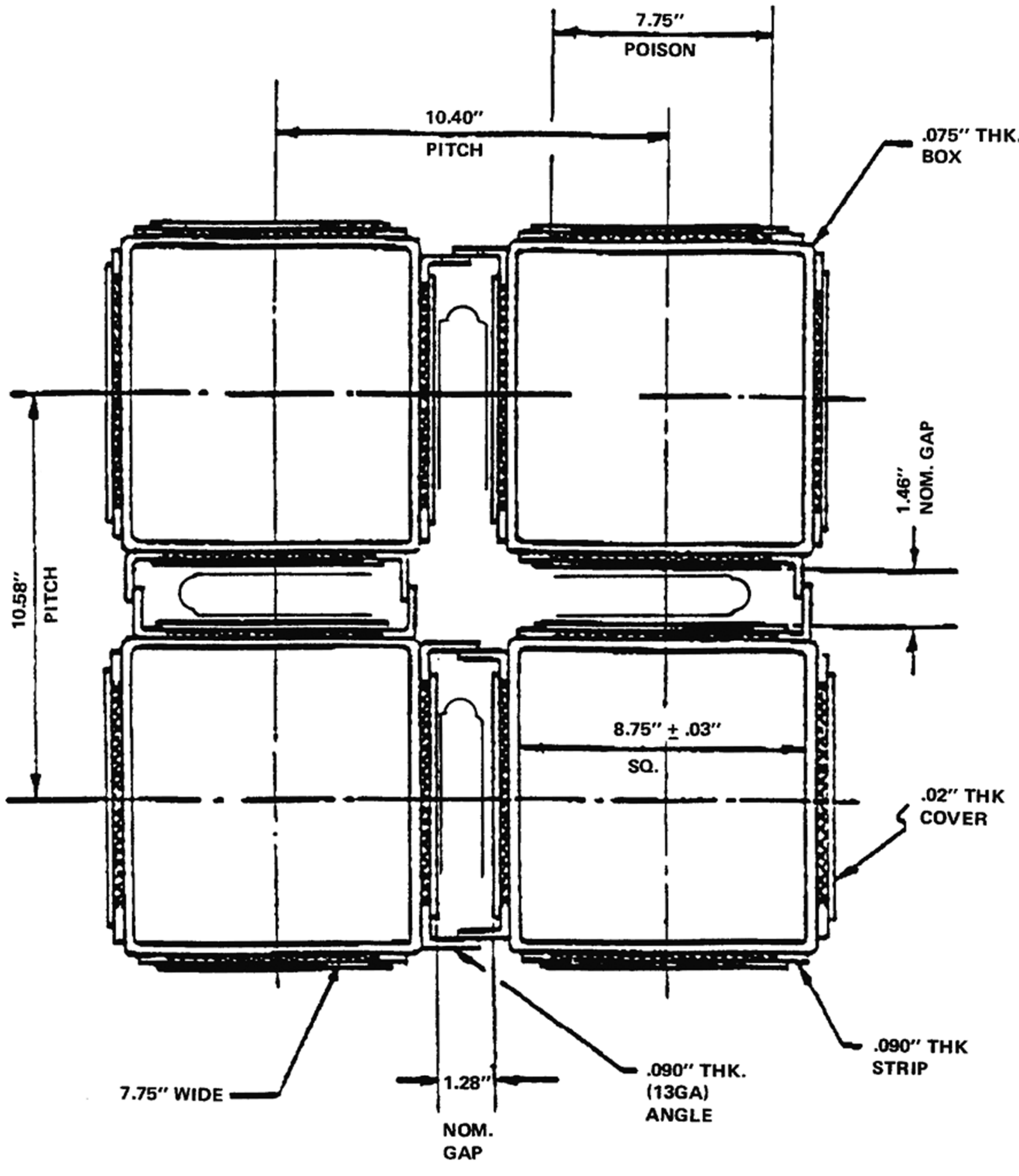
UNIT 1 AND UNIT 2

SPENT FUEL POOL STORAGE
CELL NOMINAL DIMENSIONS (UNIT 1)

FIGURE 9.1.2-2 (SHEET 1 OF 3)



Note: Applicable to racks B-1, A-1, A-4, B-2, E, A-2, A-5 and B-3. (Reference Figure 9.1.2-6).

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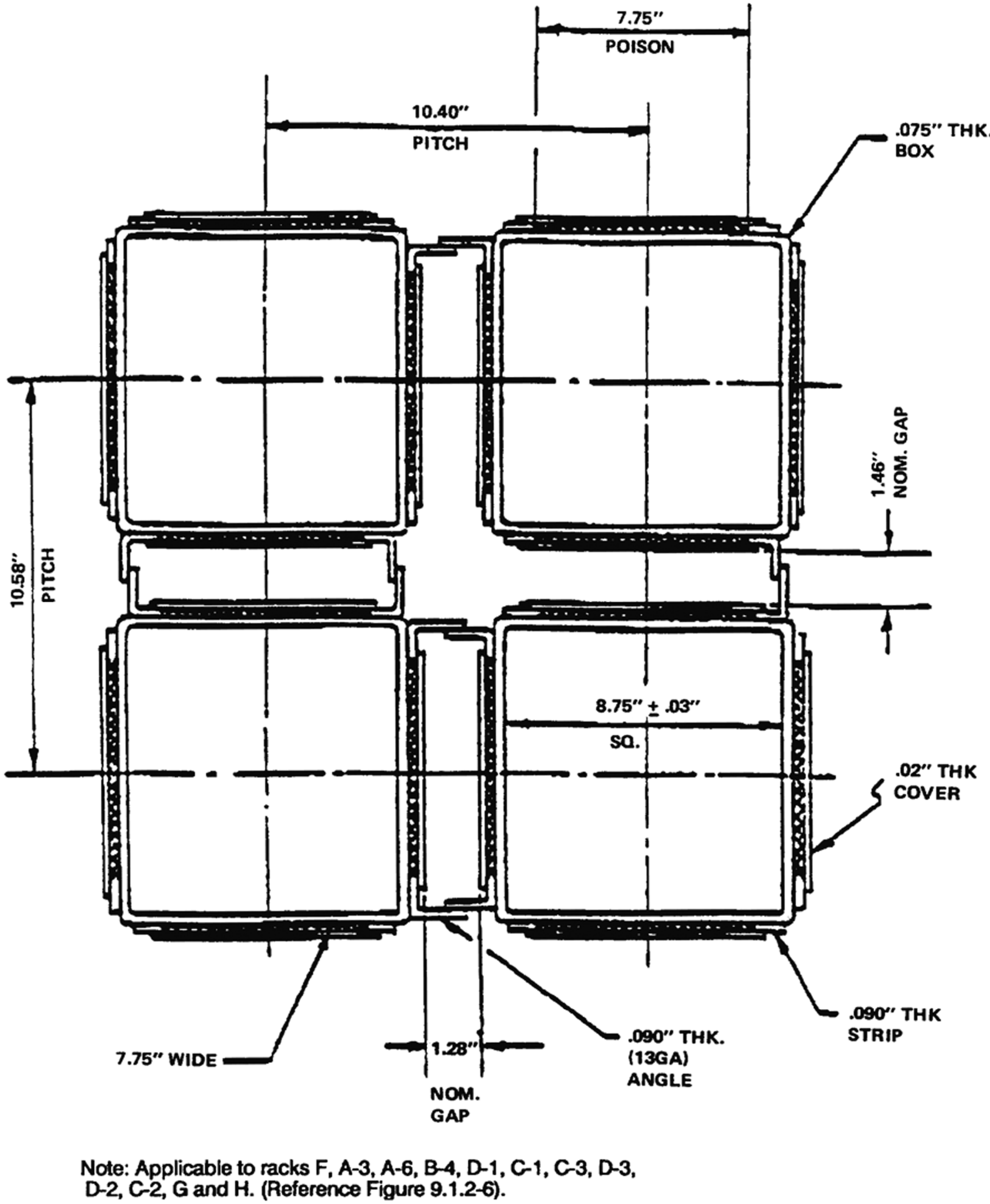
UNIT 1 AND UNIT 2

SPENT FUEL POOL STORAGE
CELL NOMINAL DIMENSIONS (UNIT 2)

FIGURE 9.1.2–2 (SHEET 2 OF 3)



Note: Applicable to racks F, A-3, A-6, B-4, D-1, C-1, C-3, D-3, D-2, C-2, G and H. (Reference Figure 9.1.2-6).

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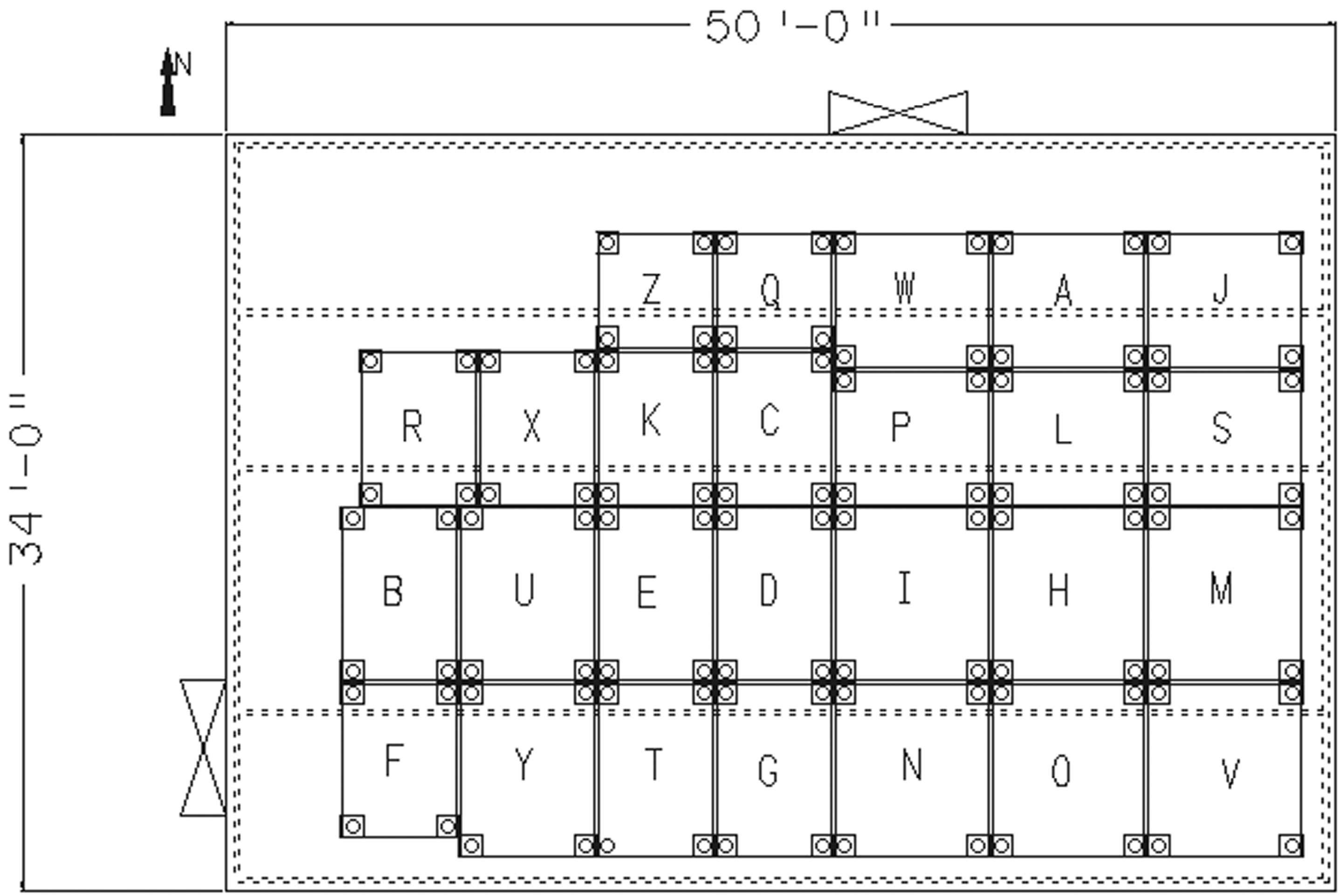
UNIT 1 AND UNIT 2

SPENT FUEL POOL STORAGE CELL
NOMINAL DIMENSIONS (UNIT 2)

FIGURE 9.1.2–2 (SHEET 3 OF 3)



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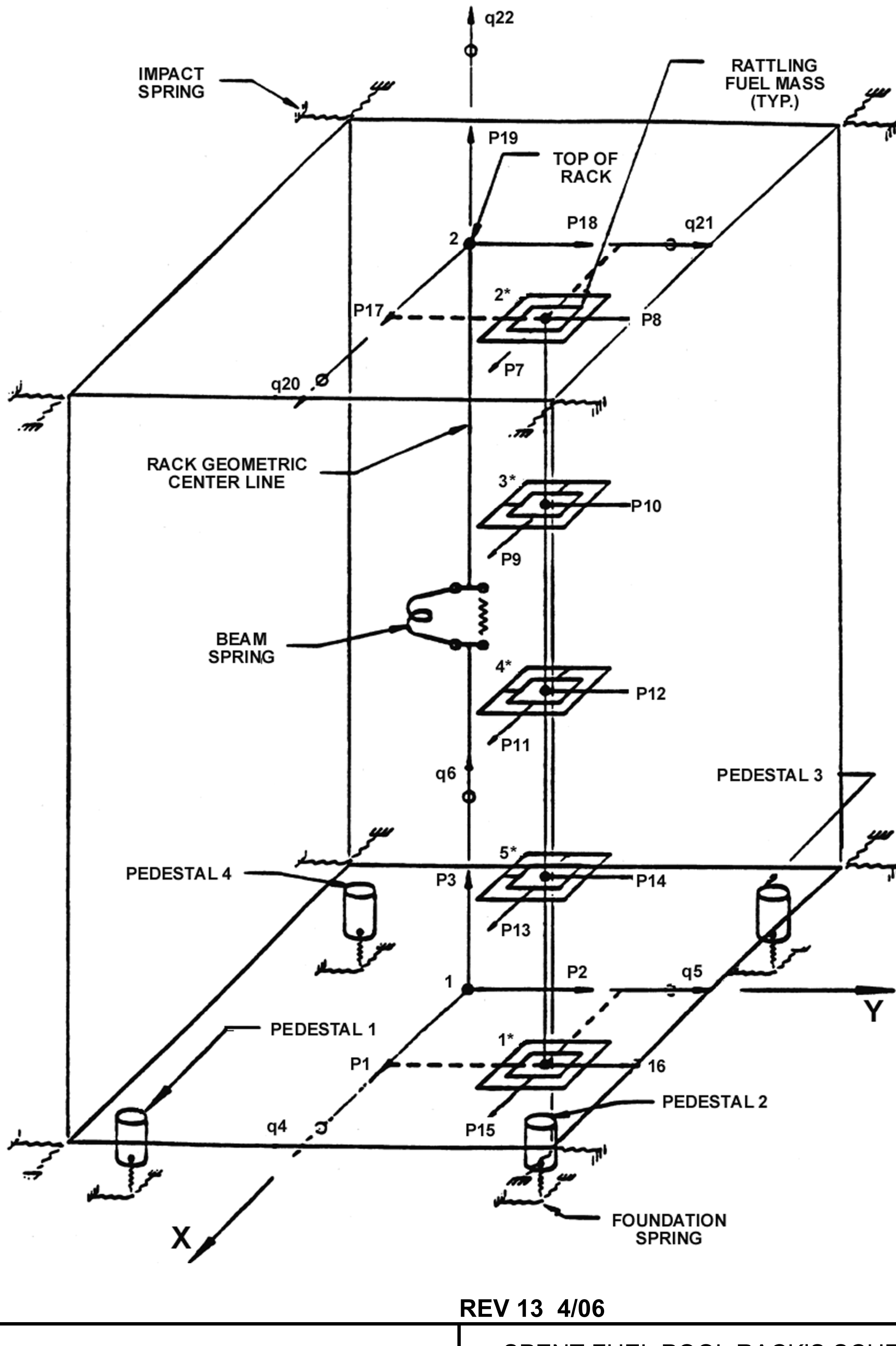
UNIT 1 AND UNIT 2

SPENT FUEL POOL STORAGE
LAYOUT (UNIT 1)

FIGURE 9.1.2-3



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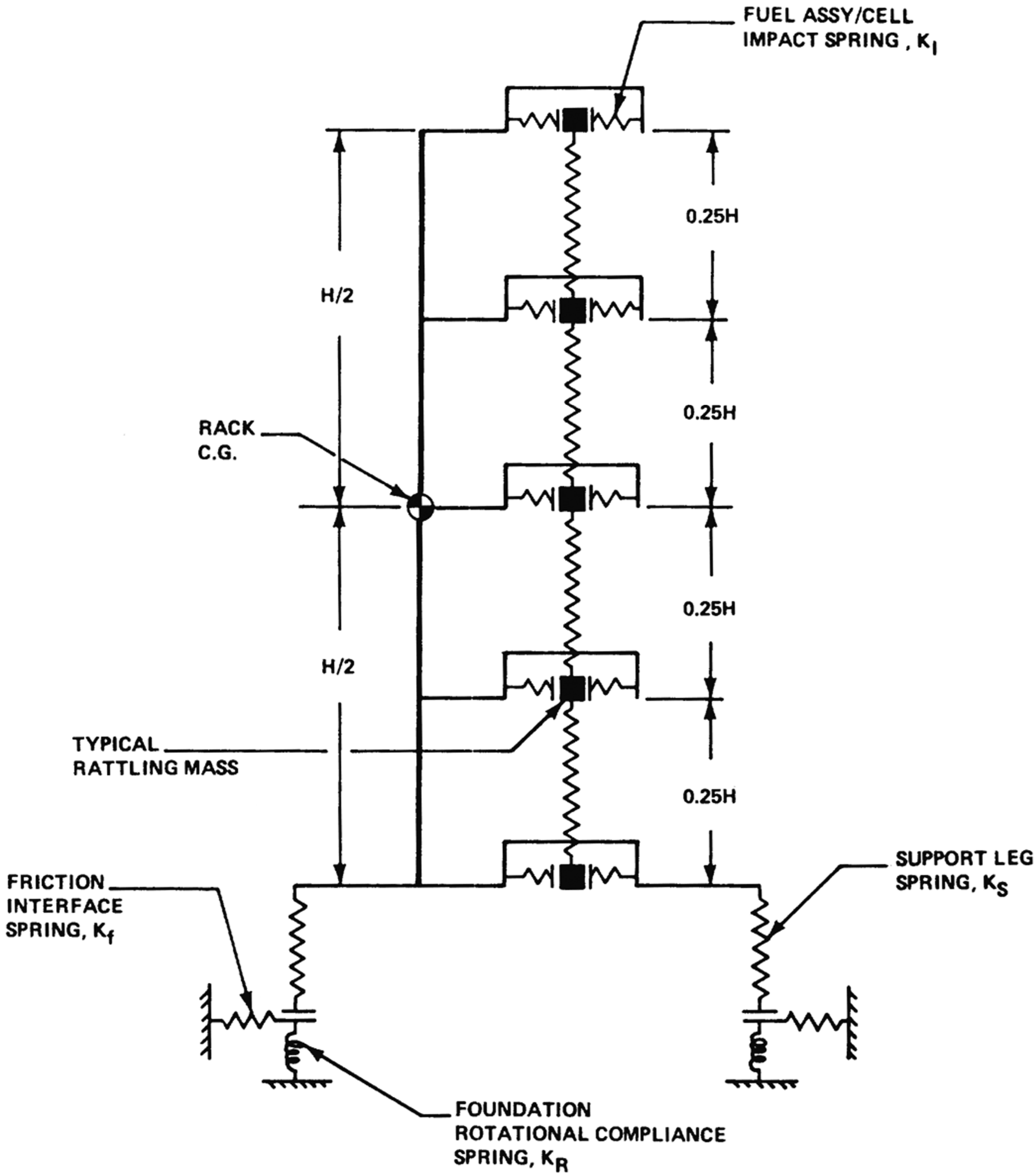
UNIT 1 AND UNIT 2

SPENT FUEL POOL RACK'S SCHEMATIC MODEL FOR DYNRACK (UNIT 1)

FIGURE 9.1.2-4 (SHEET 1 OF 4)



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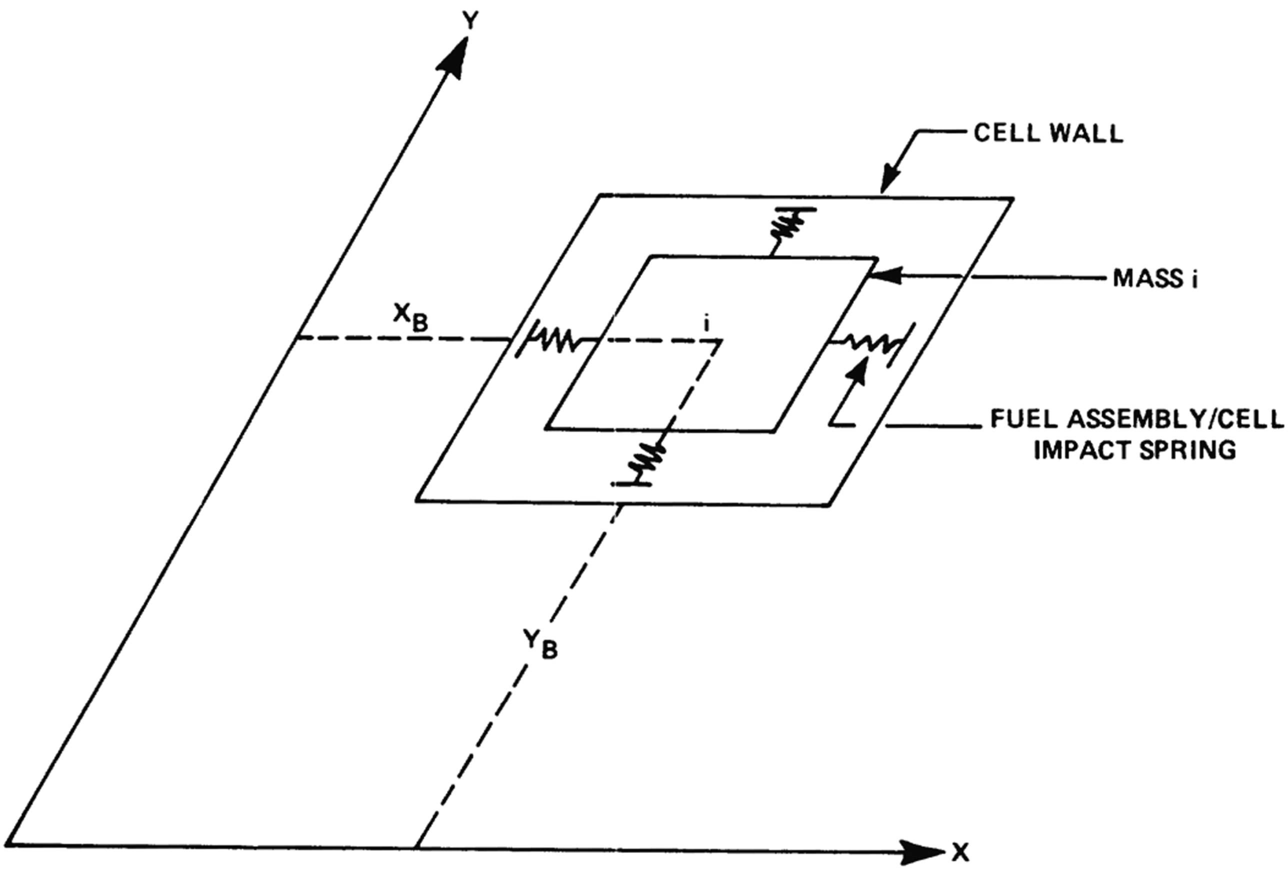
SOUTHERN COMPANY *Energy to Serve Your World®*	VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	SPENT FUEL POOL RACK'S TWO–DIMENSIONAL VIEW OF THE SPRING–MASS SIMULATION (UNIT 2)
		FIGURE 9.1.2–4 (SHEET 2 OF 4)



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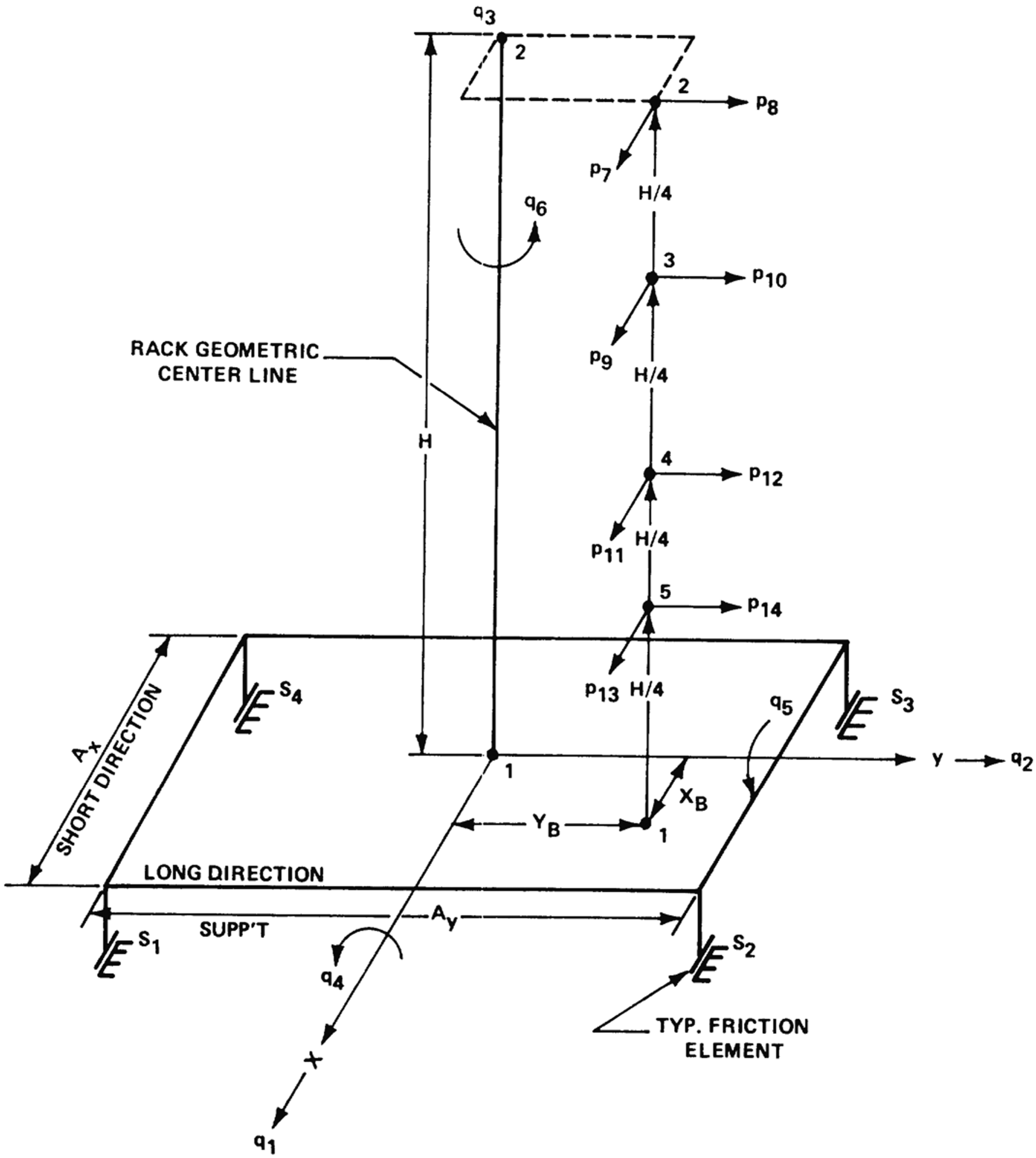
UNIT 1 AND UNIT 2

SPENT FUEL POOL RACK'S IMPACT SPRING ARRANGEMENT AT NODE 1 (UNIT 2)

FIGURE 9.1.2–4 (SHEET 3 OF 4)



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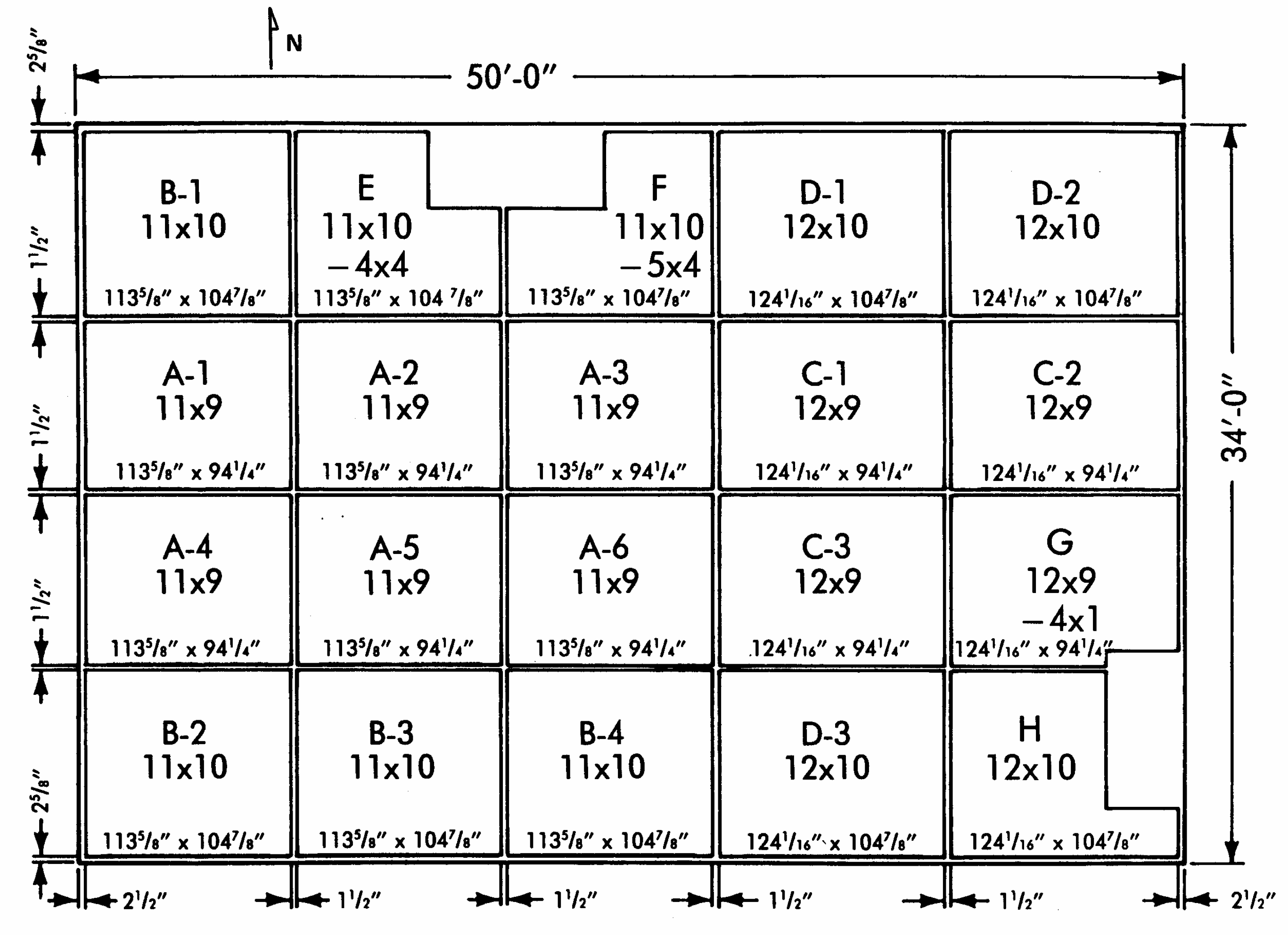
SOUTHERN COMPANY *Energy to Serve Your World®*	VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	SPENT FUEL POOL RACK'S SCHEMATIC MODEL FOR DYNRACK (UNIT 2)
		FIGURE 9.1.2–4 (SHEET 4 OF 4)



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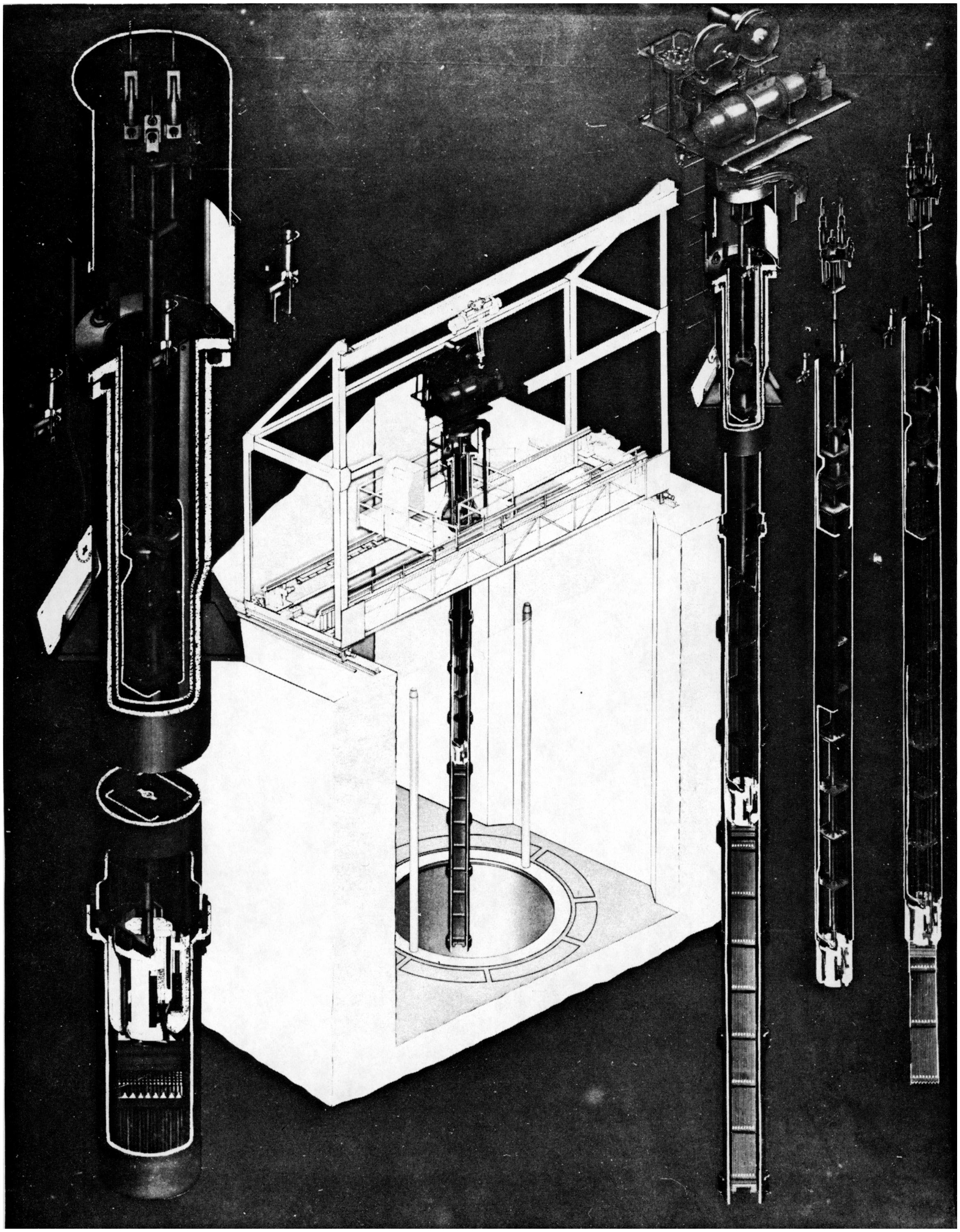
UNIT 1 AND UNIT 2

SPENT POOL STORAGE LAYOUT (UNIT 2)

FIGURE 9.1.2-5



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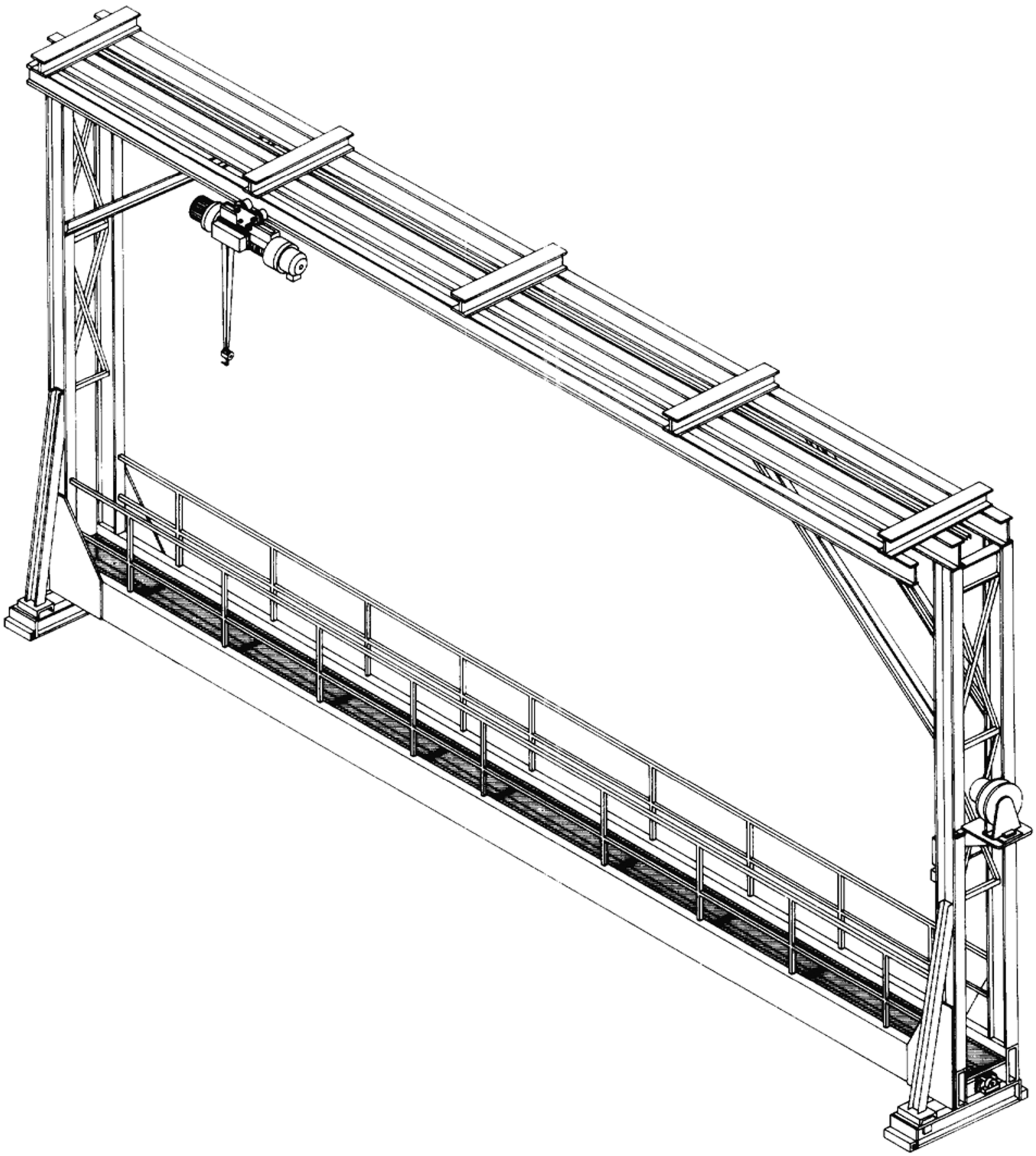
SOUTHERN COMPANY Energy to Serve Your World®	VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	REFUELING MACHINE FIGURE 9.1.4–1



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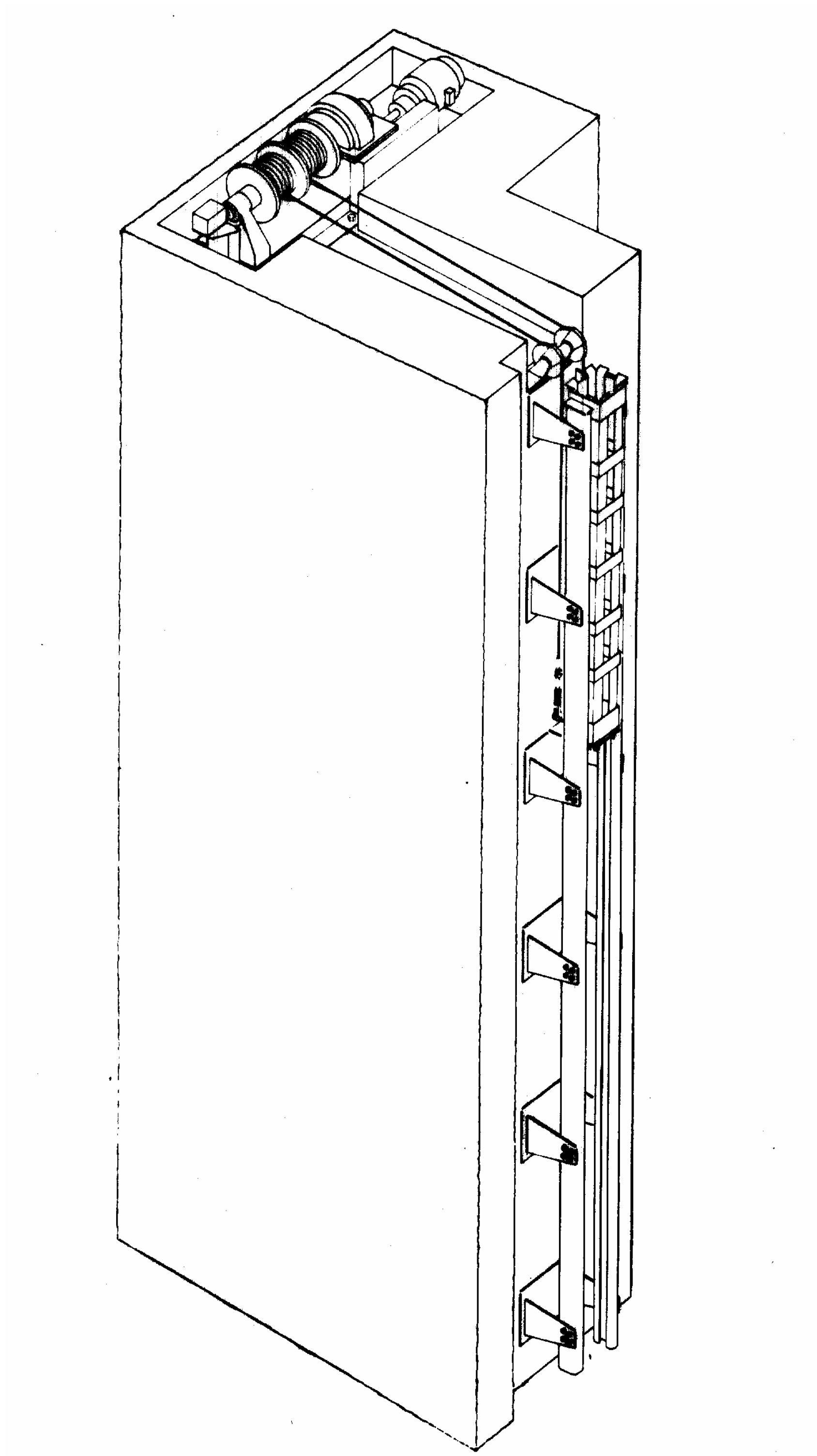
UNIT 1 AND UNIT 2

TYPICAL FUEL HANDLING MACHINE

FIGURE 9.1.4–2



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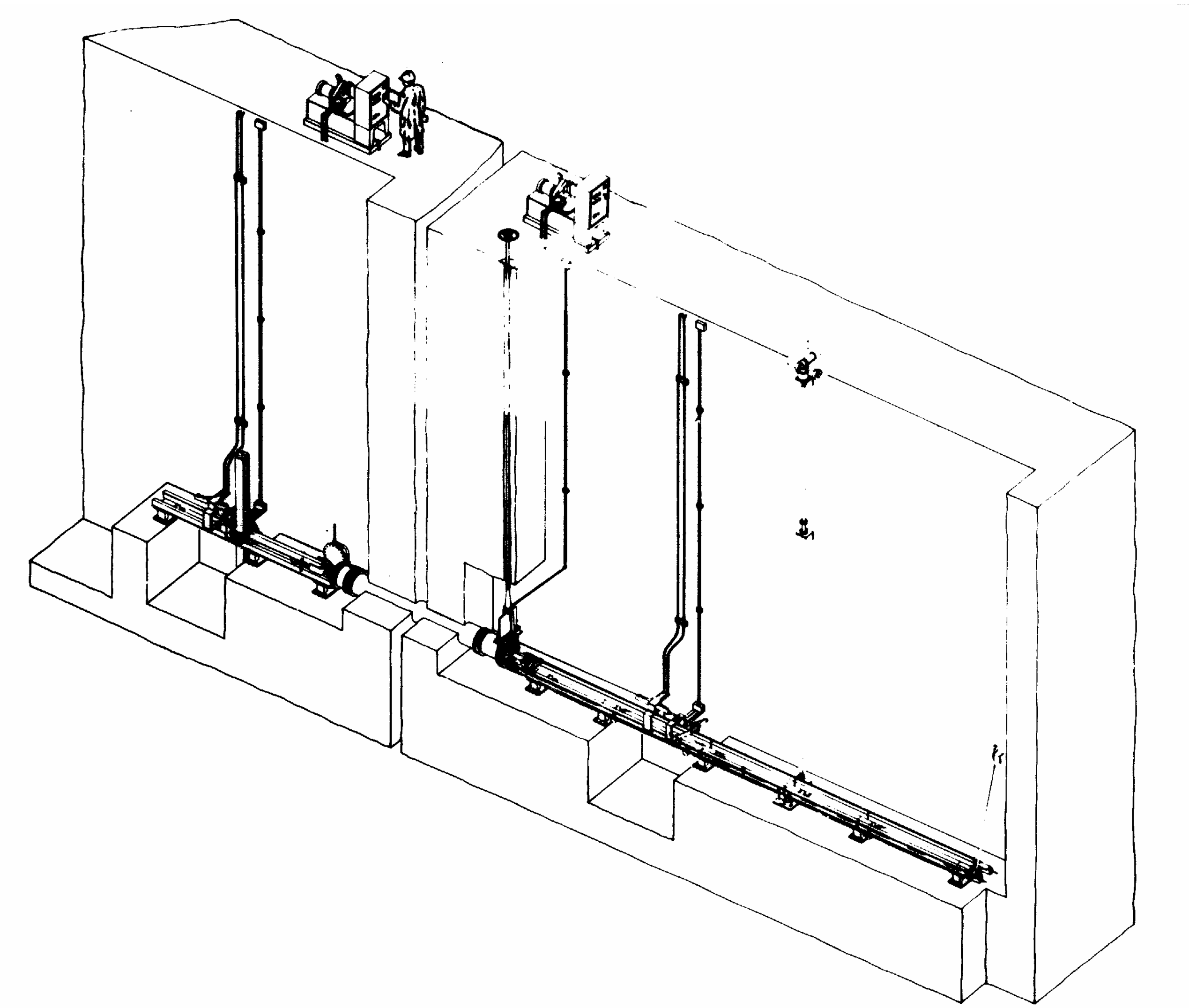
UNIT 1 AND UNIT 2

NEW FUEL ELEVATOR

FIGURE 9.1.4–3



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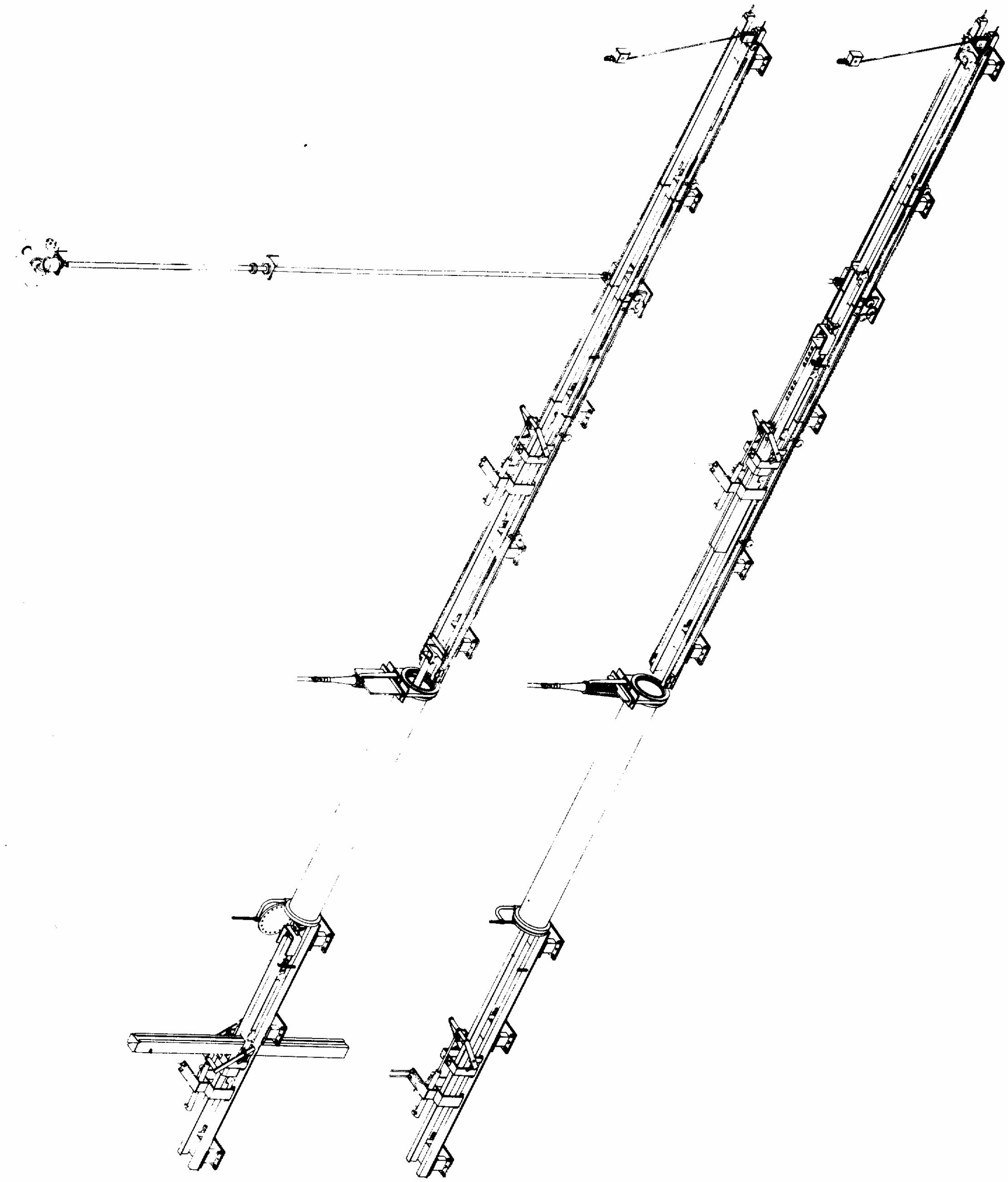
UNIT 1 AND UNIT 2

FUEL TRANSFER SYSTEM

FIGURE 9.1.4–4



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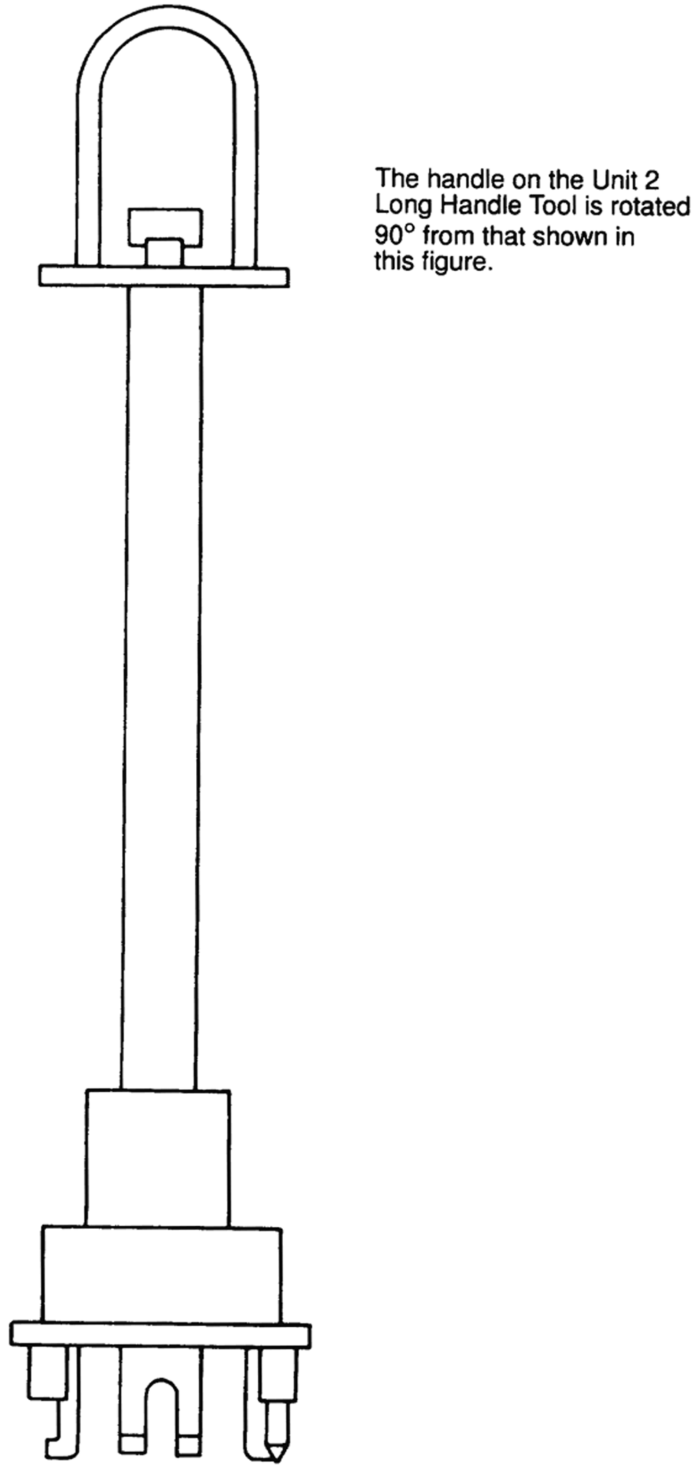
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

FUEL TRANSFER SYSTEM

FIGURE 9.1.4–5



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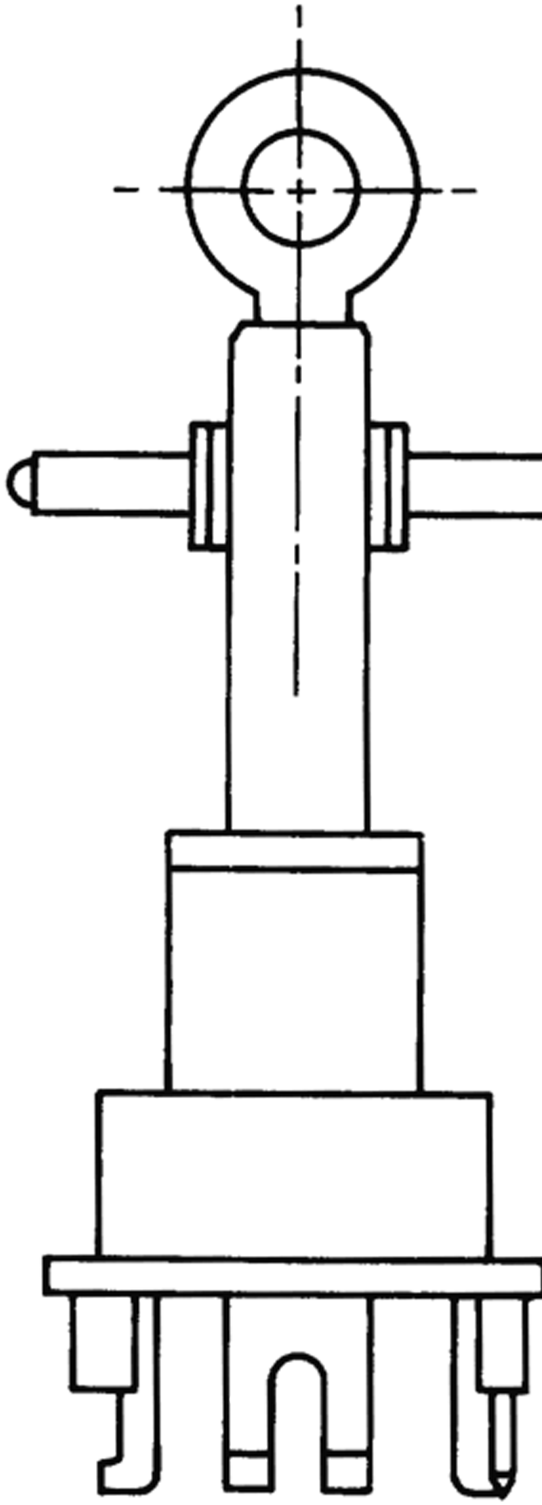
UNIT 1 AND UNIT 2

SPENT FUEL HANDLING TOOL

FIGURE 9.1.4–6



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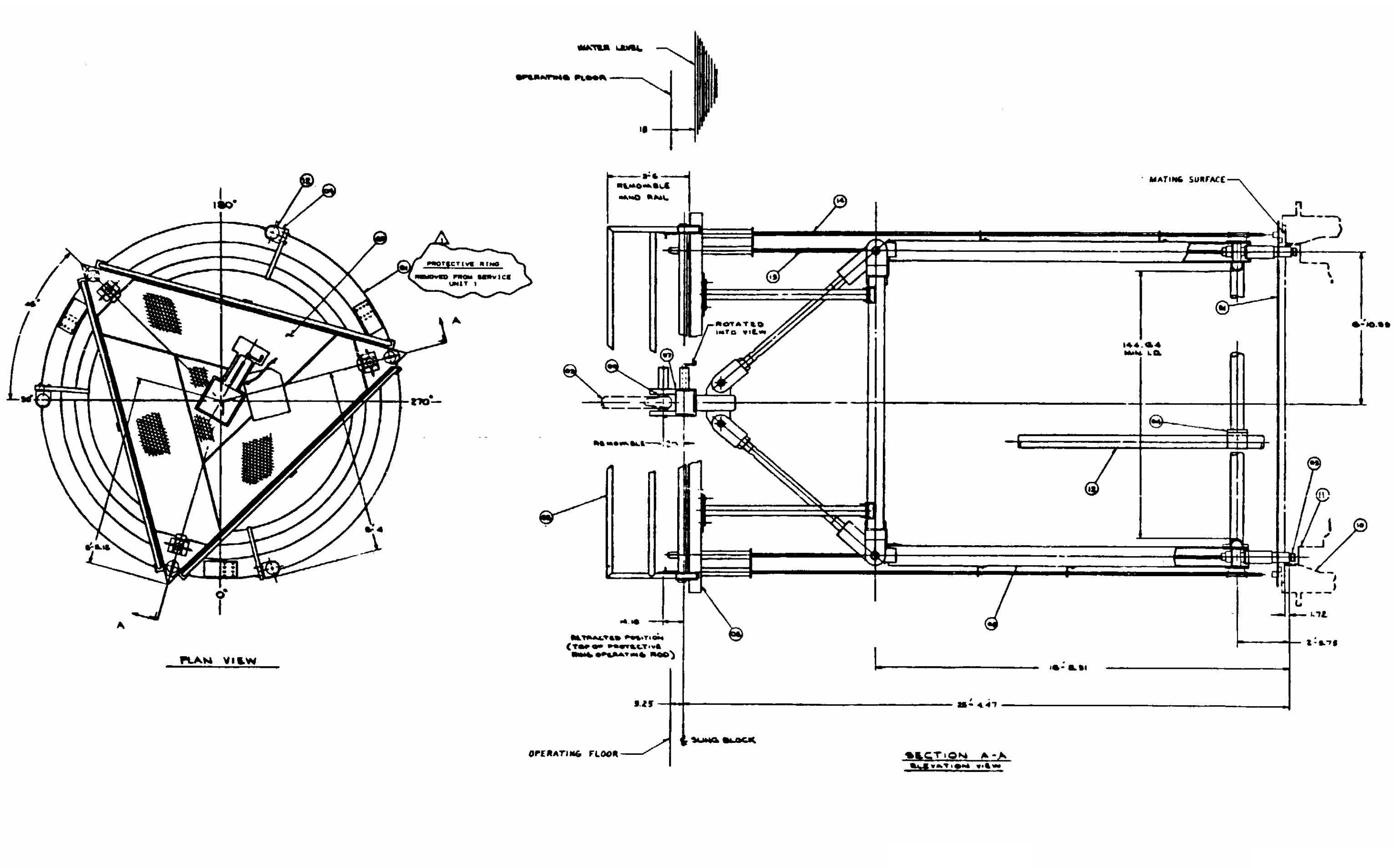
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

NEW FUEL HANDLING TOOL

FIGURE 9.1.4–7



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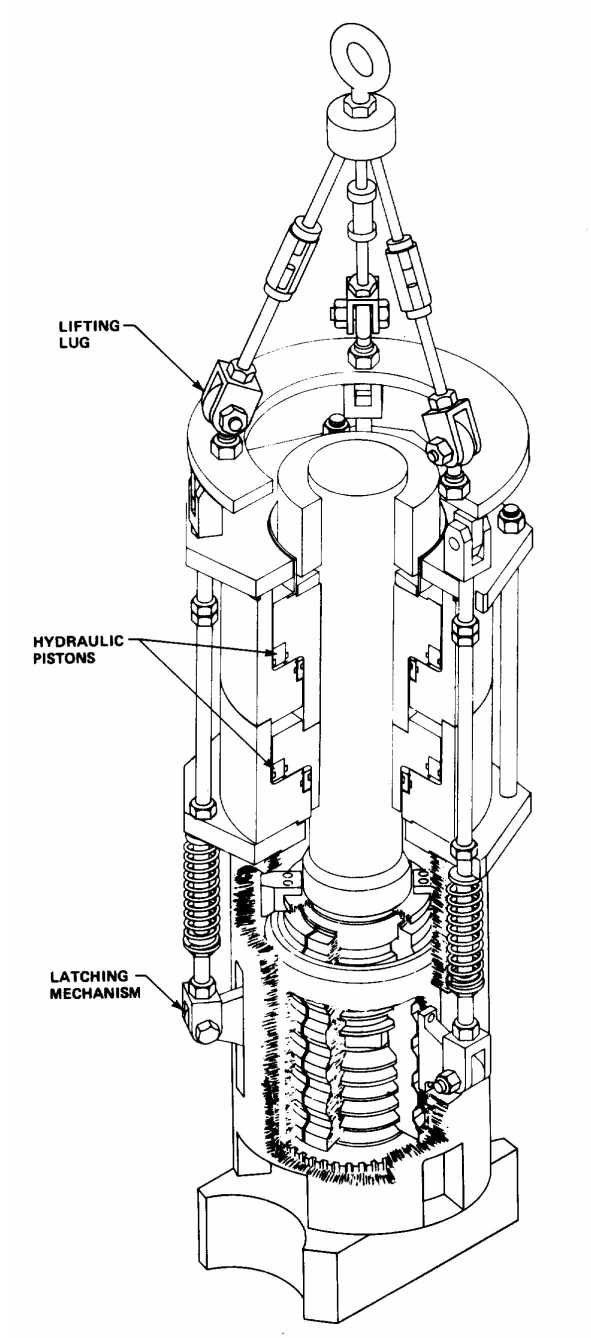
UNIT 1 AND UNIT 2

REACTOR INTERNALS LIFTING DEVICE

FIGURE 9.1.4–8



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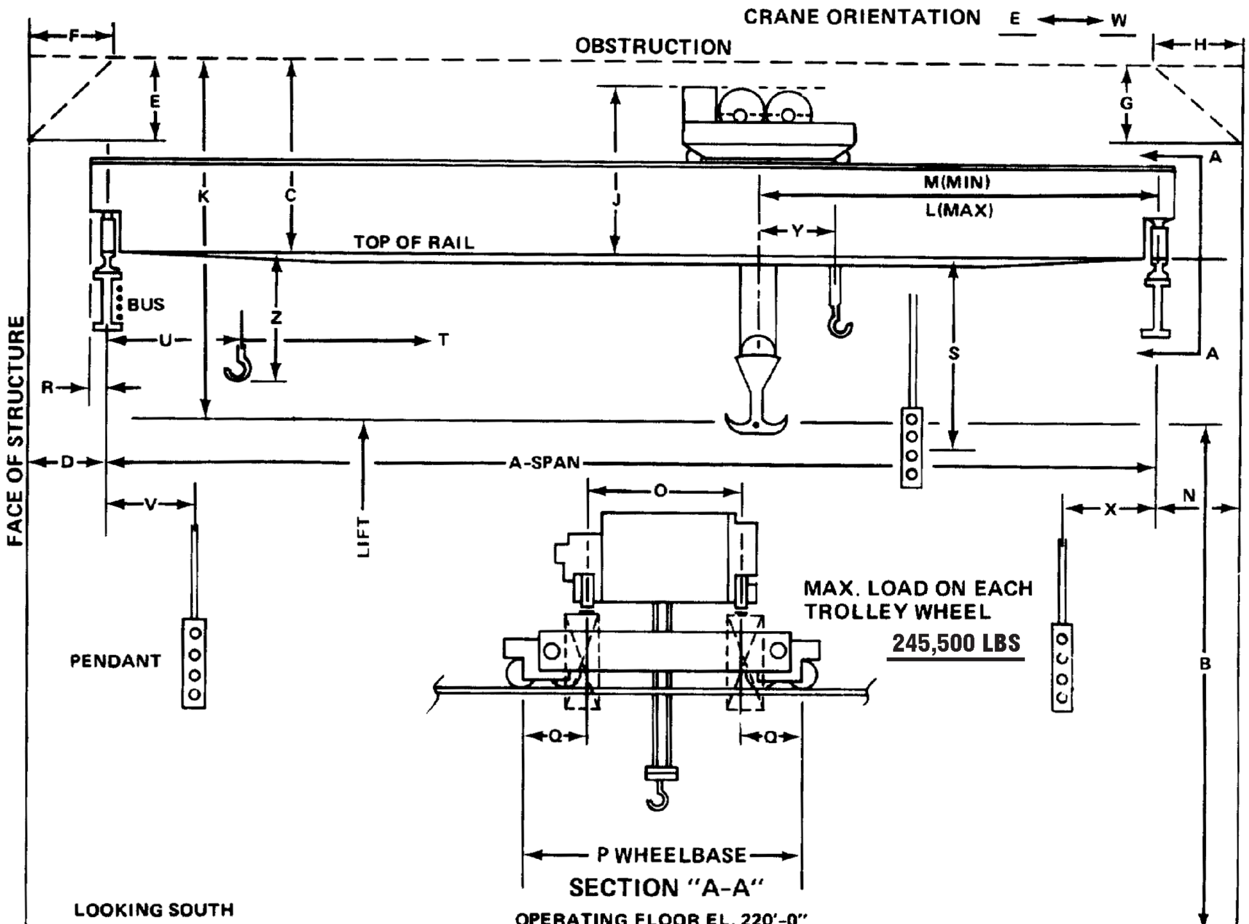
UNIT 1 AND UNIT 2

TYPICAL QUICK–ACTING STUD TENSIONER

FIGURE 9.1.4–9



CAPACITY – MAIN 125 TONS**	H N/A FT N/A IN	U 5 FT 2 IN
CAPACITY – AUX. 15 TONS	J 14 FT 1 IN	V N/A FT N/A IN
CAPACITY – MONO 2 TONS	K 19 FT 4 IN	
LIFT – MAIN 70 FT 0 IN	L 36 FT 0 IN	X N/A FT N/A IN
LIFT – AUX. 140 FT 0 IN	M 8 FT 2 IN	Y 4 FT 7 IN
LIFT – MONO 40 FT 6 5/8 IN	N 1 FT 3 IN	LENGTH OF MAIN LINE
A 42 FT 6 IN	O 22 FT 3 IN	RUNWAY 188 FT 4 IN
B 40 FT 0 IN (HIGH HOOK)	P 25 FT 9 IN	MAX. LOAD ON EACH
C 15 FT 0 IN	Q 1 FT 9 IN	WHEEL 288,500 LBS
D 1 FT 3 IN	R 1 FT 0 IN	RUNWAY RAIL
E N/A FT N/A IN	S N/A FT N/A IN*	SIZE 175 LBS
F N/A FT N/A IN	T 33 FT 0 IN	Z 4 FT 6 1/2 IN
G N/A FT N/A IN	(MONORAIL TRAVEL)	

NOTE: TOP OF RAIL – 265'-3"

* PENDANT IS A 45 FT FIXED CABLE LENGTH

** RESTRICTED AREA IS THE SHADED PORTION OF DRAWING AX4DE501

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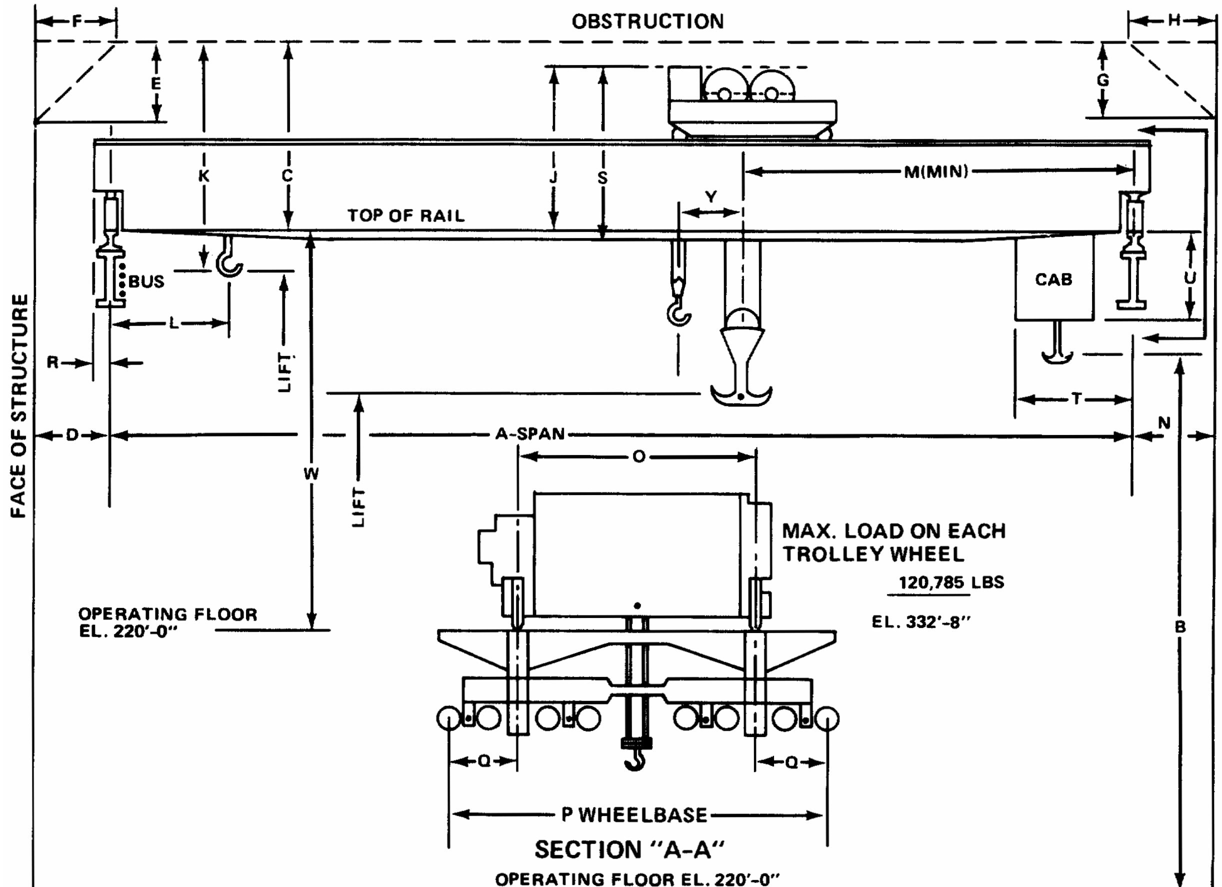
UNIT 1 AND UNIT 2

ARRANGEMENT DRAWING SPENT FUEL CASK BRIDGE CRANE

FIGURE 9.1.5–1



CAPACITY – MAIN 225 TONS
CAPACITY – AUX. 25 TONS
LIFT – MAIN 150 FT 0 IN
LIFT – AUX. 150 FT 0 IN

A 134 FT 0 IN	H N/A FT N/A IN	U 8 FT 8 IN
B 100 FT 8 IN (HIGH HOOK)	J 20 FT 8 IN	W 101 FT 10 IN
C N/A FT N/A IN	K N/A FT N/A IN	Y 6 FT 10 IN
D 3 FT 0 IN	L 6 FT 6 IN	
E N/A FT N/A IN	M 14 FT 2 IN	
F N/A FT N/A IN	N 3 FT 0 IN	
G N/A FT N/A IN	O 29 FT 10 IN	
	P 47 FT 10 IN	
	Q 9 FT 0 IN	
	R 1 FT 6 IN	
	S 20 FT 11 IN	
	T 14 FT 3 IN	

LENGTH OF MAIN LINE RUNWAY N/A FT N/A IN
MAX. LOAD ON EACH WHEEL 130,000 LBS
RUNWAY RAIL 175 LBS

NOTE: TOP OF RAIL ELEVATION 321'-10"

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ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

ARRANGEMENT DRAWING CONTAINMENT BUILDING POLAR CRANE

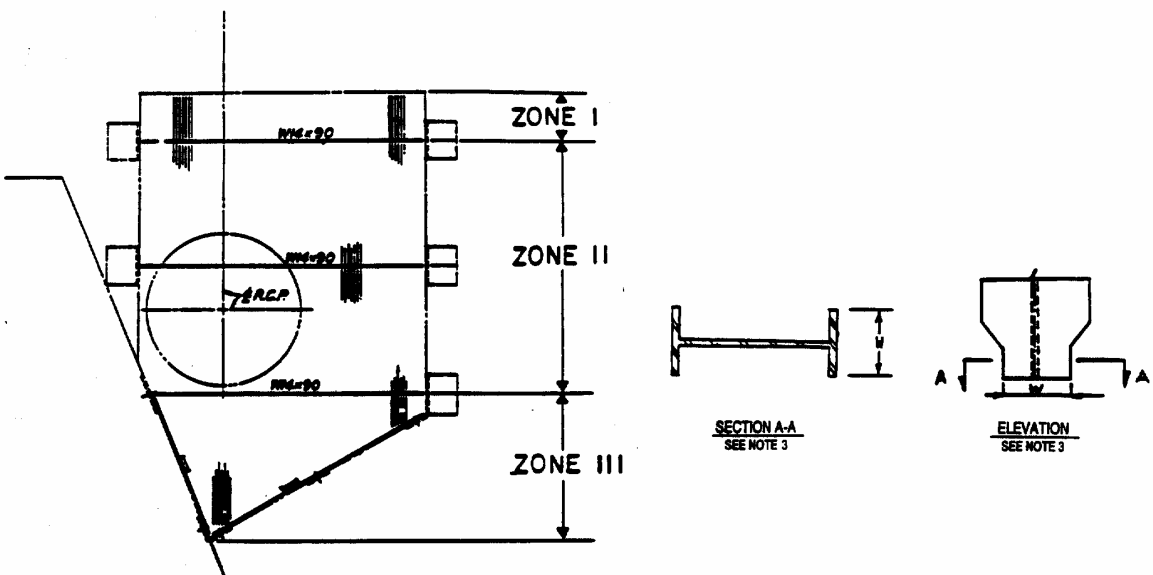
FIGURE 9.1.5–2

Elevation 220 ft - 0 in. Grating In Place

LIFTED LOAD (lbs) [2,6]	ZONE I HEIGHT [1]	ZONE II HEIGHT [1,3]					ZONE III HEIGHT [1]			
		W = 4 in.	W = 6 in.	W = 12 in.	W = 18 in.	W = 24 in.	W = 4 in.	W = 6 in.	W = 12 in.	W = 18 in.
500	SEE NOTE 4	8 in.	1 ft - 3 in.	3 ft - 2 in.	5 ft - 3 in.	7 ft - 5 in.	8 in.	1 ft - 3 in.	3 ft - 2 in.	4 ft - 4 in.
1000		-	4 in.	1 ft - 3 in.	2 ft - 3 in.	3 ft - 2 in.	-	4 in.	1 ft - 3 in.	1 ft - 11 in.
1500		-	-	8 in.	1 ft - 3 in.	1 ft - 11 in.	-	-	8 in.	1 ft - 2 in.
2000		-	-	4 in.	10 in.	1 ft - 3 in.	-	-	4 in.	9 in.
2500		-	-	2 in.	6 in.	11 in.	-	-	2 in.	6 in.
3000		-	-	-	4 in.	8 in.	-	-	-	5 in.
3500		-	-	-	3 in.	6 in.	-	-	-	3 in.
4000		-	-	-	-	4 in.	-	-	-	2 in.
4500		-	-	-	-	3 in.	-	-	-	-
5000		-	-	-	-	2 in.	-	-	-	-

NOTES

1. LIFT HEIGHT IS THE DISTANCE BETWEEN BOTTOM OF LIFTED LOAD AND TOP OF GRATING OR SLAB IMMEDIATELY BELOW LIFTED LOAD.
2. LIFTED LOAD SHALL INCLUDE THE WEIGHT OF RIGGING.
3. W IS A MINIMUM AND REFERS TO THE SMALLER SIDE OF A RECTANGLE WHICH ENCOMPASSES THE BOTTOM AREA OF THE LIFTED LOAD.
4. THERE SHALL BE NO LOADS LIFTED ABOVE ZONE I EXCEPT AS ALLOWED IN NOTE 5.
5. ALLOWABLE LIFT HEIGHT AS GIVEN FOR ZONE II MAY BE USED FOR ZONE I PROVIDED A 1-INCH-THICK PLATE IS PLACED OVER THE ZONE I GRATING. THE PLATE SHALL OVERLAP THE BORDER BY MINIMUM OF 3 INCH.
6. NO LIVE LOAD SHALL BE ALLOWED ON GRATING WHEN GRATING IS BEING USED AS A LOAD PATH.



PLAN

ZONES FOR EL 220 FT - 0 IN. GRATING IN PLACE OVER RCP HATCH NO. 1 (OTHER RCP HATCHES ARE SIMILAR)

SECTION A-A
SEE NOTE 3

ELEVATION
SEE NOTE 3

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9.2 WATER SYSTEMS

9.2.1 NUCLEAR SERVICE COOLING WATER SYSTEM

The nuclear service cooling water (NSCW) system provides cooling water for the containment coolers, control building essential chiller condensers, various engineered safety features (ESF) pump coolers, standby diesel generator jacket water coolers and the component cooling water (CCW) and auxiliary component cooling water (ACCW) heat exchangers and transfers the heat removed from these systems to the ultimate heat sink. The ultimate heat sink is described in subsection 9.2.5. Site features are described in chapter 2.

The heat removal requirement is greater for Unit 2 than for Unit 1 due to the larger spent fuel storage capacity of the Unit 2 pool. This results in some differences in the system performance and available inventory for each unit. These differences, where they are significant, are outlined in the following paragraphs. When a single value is presented, it represents the upper bound for both Units.

9.2.1.1 Design Bases

Protection of the NSCW system from wind and tornado effects is discussed in section 3.3. Missile protection is discussed in section 3.5. Protection against the dynamic effects associated with postulated rupture in piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.2.1.1.1 Safety Design Bases

A. The NSCW system, containing the plant ultimate heat sink, is designed to remove heat from plant auxiliaries that are required for a safe reactor shutdown.

B. The NSCW system is designed to detect and preclude leakage to the environment of radioactive contamination that may enter the NSCW system from the CCW system, ACCW system, or the containment coolers.

C. The NSCW system is designed to meet Seismic Category 1 requirements. Nonseismic pipe, ductwork, and components are evaluated to ensure that their physical collapse during a safe shutdown earthquake (SSE) will not adversely affect essential components.

D. The NSCW system excluding the NSCW tower fans is protected from extreme natural phenomena and missiles.

E. The NSCW system is protected from the effects of pipe whip, jet impingement, and water spray damage from high- and moderate-energy line breaks.

F. The NSCW system is protected from the effects of freezing.

G. The NSCW system is designed to perform its cooling function following a loss-of-coolant accident (LOCA), automatically and without operator action, assuming a single failure coincident with a loss of offsite power.

H. The NSCW system is designed such that boiling does not occur in the containment coolers during LOCA conditions.

I. The NSCW system is designed so that system pressure is greater than the containment building maximum calculated pressure during accident conditions to preclude leakage to the environment via the NSCW system.

J. The NSCW system is designed to minimize the effects of water hammer forces.

9.2.1.1.2 Power Generation Design Bases

The NSCW system provides cooling to plant components, as required, during normal operation and normal shutdown.

9.2.1.2 System Description

9.2.1.2.1 General Description

The NSCW system consists of separate, redundant, 100%-capacity trains comprised of cooling towers, pumps, piping, valves, and instrumentation, as shown in drawings 1X4DB133-1, 1X4DB133-2, 1X4DB134, 1X4DB135-1, and 1X4DB135-2. The system components are designed to the codes and standards in table 3.2.2-1.

The locations of the cooling towers with their pumphouse are shown in drawing AX4DD300. The locations of the components that are cooled by the NSCW system are shown in drawings 1X4DE317, 1X4DE320, 1X4DE322, 1X4DE315, 1X4DE318, 1X4DE321, 1X4DE323, 1X4DE324, 1X4DE325, 1X4DE316, 1X4DE327, and 1X4DE330. The NSCW towers and pump and fan locations are shown in drawing 1X2D05E001. Required system flows and heat loads are given in table 9.2.1-1. [*Drawings 1X4DB149-1, 2X4DB149-1, 1X4DB149-2, 2X4DB149-2, 1X4DB149-3, 2X4DB149-3, 1X4DB149-4, and 2X4DB149-4 show a flow diagram for the NSCW, CCW (subsection 9.2.2), and ACCW (subsection 9.2.8) systems.*] *[Historical]*

Cooling water for each unit is normally pumped from the cooling tower basins, one for each train, by two of three NSCW pumps provided in each train to the essential components coolers, through the two main redundant NSCW supply headers (trains A and B). After removing heat from the components, the coolant is piped back to the cooling towers where the heat is rejected through direct contact with ambient air. Each tower basin is provided with a transfer pump to effect water transfer between the two basins to permit full utilization of the water inventory in the two basins, even with the loss of one NSCW train.

Each unit is serviced by its own dual train NSCW system. There is no sharing of components between the two units on the site.

9.2.1.2.2 Component Description

Table 9.2.1-3 summarizes the design parameters of the major components in the NSCW system.

A. Pumps

The NSCW pumps and NSCW standby pump are each rated at 8600 gal/min at 230-ft head. Each pump is driven by a 700-hp motor. The transfer pump is driven by a 30-hp motor and is rated at 600 gal/min at 110-ft head.

B. NSCW Towers

The cooling towers are vertical cylindrical structures. A detailed description of the NSCW towers is provided in subsection 3.8.4.

C. NSCW Tower Fans

A detailed description of the NSCW tower fans is provided in subsection 9.2.5.

9.2.1.2.3 System Operation

Two separate, 100% redundant NSCW trains are provided, one of which is in service at all times with or without offsite power available. During power generation, at least one NSCW train is in operation. During the other plant operating modes, including post-accident coincident with a loss of offsite power, both NSCW trains may be operating, if available, although one train is sufficient to reject 100% of the heat loads associated with bringing the plant to and holding the plant at a safe shutdown condition.

The NSCW pumps each provide 50% of the cooling water requirements for each train. Two pumps are operated, with the third pump on standby, and automatically started on low pressure in the pump discharge manifold.

As discussed in subsection 9.2.5, a transfer pump, powered from the opposite emergency power train, is provided in each basin to allow transfer of water between basins and thus permit full use of the total water inventory in both basins, assuming loss of offsite power and the most limiting single active failure.

The NSCW system supplies water at a higher pressure than the fluid in the cooled safety-related component. Therefore, if leakage occurs, it will be into the system being cooled. However, as further protection against radioactivity release to the environment, radiation monitors are installed in the return line to each NSCW cooling tower to alert the operators that a radioactive leak into the NSCW has occurred. Alerted to radioactive inleakage, the operator may identify the leaking component by selective isolation of heat exchangers and determination of the rate of decrease of NSCW radioactivity while the suspect component remains isolated. Once the source is determined, the component may be isolated and repaired.

During the period such testing is being performed, the backup redundant NSCW train may be activated to provide the required cooling.

System leaks can be detected by flooding level alarms in the drain sumps associated with the various tunnels and compartments through which the NSCW system piping is routed. In addition, system leaks from the NSCW to the CCW will be indicated by a high alarm of the CCW surge tank. Flow alarms are provided to detect high leakage from an idle NSCW train. High temperature alarms for the CCW heat exchanger and the diesel generator jacket water cooler will indicate reduction in flow due to a large system leak.

The NSCW system is designed to minimize the effects of water hammer forces. The NSCW pumps start with the pump discharge valve closed. A 4-in. bypass line with an orifice around the pump discharge valve allows slow filling of the NSCW system. The NSCW pumps, discharge valves, and tower valves are sequenced to minimize water drainage and to ensure that full NSCW flow is established within the time assumed in the safety analyses.

Because the NSCW system is an open-loop system with components located as much as 56 ft above and 100 ft below the pump and the system discharges, voiding may occur in an idle train or upon loss of offsite power and subsequent pump trip. In order to preclude water hammer on pump restart, the NSCW system incorporates the following design features (these features are shown on drawings 1X4DB133-1, 1X4DB133-2, 1X4DB134, 1X4DB135-1, 1X4DB135-2, 2X4DB133-2, and 2X4DB134):

A. Interlocks to close both tower valves (spray header HV-1668A and HV-1669A and cold weather bypass HV-1668B and HV-1669B) whenever the NSCW pumps in the same train are not operating and to allow normal process controlled valve operation when the pumps are in service.

B. Motor operators on the NSCW pump discharge valves, with interlocks to close the valve if the respective pump is not running and to prevent pump start unless the valve is closed. The valve starts to open after a delay of approximately 45 s when the respective pump starts, thus, limiting the rate of system repressurization.

C. Check valves in the NSCW supply line to all components located above grade to limit the extent of system voiding resulting from draining back to the basins.

D. Keep-full system, consisting of interties between the two trains, with control room alarm on high flow and manual isolation capability. The locations of the branch takeoff and injection points have been chosen such that above atmospheric pressures will be maintained in all portions of the idle train without overpressurizing the components located 100 ft below grade. The manual isolation valve can be closed within 30 min after receipt of high flow alarm to prevent unacceptable loss of basin inventory.

E. Interlocks to close the NSCW tower blowdown valves, if in auto, unless at least one NSCW pump in the respective train is operating.

F. For Unit 2 only, the inlet and outlet isolation valves for the containment auxiliary air cooling coils and reactor cavity cooling coils are interlocked so that the outlet valve partially opens for 3 seconds, delays 60 seconds, then fully opens. The inlet valve then opens. This design serves to limit the hydraulic transients in these coolers to prevent water hammer.

G. For Unit 2 only, there are vacuum breakers installed at the high points of the system, (e.g., the control building essential chiller and the component cooling water heat exchanger). These vacuum breakers serve to mitigate the pressure reduction in these portions of the system when the train is shut down for maintenance or during post accident response.

The tower temperature controls are designed to provide automatic start of the tower fans on increasing water temperature in the return header. The first fan to start in each NSCW tower is interlocked to start when the tower's spray valve opens and will stop when the spray valve closes. The spray valve begins to open when the NSCW return temperature is above 75°F and begins to close when the temperature falls below 65°F. The other three fans in each NSCW tower are controlled by independent temperature switches set to start sequentially through a range of 79°F to 87°F. Automatic trip of these tower fans will occur on decreasing temperature with each fan set to trip sequentially through a range of 77° to 71°F. To protect against tower icing in the event of low ambient temperature, two interlocked valves function to bypass the cooling tower spray headers and return the water directly to the cooling tower basin whenever the return water temperature is below 65°F. When necessary due to low ambient temperatures, freezing of an idle NSCW train or tower basin will be prevented by operating both NSCW trains

and/or both NSCW transfer pumps, and by periodically operating all three NSCW pumps in each train. Idle piping, stagnant lines, and instrument sensing lines will be protected from freezing by either insulation, electric heat tracing, space heaters, or other means. The heat tracing is controlled by ambient sensors located outdoors in a location not exposed to sun or other heat sources so as to accurately measure the ambient temperature. The sensors are NEMA 4 rated for outdoor locations and are set to actuate at 38+5°F. A drain hole is provided in each of the four 12-in. supply headers to the tower spray nozzles to promote self-draining. Those portions of the spray header supply piping which will not self-drain are protected from freezing.

During freezing rain, enough heat is present from the basin water to prevent a heavy ice buildup.

Makeup for each NSCW tower is normally provided by a connection with the plant makeup water wells. The backup source of makeup water is the Savannah River. NSCW tower basin water is the source of supply to the NSCW system and does not perform any other function. The makeup supply to the tower basins and provisions to ensure adequate net positive suction head (NPSH) for the NSCW pumps are discussed in paragraph 2.4.11.5.

The impact of long-term corrosion on the NSCW piping is compensated for by appropriate corrosion allowances and addition of a corrosion inhibitor.

Each NSCW cooling tower is provided with chemical treatment that employs biocide to prevent biological fouling, and a corrosion inhibitor. Chemical treatment is added to each tower basin as required. A portion of the system coolant is blown down, when makeup water is available, to prevent the accumulation of fouling agents. The blowdown rate may be controlled by conductivity or manually. Upon a safety injection signal or loss of external makeup, the tower blowdown is terminated and the concentration of total dissolved solids is allowed to increase. However, during the postulated 30-day design accident case (subsection 9.2.5), the solids buildup will not prevent acceptable operation of the cooling tower or associated NSCW equipment.

Air-operated valves CV-9446 and CV-9447 modulate NSCW tower blowdown to limit the buildup of total dissolved solids in the NSCW system. The valves close automatically upon receipt of a safety injection signal and are designed to fail closed upon a loss of offsite power. Thus, the valves will close automatically whenever required to conserve NSCW tower basin inventory. The valves also close whenever the respective NSCW train is not in service as part of the keep-full system.

Failure of a tower blowdown valve to close when required will be indicated by valve position lights on the main control board and by a high flow alarm in the keep-full intertie. Additionally, this condition will be identified by basin level verification required by the Technical Specifications or, in a post-accident situation, by the valve status verification required by the emergency instructions. Isolation of the blowdown line can be effected by closing manual valves 047 and 048 (CV-9446) or 049 and 050 (CV-9447). See drawings 1X4DB133-1, 1X4DB133-2, 1X4DB134, 1X4DB135-1, and 1X4DB135-2.

Failure of the valve to close will have negligible effect on NSCW system operability. The most limiting case is for the valve to stay open coincident with a loss of offsite power (and resultant loss of basin makeup) with or without a simultaneous accident. Assuming 30-min operator response time, the loss of basin inventory is less than 1 hour in capacity.

The tower blowdown sample line class break is at the flow orifice with the nonsafety-related isolation valve downstream of the orifice. The orifices will limit basin inventory loss in the event of a seismic failure of the downstream piping. Over the postulated 30-day period without offsite power and tower makeup, the combined loss from the two sample lines (one on each NSCW

train) is equivalent to approximately 0.3 days or 1% of the total available capacity. This can be reduced to approximately 0.2 days by closing the keep-full intertie isolation valves (492 and 497) during such conditions as only one NSCW train need be operable.

The NSCW system is protected from overpressure conditions resulting from pump shutoff pressures by using relief valves on individual component flowpaths and a large relief valve on the NSCW system return header to the cooling tower. Specifically, the following component flowpaths are protected with individual pressure relief valves: centrifugal charging pump motor and lube oil coolers, safety injection pump motor and lube oil coolers, containment spray pump motor coolers, and residual heat removal pump motor coolers. Also, a pressure relief valve in the NSCW tower area protects the diesel generator, control building essential chiller, and reactor cavity cooling coil from overpressure conditions. All other components in the NSCW system have a design pressure greater than their respective pressures at pump shutoff conditions. Thermal relief valves protect other components cooled by NSCW, should NSCW flow be terminated for any reason.

The NSCW corrosion coupon racks allow for continuous monitoring of corrosion rates in the NSCW system. These racks are located in the NSCW chemical addition room.

The chlorine sample lines from the NSCW cooling tower supply headers supply flow to the NSCW corrosion racks. The class break for these lines is downstream of a manual isolation valve. Operator action to close these valves within 8 hours will be taken to limit potential flow loss due to a failure of the downstream piping.

9.2.1.3 <u>Safety Evaluation</u>

A. The volume of NSCW maintained in the tower basins is sufficient to perform required cooling. The normal source of makeup water is the makeup wells. In the event of failure of these wells, a backup source is available from the river. Required flows are shown in table 9.2.1-1. Refer to subsection 9.2.5 for a discussion of conformance with Nuclear Regulatory Commission Regulatory Guide 1.27, Revision 2.

B. Paragraphs 9.2.1.2 and 9.2.1.5 describe provisions for identifying and isolating leakage from the system.

C. The system is designed and constructed as Seismic Category 1, as indicated in table 3.2.2-1. All NSCW system piping is contained within Seismic Category 1 structure.

D. Section 3.5 provides the basis for missile protection. The NSCW pumps are protected by a series of concrete barrier walls and slabs in a pumphouse.

E. Section 3.6 provides the basis for protection from high- and moderate-energy line breaks. Sections 3.3 and 3.4 provide the basis for protection from natural phenomena.

   External hazards and fires are evaluated in subsection 2.2.3 and the Fire Hazards Analysis, respectively.

F. The lowest ambient temperature anticipated at the site will result in minimal or no freezing of the NSCW in the basin because of the following factors:

   1. The cooling towers are bypassed on low system return temperature, with the water being returned directly to the basin. Freezing of an idle tower

basin is avoided by either operating both trains or both NSCW system transfer pumps.

2. Since the basin water level is below ground and the basin depth is approximately 80 ft, the surrounding nonfreezing ground temperature and the convection currents in the basin due to pump operation will be factors tending to prevent freezing.

3. The NSCW pumps' shaft and impellers are located within a concrete casing, which is surrounded by soil. The pumps and motors are further protected by a concrete pumphouse.

G. Two 100%-capacity, redundant trains are provided by the NSCW system. Three 50%-capacity pumps are provided in each train. In the event of failure of one pump, the train will still be operable, since two 50%-capacity pumps remain in that train. This allows maintenance to be performed on any pump without a plant shutdown. In event of a second pump failure or failure of some other portion of the train, the redundant train ensures a safe and orderly plant shutdown. A failure modes and effects analysis is provided in table 9.2.1-2.

H. The NSCW pressure in the containment coolers and return piping exceeds the vapor pressure corresponding to the maximum calculated fluid temperature, thus preventing boiling (flashing) during post-accident conditions.

I. The NSCW pressure in the containment coolers exceeds the containment building maximum internal pressure during accident conditions, thus preventing leakage of the containment atmosphere to the environment via the NSCW system.

J. Paragraph 9.2.1.2.3 describes the design provisions to minimize the effects of water hammer.

9.2.1.4 Tests and Inspections

Hydrostatic testing will be done prior to initial startup. Preoperational testing is described in section 14.2. Proper system performance during operation will be verified by monitoring system pressures, temperature, and flows.

Inservice inspection of piping is performed in accordance with the requirements of American Society of Mechanical Engineers Section XI, as discussed in section 6.6.

Inservice testing of pumps and valves is performed to ensure operational readiness as described in subsection 3.9.6.

The Generic Letter 89-13 Program describes the activities credited as part of the license renewal aging management program. See subsection 19.2.12.

9.2.1.5 Instrumentation Applications

The water makeup to the NSCW system is controlled by a level instrument in the tower basin which opens and closes an automatic valve in the makeup line on low and high level, respectively.

Temperature instrumentation in the return line functions, on low temperature, to operate interlocked valves so as to bypass the cooling tower spray header and return the system flow directly to the basin.

Flow and temperature instruments and alarms are located throughout the system, sufficient to allow the operator to monitor the system and verify adequate performance.

A radiation detector is mounted in the return line to the tower to ensure that no radioactivity is present in the system and to preclude the possibility of radioactive blowdown being discharged.

9.2.2 COMPONENT COOLING WATER SYSTEM

The component cooling water (CCW) system provides cooling for the spent fuel pool (SFP) during all plant operating modes and for the residual heat removal system (RHRS) during normal shutdown and emergency conditions. The CCW system also serves as an intermediate system or barrier between the reactor coolant system and the nuclear service cooling water (NSCW) system which is open to the atmosphere.

9.2.2.1 Design Bases

Protection of the CCW system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against dynamic effects associated with the postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

For the power uprate, governing design cases were reanalyzed. Values which represent power uprate conditions are so designated within this section.

9.2.2.1.1 Safety Design Bases

A. The CCW system is designed to transfer reactor heat energy from the RHRS to the NSCW system at a rate sufficient to avoid fuel or core damage following a loss-of-coolant accident (LOCA). This safety design basis is in accordance with 10 CFR 50, General Design Criterion 44, Cooling Water.

B. The CCW system is designed to provide the cooling waterflow for removal of heat from the seal coolers for the RHR pumps and from the spent fuel pool heat exchangers.

C. The CCW system is designed so that a single failure of any component, assuming the loss of offsite power, cannot impair the system's capability to comply with its safety-related heat removal function.

D. The CCW system is designed to remain functional during and after a safe shutdown earthquake (SSE).

E. Active components of the CCW system are capable of being periodically inspected and tested during plant power generation operation. Provisions are made for suitable inspection of important components at appropriate times. Design is pursuant to 10 CFR 50, General Design Criteria 45, Inspection of Cooling Water System, and 46, Testing of Cooling Water System.

F. The CCW system is designed to remove reactor decay heat at a sufficient rate to bring the reactor to a cold shutdown condition in 36 h with a loss of offsite power and assuming the most limiting single active failure in accordance with Regulatory Guide 1.139.

9.2.2.1.2 Power Generation Design Bases

A. The CCW system provides a continuous supply of cooling water to the SFP heat exchanger during all normal operating and normal shutdown conditions and during refueling with one or two pumps running, depending on system load. However, during the first fuel cycle of power generation, neither train of the CCW system is required to provide cooling to the SFP heat exchanger.

B. The CCW system is designed with lower pressures than the NSCW system to prevent potentially radioactive leakage into the NSCW system.

C. The CCW system is designed in a manner which prevents long-term corrosion that may degrade system performance.

D. The CCW system is equipped with radiation monitoring capability.

9.2.2.1.3 Codes and Standards

Codes and standards applicable to the CCW system are listed in table 3.2.2-1. The CCW system is designed and constructed in accordance with American Society of Mechanical Engineers (ASME) Section III, Class 3, except for the CCW chemical addition tank and associated piping.

9.2.2.2 System Description

9.2.2.2.1 General Description

The CCW system is shown in drawings 1X4DB136 and 1X4DB137. The system consists of two separate 100% redundant trains. Each train supplies cooling water to one spent fuel pool heat exchanger, to one RHR heat exchanger, and to the seal cooler of the RHR pump aligned with that RHR heat exchanger.

Each CCW train consists of one heat exchanger, three 50% capacity pumps, one CCW surge tank, one chemical addition tank, and associated piping, valves, and instrumentation.

9.2.2.2.2 Component Description

A summary of design parameters for major system components is provided in table 9.2.2-1.

A. Pumps

The CCW pumps are centrifugal pumps, rated at 5000 gal/min at a 160-ft head. The pumps are driven by 300-hp motors.

B. Heat Exchangers

The CCW heat exchangers are shell and tube type, two-pass flow on the tube side, rated at 129.1 x 10^6 Btu/h.

C. Surge Tanks

The surge tanks are horizontal cylindrical atmospheric tanks with a capacity of 2200 gal each.

9.2.2.2.3 System Operation

The CCW system functions as a closed loop system. The heat loads of the CCW system are provided in table 9.2.2-2. The CCW pumps take suction from the shell side of the CCW heat exchangers and circulate the CCW through the components to be cooled, back to the shell side of the CCW heat exchanger, where the collected heat is transferred to the NSCW system which in turn transfers the heat to the ultimate heat sink. Refer to subsections 9.2.1 and 9.2.5 for details of the NSCW system and ultimate heat sink, respectively.

There are three 50%-capacity CCW pumps in each train. The third pump serves as a standby and allows maintenance to be performed on one pump.

The surge tank is connected to the main CCW line on the suction side of the pumps and functions to ensure that the system is kept filled and pump net positive suction head (NPSH) requirements are maintained. Makeup water is added to the surge tank as required from the reactor makeup water storage tank and/or the demineralized water storage tank. To ensure against radioactive release should the CCW be contaminated, surge tank overflow is connected in the CCW drain tank and either returned to the CCW system or treated prior to offsite disposal.

One train is operated during normal power generation. Single pump operation may be used provided spent fuel pool temperature remains below 130°F, the high temperature alarm limit. However, during the first fuel cycle of power generation, neither train of the CCW system is required to provide cooling to the SFP heat exchanger. Both trains are automatically started by an engineered safety feature (ESF) signal. Both trains can be operated during plant shutdowns, although only one train is required to bring the plant to cold shutdown conditions with loss of offsite power and assuming the most limiting single active failure.

Overpressure conditions resulting from pump shutoff conditions are prevented by a pressure relief valve on the RHR pump seal water cooler and by thermal relief valves on the shell sides of the SFP and RHR heat exchangers. Both the SFP and RHR heat exchangers are located sufficiently high, so that they can withstand pump shutoff pressures without the shell side design pressures being exceeded.

9.2.2.3 <u>Safety Evaluation</u>

A. The nominal CCW system cooling capacity based upon two-train cooldown is 129 x 10^6 Btu/h for each train. During two-train cooldown, the maximum heat load is 130 x 10^6 Btu/h, and cold shutdown is achieved in 17 h after reactor trip. During one-train cooldown, the peak heat load is approximately 213 x 10^6 Btu/h, and cold shutdown is achieved in 35 h after reactor trip. Thus, the CCW system satisfies the cold shutdown requirements of Regulatory Guide 1.139 and Branch Technical Position RSB 5-1. During accident conditions, the heat load on the CCW system is 184 x 10^6 Btu/h and therefore less than that for cold shutdown. Hence, the CCW system is capable of performing its duty of removing heat at the required rate.

B. There are three 50%-capacity pumps in each train of the CCW system. Thus, the failure of one pump does not impair the function of that train. Either train has the heat removal capacity necessary to bring the plant to a cold shutdown in less than 36 h. Therefore, even the failure of one train would not prevent the system from meeting the requirements. The failure modes and effects analysis is presented in table 9.2.2-3.

C. The safety-related portion of the system is designed and constructed as Seismic Category 1, so that it will remain functional during and after a SSE. The CCW chemical addition tank and associated piping is nonsafety related. This portion of the system is isolated from the safety-related process flow path by locked closed, safety-related manual valves.

D. Periodic inservice inspection is performed in accordance with the requirements for ASME Section XI, Class 3 components as described in subsection 3.9.6.

9.2.2.4 Tests and Inspections

Preoperational testing is performed to verify that the system is installed in accordance with plans and specifications. Pipe welds are inspected in accordance with applicable codes.

The system is tested to verify that proper sequence of valve positions and pump starting occurs on various signals. The pumps are tested to verify performance. Inservice testing of valves and pumps is described in subsection 3.9.6.

9.2.2.5 Instrumentation Applications

Control room monitoring of all essential system parameters is provided. Low flow in either train actuates an alarm in the control room. High temperature downstream of all the cooled components also actuates an alarm in the control room. In addition, high temperature downstream of the CCW heat exchangers actuates an alarm in the control room. Level instrumentation on the surge tank keeps the operator informed of surge tank status and provides an indication of any leakage into or out of the CCW system. In the event of leakage, the affected train can be isolated and the redundant train placed into service. Radiation monitors are installed in each train with an alarm and indication in the control room.

9.2.3 DEMINERALIZED WATER MAKEUP SYSTEM

The demineralized water makeup system receives water from the well water storage tank, processes this water to remove soluble and insoluble impurities and dissolved gases, and provides for storage and transfer of demineralized water.

9.2.3.1 Design Bases

The system is designed to serve both Units 1 and 2.

9.2.3.1.1 Safety Design Basis

There is no safety design basis for the demineralized water system.

9.2.3.1.2 Power Generation Design Basis

A. The demineralized water makeup system provides demineralized water to the reactor makeup water storage tanks, the condensate storage tanks, the component cooling water system, the auxiliary component cooling water system, the turbine plant closed cooling water system, the liquid radwaste system, and other usage points (e.g., the water used in laboratories and for washdown of equipment).

B. The demineralizing capacity of the demineralized water makeup system is sufficient to supply the anticipated normal makeup demand.

C. The demineralized water transfer pumps are sized to provide adequate capacity and head for the distribution of demineralized water.

D. Sufficient storage capacity is available to augment condensate and reactor makeup storage such that approximately a 1-day supply of normal anticipated makeup demand to both the condensate and primary systems is maintained. Sufficient storage capacity is provided onsite to supply the anticipated needs for plant startup.

E. Adequate water chemistry is maintained by the demineralized water system.

9.2.3.1.3 Codes and Standards

Codes and standards applicable to the demineralized water makeup system are listed in table 3.2.2-1. The system is designed and constructed in accordance with Quality Group D specifications.

9.2.3.2 System Description

9.2.3.2.1 General Description

The demineralized water makeup system is designed to serve both units simultaneously and is shown in drawings AX4DB190-1, AX4DB190-2, AX4DB177, and AX4DB178. Design parameters for major system components are provided in table 9.2.3-1. The system consists of the components listed below.

- Vendor-supplied water treatment system which consists of multimedia and cartridge filters, reverse osmosis units, electrodeionization units, mixed bed demineralizers, catalytic oxygen removal subsystem, and a chemical control subsystem.
- Two neutralizing sumps with mechanical mixers.
- Two neutralizing sump pumps.
- A demineralized water storage tank.
- Three demineralized water transfer pumps.

- Associated piping, valves, and instrumentation.

9.2.3.2.2 Component Description

9.2.3.2.2.1 Vendor-Supplied Water Treatment System. Three multimedia filters, three cartridge filters, two reverse osmosis units, two electrodeionization units, two primary mixed bed demineralizer trains, catalytic oxygen removal subsystem, two polishing mixed bed demineralizer trains, and a chemical control subsystem are provided to remove particulate, dissolved gases, and dissolved ions from the raw well water. Well water initially flows through the multimedia filters, then through the cartridge filters, the reverse osmosis units, the electrodeionization units, and then the primary mixed bed demineralizers. After the primary mixed bed demineralizers, the process fluid passes through a catalytic oxygen removal subsystem and the polishing mixed bed demineralizers and then to the demineralized water storage tank. Online monitoring of key parameters such as conductivity, sodium, and silica is provided. In the event that the product water quality is not within specified limits, it is automatically diverted to the waste neutralization sump before entering the demineralized water storage tank or inlet piping. A chemical injection subsystem is included for polymer or coagulant injection to enhance filter efficiency.

9.2.3.2.2.2 Neutralizing Sumps. The neutralizing sumps are concrete with vinyl chloride liners (Ameron T-Lock or equivalent), each capable of receiving the process waste, relief valve discharge, equipment drains, and diverted off-specification demineralized water from the vendor-supplied water treatment system. Each sump is equipped with a mechanical agitator to mix the waste water with the neutralizing chemicals.

9.2.3.2.2.3 Neutralizing Sump Pumps. A corrosion-resistant pump is provided in each sump to discharge the neutralized waste to the waste water retention basin.

9.2.3.2.2.4 Demineralized Water Storage Tank. The demineralized water storage tank is a 250,000-gal, covered, vented, corrosion-resistant tank that stores the demineralized water prior to distribution to the various services. The tank is provided with a diaphragm that is in continuous contact with the tank water surface to prevent absorption of oxygen which would lower the water quality below that necessary for use as primary and secondary makeup. Overpressure protection for the water volume of the tank is provided by a loop seal. The water temperature is maintained above freezing by minimum flow recirculation. The tank is equipped with level switches for system controls, a high-level switch for alarm, and a low-level switch for alarm and for tripping the demineralized water transfer pumps. A level transmitter provides remote level indication on a control panel.

9.2.3.2.2.5 Demineralized Water Transfer Pumps. Three 50% capacity, horizontal, centrifugal pumps of type 316 stainless steel are provided for the distribution of the demineralized water.

9.2.3.2.2.6 Demineralizer Booster Pumps. Three 50% capacity, horizontal, centrifugal pumps are provided in order to produce the required pressure at the inlet to the demineralized water system.

9.2.3.2.2.7 Demineralized Water Transfer Booster Pumps. Two 100% capacity, horizontal, centrifugal pumps are provided to boost the pressure of flow to the fuel handling building and containment buildings during the refueling period.

9.2.3.2.2.8 Demineralizer Backwash Pump. One 100%- capacity, horizontal, centrifugal pump was originally provided for the backwashing of activated charcoal filters. This pump has been removed from the system process but remains in place for future use.

9.2.3.2.2.9 Materials of the Makeup Demineralizer System. PVC or stainless steel piping is used to interface the process piping with vendor-supplied water treatment equipment. All process raw water piping is Saran-lined or stainless steel except for the unlined water inlet.

9.2.3.2.3 System Operation

9.2.3.2.3.1 Water Treatment. Water is supplied to the demineralized water system from the well water storage tank by the demineralizer booster pumps. Well water is initially passed through the multimedia filters, then through the cartridge filters, the reverse osmosis units, the electrodeionization units, and the primary mixed bed demineralizers. After the primary mixed bed demineralizers, the process fluid passes through a catalytic oxygen removal subsystem, the polishing mixed bed demineralizers, and then to the demineralized water storage tank. The demineralized water transfer pumps maintain pressure to transfer the deionized water as required by the reactor makeup water system, the condensate storage tank, the component cooling water system, the turbine building closed cooling water system, the auxiliary steam system, the liquid radwaste system, and other usage points.

9.2.3.2.3.2 Neutralization. The process waste, relief valve discharge, equipment drains, and diverted off-specification demineralized water from the vendor-supplied water treatment system is collected in the neutralizing sump and mixed by a mechanical agitator. The waste can either be diluted or neutralized to bring water quality to within discharge limits. If required, the neutralization of waste is controlled manually and monitored by a pH indicator. Neutralized waste is discharged by the neutralizing sump pumps to the Savannah River via the waste water retention basin.

9.2.3.3 Safety Evaluation

This system has no safety design basis.

9.2.3.4 Tests and Inspections

The demineralized water system is tested functionally under all anticipated operating conditions prior to initial plant startup. This verifies that all system units and controls function properly. The system continues to be proved operable through normal plant operation.

9.2.3.5 Instrumentation Applications

Local and remote indicators and alarms are provided to monitor the system process and protect system components. Monitoring of water quality via key parameters such as flow rate, conductivity, sodium, and silica is provided. In the event that the product water quality is not within specified limits it is automatically diverted to the waste neutralization sump before entering the demineralized water storage tank or inlet piping. High- and low-level alarms are installed on the demineralized water storage tank. The neutralizing sumps are provided with high- and low-level alarms.

9.2.4 POTABLE AND SANITARY WATER SYSTEM

9.2.4.1 Design Bases

The potable water system is designed to furnish water for domestic use and human consumption.

9.2.4.1.1 Safety Design Basis

There is no safety design basis for the domestic water system.

9.2.4.1.2 Power Generation Design Basis

A. The potable water system layout is designed to prevent contamination due to potential radioactivity or due to backflow from cross-connected systems using water unfit for human consumption.

B. The potable water is treated to prevent harmful physiological effects. Its bacteriological and chemical quality conforms to the requirements of the regulations of the State of Georgia Department of Natural Resources Environmental Protection Division.

C. Potable water is supplied to provide a quantity of 100 gal/person/day for the largest number of persons expected to be at the station during a 24-h period of plant construction and power generation upon completion of construction. The maximum number of people served by the potable water system during any 1-day of construction or power generation is 3500. The potable water system also provides a storage capacity of 25,000 gal.

D. Water heaters provide hot water to the main lavatory, shower areas, and other locations where needed. The heater capacity is based on providing an adequate supply of hot water for the anticipated maximum drawdown in the plant. The heater also provides a storage capacity equal to the probable maximum hourly demand for hot water.

E. Potable water system outlets are provided in compliance with the intent of Title 29 CFR 1910, Occupational Safety and Health Standards.

9.2.4.1.3 Codes and Standards

Codes and standards applicable to the potable water system are listed in table 3.2.2-1. The potable water system is designed and constructed in accordance with the Southern Plumbing Code.

9.2.4.2 System Description

9.2.4.2.1 General Description

The source of water for the potable water system is from two deep wells onsite. Wells MU-1 and MU-2A are capable of supplying water at 2000 gal/min and 1000 gal/min, respectively. The potable water system consists of a potable water storage tank, two potable water feed pumps, a jockey pump, a distribution loop around the power block, hot water storage heaters, and necessary interconnecting piping and valves. Disinfection is by a chlorination system installed upstream of the potable water storage tank. The potable water system is shown in drawings CX4DB153, AX4DB198-1 and AX4DB198-2. Pertinent data for the major system components is provided in table 9.2.4-1.

9.2.4.2.2 Component Description

9.2.4.2.2.1 Potable Water Storage Tank. The potable water storage facility consists of a 25,000-gal, internally coated, carbon steel tank which stores water for use in the potable water system. High water level and low water level signals from this tank control the operation of the plant makeup well water pumps. On low potable water tank level a makeup well water pump turns on, and the inlet valve to both the potable water tank and the well water storage tank opens. This adds extra protection from low level in the well water storage tank and ensures adequate level in the potable water storage tank.

A low tank level signal stops the potable water feed pumps to prevent damage to the pumps. High- and low-level alarms are provided in the control room. Manual override of the automatic level controls is available.

9.2.4.2.2.2 Potable Water Feed Pumps. Each of the two potable water feed pumps is a full-capacity, horizontal, motor-driven pump taking suction from the potable water storage tank and pumping to the domestic water distribution loop. The pumps are operated as required to meet the potable water demand in the plant. A continuously operated jockey pump with smaller capacity is used to supply potable water and maintain the pressure of the system during low-flow requirement periods.

9.2.4.2.2.3 Chlorination System. The chlorination system disinfects the potable water as the well water enters the potable water storage tank. Continuous chlorination is maintained throughout the system as specified by the Georgia Department of Natural Resources Environmental Protection Division. The system consists of one metering pump and one 250-gallon storage tank. This system is described in subsection 9.3.7.

9.2.4.2.2.4 Hot Water Storage Heaters. Electric storage water heaters of the immersion heating element type is used to supply hot water to the shower and toilet areas and to other plumbing fixtures, outlets, and equipment requiring domestic hot water service as required.

9.2.4.2.2.5 Valves. American Society of Mechanical Engineers code rated and approved relief valves are provided on all equipment and in all piping requiring temperature or pressure relief.

9.2.4.2.2.6 Piping. Construction materials used in the potable water distribution system prevent the introduction by the system piping of objectionable tastes, odors, discoloration, and toxic conditions into the system. Materials conform to the provisions of the Southern Plumbing Code or local codes having jurisdiction.

Piping is sized to limit flow velocity to approximately 6 ft/s and thus minimize system shock and water hammer; also, approved water hammer arresters are installed at appropriate locations to further reduce this problem.

9.2.4.2.2.7 Protection Against Contamination. No cross-connections exist between the potable water system and any potentially radioactive system or any system using water for purposes other than domestic water service. All branches of the potable water system supplying plumbing fixtures that are located in areas where access is restricted due to a potential radiological hazard are provided with backflow prevention devices of the reduced pressure zone type. Hot water supply and recirculation lines connected to the main hot water storage heater are not installed to service such restricted areas. Local electric water storage heaters are provided as required to serve such restricted areas.

Because of the above design features in the domestic water system, sharing of the domestic water system between Units 1 and 2 does not degrade contamination protection.

9.2.4.2.2.8 Lead Corrosion Inhibitor Injection System. Phosphate is injected into the potable water system as an inhibitor to lead corrosion. The injection system consists of an injection skid equipped with a phosphate storage tank and metering pump.

9.2.4.3 Safety Evaluation

The potable water system has no safety functions.

9.2.4.4 Tests and Inspections

The potable water system is tested hydrostatically for leak-tightness in accordance with applicable plumbing code requirements. Inspection of the entire system for compliance with the provisions of the Southern Plumbing Code or local codes having jurisdiction is performed. The system is then disinfected, flushed with potable water, and placed in service. The presence of residual chlorine can be confirmed through control laboratory tests of samples at the potable water storage tank and at usable points as required. Microbiological testing of the potable water, as well as the plant low volume and sanitary wastes, is conducted in accordance with applicable requirements of federal regulations and regulations of the State of Georgia.

9.2.4.5 Instrumentation Applications

Thermostats, high-temperature limit switches, and temperature gauges are installed on the hot water storage heaters. Pressure regulators are employed in those parts of the distribution system where pressure restrictions are imposed.

9.2.5 ULTIMATE HEAT SINK

The ultimate heat sink for VEGP is the nuclear service cooling water (NSCW) towers. Two 100% capacity redundant NSCW towers are provided for each generating unit, one tower associated with each train of the NSCW system. Each NSCW tower consists of a basin which contains the ultimate heat sink water and an upper structure in which the NSCW heat loads are transferred to the atmosphere. The combined storage capacity of the two tower basins per unit will meet the intent of the short-term storage requirements without makeup in conformance with Nuclear Regulatory Commission (NRC) Regulatory Guide 1.27.

The heat removal requirement is greater for Unit 2 than for Unit 1 due to the larger spent fuel storage capacity of the Unit 2 pool. This results in some differences in the system performance and available inventory for each unit. The Unit 2 ultimate heat sink analyses envelope Unit 1. Therefore, all Unit 2 values are applicable to Unit 1. Case results are listed as a single value (applicable to Units 1 and 2). Unit 1 specific values are retained for historical purpose (cases 2, 4, and 5-see paragraph 9.2.5.2.4). For the power uprate, the governing design cases were reanalyzed (cases 1 and 3).

9.2.5.1 Design Bases

Protection of the ultimate heat sink from wind and tornado missiles effects is discussed in sections 3.3 and 3.5. Seismic design is discussed in 3.8. Flood design is discussed in section 3.4. Protection against the dynamic effects associated with postulated rupture in piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.2.5.1.1 Safety Design Bases

A. The ultimate heat sink is designed so that a single failure coincident with a loss of offsite power does not result in inadequate core cooling or prevent a safe shutdown under extreme meteorological conditions.

B. Regulatory Guide 1.27 recommends the ultimate heat sink be capable of providing sufficient cooling for at least 30 days, with no makeup water, assuming two-train operation for 1 day and single-train operation for the remaining 29 days. System design is based upon maximum conditions of dry and wet bulb temperatures as they affect peak basin temperature, tower evaporation losses, and basin capacity.

C. The ultimate heat sink is protected from freezing.

9.2.5.1.2 Power Generation Design Bases

The heat rejection capacity of each tower is adequate for rejection of the heat developed during normal power operation with either one or two trains operating.

9.2.5.1.3 Codes and Standards

The cooling towers and appurtenances are designed and constructed in accordance with the codes and standards listed in table 3.2.2-1. The towers and basins are Seismic Category 1.

9.2.5.2 System Description

9.2.5.2.1 General System Description

The NSCW towers operate in conjunction with the NSCW system. A description of this system is given in subsection 9.2.1. A description of the NSCW towers is provided in subsection 3.8.4. Ultimate heat sink process parameters are presented in table 9.2.5-1. Each unit is provided with its own independent ultimate heat sink, with no sharing of components between the two units on the site.

9.2.5.2.2 Component Description

The NSCW towers are circular mechanical draft towers constructed of reinforced concrete. The tower structural design, including pertinent dimensions is discussed in paragraph 3.8.4.1.7. Each tower is subdivided into four individual fan cells. Each tower includes a pumphouse which contains the NSCW pumps, transfer pump, supply header, return header, return isolation and tower bypass valves. Tornado missile protection for the NSCW pumps and valves is provided as discussed in subsections 3.5.2 and 3.8.4.

Each NSCW fan is driven through a right-angle gear reducer by a 100 hp, 1800-rpm motor that is powered from the essential ac buses. Each fan is 22 ft in diameter with 12 blades and has a capacity of 531,100 ft^3/min.

The NSCW tower basins have an 88-ft inside diameter and are 80 ft 3 in deep at minimum water level. The minimum capacity of each basin is 3.65×10^6 gal (30.1×10^6 lb) of water.

Safety-related transfer pumps are provided in each tower basin to allow water in either basin to be used as makeup for the other basin. Pump data are presented in subsection 9.2.1.

9.2.5.2.3 System Operation

The NSCW pumps take suction from the cooling tower basin as described in subsection 9.2.1. The water is returned to the cooling tower spray manifolds, or in the event of low return temperature from the NSCW system, the spray manifolds are bypassed and the water is returned directly to the basin. Heat rejection to the environment is effected by direct contact with the forced airflow, which provides both sensible and evaporative cooling of the NSCW return flow. As discussed in paragraph 2.4.11.5, evaporation and drift losses during normal operation are made up from NSCW makeup wells and, if required, from the Savannah River. Also, as discussed in paragraph 2.4.11.5, the NSCW tower basins and pumps are designed to ensure adequate pump net positive suction head under all operating modes and at the end of the short-term period prescribed in Regulatory Guide 1.27.

During accident conditions, including a loss-of-coolant accident (LOCA) or a main steam line break (MSLB) accident inside the containment coincident with loss of offsite power, sources of basin makeup water are presumed lost. During such conditions, the combined inventory of the

two NSCW tower basins provides greater than a 30-day cooling water supply assuming the worst combination of meteorological conditions and accident heat loads which maximize tower heat load, basin temperature, and evaporative losses. (Refer to paragraphs 9.2.5.2.4 and 9.2.5.2.5 below.) Each tower basin contains a safety-related transfer pump to permit the use of combined storage capacity of the two basins to satisfy the short-term recommendation of Regulatory Guide 1.27. The transfer pumps are powered by the opposite power train; i.e., the train A transfer pump is located in the train B basin and vice versa. Therefore, loss of one electrical train will not compromise the ability to satisfy the short-term requirements. Similarly, loss of the transfer pump in one train can be compensated for by operating the other NSCW train or by operating each train separately. Since the basins are concrete Seismic Category 1 structures located entirely below ground with the normal water level approximately at grade, a basin failure resulting in loss of water inventory is considered highly improbable, hence, the ultimate heat sink satisfies the intent of the short-term recommendations of Regulatory Guide 1.27. Provisions for long-term operation are discussed in paragraph 2.4.11.5.

The impact of long-term corrosion on the NSCW piping is compensated for by appropriate corrosion allowances. Waterproofing of the tower basin is provided as discussed in subsection 3.8.4.

Each NSCW cooling tower is provided with chemical treatment that may employ a biocide to prevent biological fouling, a dispersant to maintain solids in suspension, a corrosion inhibitor. Chemical treatment is added to each tower basin as required. A portion of the system coolant is blown down, when makeup water is available, to prevent the accumulation of fouling agents. The blowdown rate is determined using a conductivity cell and is based on the total dissolved solids in the water. Upon a safety injection signal or loss of external makeup, the tower blowdown is terminated, and the concentration of total dissolved solids is allowed to increase. However, during the postulated 30-day design basis accident case the solids buildup will not prevent acceptable operation of the cooling tower or associated NSCW equipment.

9.2.5.2.4 System Performance

Table 9.2.5-1 lists the ultimate heat sink process parameters. Table 9.2.5-2 lists the maximum ultimate heat sink heat loads on the NSCW cooling towers during both normal operation and accident conditions. These data were developed from the individual heat loads for the equipment cooled by the NSCW system and from the results of transient accident analyses. (Refer to subsection 9.2.1.) These loads account for, as appropriate, reactor coolant system heat load, both residual decay and sensible heat loads, pump work, and station auxiliary system individual and total heat loads for both one- and two-train operation. (Residual decay heat is computed consistently with the method of NRC Branch Technical Position ASB9-2.) The NSCW system is designed to effect safe shutdown with only one train available, a condition which maximizes tower heat load and basin temperature, since all reactor residual (decay) and sensible heat load is imposed on one tower. However, since two-train operation increases total water consumption, the basins are sized on the basis of two-train operation for 24 h followed by single-train operation for the remainder of the short-term period specified in Regulatory Guide 1.27.

Originally five cases were analyzed for the ultimate heat sink analysis. They were:

1. Ultimate heat sink design, LOCA case (two-train operation post LOCA for 1 day followed by one-train operation for 29 days or until basin depletion) Units 1 and 2 (table 9.2.5-3);

2. Ultimate heat sink performance, post-LOCA (during two-train post-LOCA operation until basin depletion) Unit 1 (table 9.2.5-4) [HISTORICAL];
3. Ultimate heat sink maximum temperature case (one-train operation post-LOCA until basin depletion) Units 1 and 2 (table 9.2.5-5);
4. Ultimate heat sink design, MSLB accident case (two-train operation post-MSLB accident inside containment for 1 day followed by one-train operation for 29 days) Unit 1 (table 9.2.5-6) [HISTORICAL];
5. Ultimate heat sink performance, post MSLB accident (during one-train operation post-MSLB accident inside containment) Unit 1 (table 9.2.5-7) [HISTORICAL].

Based on this data, the governing case for the maximum inventory loss is two-train operation post-LOCA for 1 day followed by one-train operation for the remainder of the accident duration (Case 1). The governing case for the maximum basin temperature and NSCW outlet temperature from the fan coolers is one-train continuous operation post-LOCA (Case 3). On this basis, only these two cases were evaluated for Unit 2 to account for the difference in the heat removal requirement.

For the Unit 1 3626 MWt plant uprate, cases 1 and 3 were reanalyzed to determine the impact to the plant. Unit 1 system performance data for cases 1 and 3 are presented in Tables 9.2.5-3 and 9.2.5-5.

For historical purposes, Unit 1 system performance data, including containment conditions, total heat loads, evaporation rates, and basin water depth and temperature for cases 2, 4, and 5 are presented in tables 9.2.5-4, 9.2.5-6, and 9.2.5-7. These values do not represent the Unit 1 power uprate or SFP reracking.

Table 9.2.5-10 provides shutdown heat loads with loss of offsite power for two-train and one-train operation. The two-train analyses (tables 9.2.5-3, 9.2.5-4, and 9.2.5-6) used meteorological conditions (paragraph 9.2.5.2.5.B) which maximize total water usage (drift and evaporation) over the postulated 30-day period. Since blowdown is terminated during accident conditions, blowdown need not be considered in basin sizing. The one-train analyses, for which system temperatures are a maximum, used meteorological conditions (paragraph 9.2.5.2.5.A) which maximize the cold water outlet temperature from the cooling tower.

For the 1-day, two-train analyses (tables 9.2.5-3 and 9.2.5-6), water from the basin of the inactive train is transferred to the basin of the active train until the inactive train basin is depleted.

For the one-train analyses (tables 9.2.5-5 and 9.2.5-7), no interbasin water transfer is assumed.

<u>Number of Fans Required Based on Ambient Wet-bulb Temperature:</u>

Technical Specifications requires four fans and four spray cells per train to be operable with ambient wet-bulb temperature > 63°F. With ambient wet-bulb temperature ≤ 63°F, four spray cells and only three fans are required to be operable.

Tornado Scenario

During and following a tornado, offsite power is presumed lost, with a subsequent reactor trip. Immediately following the reactor trip, the auxiliary feedwater system (subsection 10.4.9) is used to maintain the plant at hot standby, using the inventory of the safety-grade condensate storage

tanks (CSTs) to effect reactor heat removal. Each CST has sufficient auxiliary feedwater supply to hold the plant at hot standby for 4 h followed by a 5-h cooldown to the temperature (350°F) at which the residual heat removal (RHR) system may be placed into service (see paragraph 9.2.6.1.1.B for Unit 2 CST capacity requirements). If both CSTs are available, the allowable time at hot standby is increased to 31 h before cooldown must be initiated. Once the RHR system is placed in service, the RHR heat load is rejected to the component cooling water (CCW) system which in turn rejects the heat load to the ultimate heat sink (the cooling tower) via the nuclear service cooling water (NSCW) system.

During hot standby, assuming the most limiting single active failure (loss of one complete NSCW train), plus loss of one fan in the operable tower as a result of a missile strike, the remaining three fans in the operating train will maintain the temperature in the tower basin below 90°F. Thus the ability to maintain hot standby under such conditions is provided.

During the subsequent cooldown using the RHR and CCW systems, three fans in one NSCW tower are adequate to bring the plant to a cold shutdown condition. However, because the tower is only 75% effective, cold shutdown will not be achieved in 32 h (36-4) stated in paragraph 9.2.2.1.1.F. However, the system is in compliance with Branch Technical Position BTP RSB-5-1, Section A.4, requirement that the system be capable of bringing the reactor to a cold shutdown condition within a reasonable time following shutdown.

In addition, the peak basin temperature during three-fan cooldown operation will exceed the nominal design maximum of 95°F, reaching approximately 97°F for Unit 1 and 98°F for Unit 2 6 to 8 h after RHR initiation, and remaining above 95°F for a total of 20 h for Unit 1 and 35 h for Unit 2 during cooldown. The NSCW tower transfer pump may be used to transfer cooler water from the idle basin which would help keep the NSCW temperature down. Even if the peak basin temperature exceeds 95°F, the excess is less than 3°F and exists for a relatively short period in terms of total plant life and in terms of total RHR system operation over the plant life. Because of these considerations, and because three-fan cooldown has a very low probability of occurrence, it is concluded that there are no operational problems associated with this mode of operation.

Firefighting Support

It is not anticipated that the (UHS) will be utilized to provide a water supply to support firefighting activities; however, it does offer backup capability. The normal fire protection system is equipped with one motor-driven and two diesel-driven fire pumps. If the motor-driven pump becomes inoperable, considering loss of offsite power, either diesel pump is available should fire suppression become necessary. The UHS is connected with the fire protection system only with respect to the independent seismic category I standpipe system. Should the normal fire protection system become incapable of fire water delivery, the category I standpipe system will be utilized as the backup. The design basis is two fire hoses operating for 30-min at 100 gal/min each. This amounts to 6000 total gallons of water that would be extracted from the UHS.

Although a fire is not postulated coincident with an accident, a simultaneous loss of offsite power with plant cooldown is assumed. On that basis, with all basin makeup lost, the 6000 gal used for fire protection amount to approximately 2 in. (out of 160 ft total) of basin depth. In terms of lost basin inventory, basin water usage for fire protection is equivalent to approximately 0.03 days (40 minutes) of the UHS capacity, and thus is negligible relative to the 30-day recommendation of Regulatory Guide 1.27.

9.2.5.2.5 Meteorological Criteria

A. Conditions Which Maximize Water Temperature

The NSCW towers must be capable of dissipating the design bases heat loads under environmental conditions which minimize heat dissipation without exceeding the design limit NSCW temperature of 95°F.

The meteorological conditions for maximum NSCW temperature are found by utilizing a simplified steady-state model of the NSCW towers. The meteorological data for 33 years (1947 to 1981) were screened for the 1 h resulting in the maximum NSCW temperature and the 1 day (consecutive 24-h period) resulting in the maximum average NSCW temperature. The maximum 1-h NSCW temperature was found to result from the meteorological data of July 18, 1958, at 5 p.m. The maximum 1-day average NSCW temperature was found to result from the meteorological data of August 17, 1952, at 5 a.m. to August 18, 1952, at 5 a.m. The meteorological data used in the detailed transient analysis is composed of the data for the 1-h maximum followed by the 1-day maximum average conditions.

These meteorological data are repeated to produce data for a 30-day period.

Table 9.2.5-8 shows the meteorological data which are used in the transient computer program.

B. Conditions Which Maximize Water Usage

To determine the required size of the NSCW storage basins, water usage must be determined for a 30-day period following a normal or LOCA shutdown, assuming all sources of makeup water are lost.

The meteorological conditions for maximum water usage, other conditions remaining constant, are found in the following manner. The equation for evaporation rate is derived for the tower with storage basin as:

$$L = \frac{Q - LC\,(T_2 - T_b) - D\,C_p\,(T_1 - T_2)}{(H_2 - H_1)/(X_2 - X_1) - C\,(T_2 - 32)}$$

where:

L = evaporation (lb/h).

Q = heat load (Btu/h).

L = waterflow (lb/h).

C_p = water specific heat (Btu/lb-°F).

T = temperature, T_1 NSCW return water to tower, T_2 cold water outlet from tower, T_b basin (°F).

D = drift loss (lb/h, i.e., 0.01% of total NSCW circulating flow).

H = moist air enthalpy, H_1 tower inlet, H_2 tower outlet (Btu/lb of dry air).

X = specific humidity, X_1 tower inlet, X_2 tower outlet (lb of moisture/lb

of dry air).

32°F = datum for enthalpy of moisture in air.

In using this equation, the moist air enthalpy and specific humidity are calculated at the inlet and outlet wet bulb temperature and dry bulb temperatures by a computer program. The equations used for air properties are given in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1977 fundamentals handbook, and the outlet water temperature T_2 is found by iterative procedures, using the calculation method of the Cooling Tower Institute. Since the evaporation equation is based on the enthalpy change of the moist air, both latent and sensible heat effects are included in the results.

Losses resulting from blowdown need not be considered, as discussed in paragraph 2.4.11.6.

The meteorological data for 33 years (1947 to 1981) were screened using the above steady-state model of the NSCW towers in order to obtain the data which result in the highest water usage. The meteorological data resulting in the highest water usage for 1 h, 1 day, and 30 days were found. These data are combined by placing the 1-h, 1-day, and 30-day water usage periods in consecutive order. The 1-h maximum water usage was found to result from the meteorological data of July 24, 1952, at 5 p.m. The 1-day maximum water usage was found to result from the meteorological data of July 21, 1977, at 8 a.m. to July 22, 1977, at 8 a.m. The 30-day maximum water usage was found to result from the meteorological data of June 22, 1977, at 1 p.m. to July 22, 1977, at 1 p.m. Table 9.2.5-9 shows these meteorological data which are used in the transient computer program.

9.2.5.3 Safety Evaluation

A. The failure modes and effects analysis for the Ultimate heat sink is included as part of that for the NSCW system in table 9.2.1-2 and demonstrates that the ultimate heat sink satisfies the single failure criteria.

B. As part of the power rerate, an analysis was performed to calculate the basin inventory, basin temperature, and the time dependent evaporative loss. The combined volume of water in the two cooling tower basins is sufficient to provide greater than a 30-day cooling capacity for Unit 2 with two trains operating for the first day and one train operating for the remaining days. The tower basin capacity for Unit 1 was not reevaluated for the power rerate. The calculation was performed for Unit 2 since the higher heat loads from the reracked spent fuel pool make it the more conservative choice; therefore, the results will be bounding for Unit 1. Following the first day of an accident, the operating basin is replenished from the basin of the inactive train until this second basin is depleted. The transfer pump in each basin is powered from the opposite electrical train, ensuring transfer capability to the operating train in the event of a loss of offsite power and concurrent loss of one onsite ac power supply. Each train of the NSCW system is 100% capacity and can provide adequate cooling during normal operation or accident conditions.

Tower performance, as affected by peak basin temperature, is based on the worst 1-day NSCW temperature and assuming no interbasin water transfer. Basin capacity and tower evaporation rates are based on the combination of wet

bulb temperature and dry bulb temperature which results in the greatest water loss over the short-term period following the accident.

If both NSCW trains are operated continuously, the basins will provide a 17.25-day cooling capacity for Unit 1 and 16-day capacity for Unit 2 without makeup. The normal source of makeup water is the makeup wells. A backup source from the river is provided for long-term basin makeup following the initial short-term period (paragraph 2.4.11.5).

C. A description of the provisions to prevent freezing of the nuclear service cooling water system and the ultimate heat sink given in paragraph 9.2.1.2.3.

9.2.5.4 Tests and Inspections

Inservice inspection of piping is performed with the requirements of American Society of Mechanical Engineers Section XI, as discussed in section 6.6.

Inservice testing of pumps and valves is performed to ensure operational readiness as described in subsection 3.9.6.

Periodic inspections of the cooling tower fill material and supports and the drift eliminators and supports will be conducted to detect deterioration.

Tests and inspections credited by license renewal for aging management of the NSCW towers are included in the Generic Letter 89-13 Program (see subsection 19.2.12). Structural Monitoring Program (see subsection 19.2.32) and Periodic Surveillance and Preventive Maintenance Activities (see subsection 19.2.21).

9.2.5.5 Instrumentation Applications

Water level in the cooling tower basin is controlled by level instrumentation that opens or closes an automatic valve in the makeup line. Basin water level is normally maintained at el 217 ft 9 in. (80 ft 9 in. above the bottom of the basin), with a low-low level alarm set to operate whenever the basin level falls approximately 6 in. below the normal water level. Thus, any failure of the makeup system during normal operation will be alarmed, as will abnormal transfer pump operation. As discussed in paragraph 9.2.1.2.3, one NSCT fan in each tower is interlocked with the tower's spray valve while the other three fans are individually thermostatically controlled by temperature sensors in the return line. Therefore, from zero to four fans will run, depending on the temperature in the return line and at least one fan will operate when the tower spray is in operation. The fans are equipped with vibration sensors that alarm in the control room in the event of high vibration.

9.2.5.6 Standard Review Plan Evaluation

Position C-1 of Regulatory Guide 1.27 requires that the ultimate heat sink be capable of providing cooling sufficient for 30 days without makeup, unless it can be demonstrated that replenishment or use of an alternate water supply can be effected to ensure continuous capability of the sink to perform its safety function. Using most conservative data for decay and sensible heat loads, pump and equipment heat loads, and worst 30-day meteorological data for tower evaporation, the total available water in the tower basins, allowing for single failure and loss of all nonsafety-grade equipment, is sufficient to provide greater than a 30-day capability for both Unit 1 and Unit 2 without makeup.

The original ultimate heat sink analysis was based upon conservative assumptions to maximize evaporation and drift losses. A major water user was the diesel generator which, based upon heat rejection at rated load for 30 days, uses approximately 25% of the total inventory. However, if allowance is made for actual installed loads (rather than name plate rating) and for deenergization of some redundant engineered safety features equipment during the long-term cooling period post-accident, water usage for the diesel generator is reduced the equivalent of approximately 2 days total usage. The current analysis accounts for this reduction.

A second conservatism in the original analysis was the value used for tower drift. In the original tower design, the drift loss was 0.03% of the circulated flow. However, the current vendor guarantee is 0.01% of circulated flow. The estimated difference in the two drift values over 30 days is the equivalent of 0.7-day total usage. The current analysis also accounts for this reduction.

The analysis is still conservative because it assumes the heat rejection rate of the ESF chiller and piping penetration area cooler to be constant at their maximum values, although they will decrease over a period of time. Also, the analysis assumes that the LOCA occurs immediately after the refueling operation is completed when the spent fuel pool heat load is at its maximum. Finally, the analysis accounts for the seepage loss.

9.2.6 CONDENSATE STORAGE FACILITY

The condensate storage facility consists of two condensate storage tanks (CSTs), a vacuum degasifier, degasifier feed and transfer pumps, degasifier vacuum pumps, and associated valves, piping, and instrumentation. The condensate storage facility provides the following:

- Degasified and demineralized makeup and surge capacity to compensate for changes in the turbine plant water inventory.
- Reserve supply for emergency shutdown decay heat removal in the event of failure of the normal feedwater system.
- Secondary system fill water for plant startups.

9.2.6.1 <u>Design Bases</u>

Protection of the condensate storage from wind and tornado effects is discussed in section 3.3. Flood protection is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against the dynamic effects associated with postulated rupture in piping is addressed in section 3.6. Environmental design is discussed in section 3.11.

9.2.6.1.1 Safety Design Bases

A. The condensate storage facility provides water to the suctions of the auxiliary feedwater pumps during emergency conditions, including loss of offsite power, with a coincident single failure.

B. Each CST capacity is based on satisfying the safety-grade cold shutdown capability which is sufficient to allow plant operation in the hot standby mode for 4 h, followed by a 5-h orderly plant cooldown, at an average rate of 50°F/h but

not to exceed a rate of 100°F/h, to a temperature of 350°F when the residual heat removal (RHR) system may be placed in operation. For Unit 2, a combined safety-related capacity in two CSTs supports an additional 3 h of hot standby/cooldown for a total of 12 h prior to placing RHR in service.

C. The CSTs are designed to remain functional during and after a safe shutdown earthquake (SSE). Provision is made so that failure of any non-Seismic Category 1 lines attached to the CSTs cannot cause a loss of the reserve capacity required for safe plant shutdown.

D. The piping layout from the CSTs to the auxiliary feedwater pumps ensures adequate net positive suction head (NPSH) at the maximum CST water temperature.

9.2.6.1.2 Power Generation Design Bases

A. The CSTs provide:

1. Sufficient water storage for simultaneous filling of all three condenser shells upon completion of condenser field erection for the purpose of hydrostatic testing of the condenser.
2. Sufficient water volume for filling of the condensate feedwater system condenser hotwells and steam generators to their normal water levels just prior to initial plant operation.
3. Sufficient water capacity to simultaneously fill all three condensers for leak testing of condensers during scheduled shutdown periods.

B. The CSTs serve as a reservoir to supply or receive condensate as required by the condenser hotwell level control system.

C. The condensate storage facility permits periodic testing of the auxiliary feedwater pumps and valves.

9.2.6.1.3 Codes and Standards

Codes and standards applicable to the condensate storage facility are listed in table 3.2.2-1. The storage tanks and safety-related piping are designed and constructed as Seismic Category 1. The vacuum degasifier and appurtenances are designed and constructed as Seismic Category 2.

9.2.6.2 <u>System Description</u>

9.2.6.2.1 General System Description

The condensate storage facility is shown in drawing 1X4DB161-1. The layout of the condensate storage facility is shown in section 1.2. The system consists of two CSTs, a vacuum degasifier, degasifier feed pump, degasifier transfer pump, a degasifier feed/transfer pump, two degasifier vacuum pumps, and associated piping and instrumentation. There is one condensate storage facility for each plant unit.

9.2.6.2.2 Component Description

A. Condensate Storage Tanks

Each CST has a capacity of 480,000 gal. The tanks are vertical right cylindrical tanks, constructed of reinforced concrete with stainless steel liners. The tanks are provided with vent and overflow standpipes. The tanks are provided with level and temperature instrumentation. Each pair of tanks is surrounded by a dike with a capacity to retain leakage or overflow equal to 5% of one tank volume.

B. Vacuum Degasifier Subsystem

This subsystem consists of the vacuum degasifier designed to withstand pressure range from 30 in. mercury vacuum to 125 psig. The capacity rate of the degasifier is 350 gal/min. Two vacuum pumps are provided to maintain the required vacuum in the degasifier. Three fluid pumps are provided:

1. One to feed condensate to the degasifier.
2. One to transfer condensate from the degasifier back to the CSTs.
3. One that can be used as either a feed or a transfer pump. Each of these three pumps is rated at 350 gal/min at 32 psig.

To control corrosion within the system, the CSTs are provided with floating diaphragms which minimize the absorption of oxygen by the condensate. The degasifier system further reduces the concentration of dissolved oxygen.

9.2.6.3 <u>System Operation</u>

9.2.6.3.1 Normal Operation

The condensate level in each storage tank is automatically maintained by a level control valve in the line from the demineralized water system. The valve opens when the volume of liquid in the tank drops to 457,000 gal and closes when the volume increases to 503,000 gal, thus maintaining the volume at 480,000 gal plus or minus 23,000 gal.

If changes in the condensate system inventory cannot be accommodated by the condenser hotwell, the hotwell level control automatically obtains makeup from, or diverts excess to, the condensate storage facility.

Operation of the degasifier subsystem is intermittent as required to maintain the dissolved oxygen in the condensate at less than 0.1 ppm.

The condensate storage facility normally contains no radioactivity. However, in the event of a primary-to-secondary leak resulting from a steam generator tube leak, it is possible for the CSTs to become contaminated. A further discussion of the radiological aspects of primary-to-secondary leakage is included in chapter 11.

9.2.6.3.2 Emergency Operation

The condensate storage facility is normally aligned such that CST No. 1 provides water to all three auxiliary feedwater pumps. A separate line connects the tank to each pump. In each line

are two locked open valves; thus, no automatic or manual action is required to supply water to the suction of the auxiliary feedwater pumps.

As the level in CST No. 1 decreases to the minimum allowable level, the operator manually realigns the system so that CST No. 2 serves all three pumps. A separate line connects each pump to CST No. 2. Each line contains a locked open valve and a normally shut, remote-manual valve. The remote-manual valves have two points of control:

- The main control room.
- The appropriate shutdown panel (train A or B) or the auxiliary feedwater turbine-driven pump local control panel.

9.2.6.4 Safety Evaluation

A. Two CSTs are provided for each plant unit. The system's active components are designed to satisfy the single failure criteria. A failure modes and effects analysis (FMEA) is included in the FMEA provided for the auxiliary feedwater system in subsection 10.4.9.

B. The total design capacity of each storage tank is 480,000 gal. For Unit 1, a total of 340,000 gal is required to operate the plant in hot standby mode for 4 h, followed by a 5-h cooldown to 350°F, the temperature at which the RHR system may be used to remove the remaining residual heat as required for plants with safety-grade cold shutdown capability. (See paragraph 10.4.9.2.2.5.) For Unit 2, a combined safety-related volume of 378,000 gal in two CSTs is required to support an additional 3 h of hot standby/cooldown for a total of 12 h prior to placing RHR in service.

C. The CSTs and associated safety-related piping and valves are designed and constructed as Seismic Category 1, ensuring that they will remain functional through the SSE.

The components and supporting structures of any system or equipment which are not Seismic Category 1 are evaluated to ensure that their failure does not cause a loss of function of safety-related portions of the condensate storage facility.

All nozzles used in normal power generation and nozzles to and from the vacuum degasifier are located on the storage tank at an elevation such that a reserve volume of 340,000 gal is always maintained below the level of these nozzles. This ensures an adequate reserve for emergency safety use.

D. For a maximum CST water temperature of 120°F, the NPSH margin at the motor- and turbine-driven auxiliary feedwater pumps suctions is greater than 11 ft.

9.2.6.5 Tests and Inspections

Hydrostatic testing will be done prior to initial startup. Analytical qualifications are performed as required by seismic category and quality classification of each item.

Proper system performance and integrity during normal plant operation will be verified by system operation and visual inspections.

Correct positioning of valves is ensured by written procedure, as applicable.

Inservice testing of pumps and valves is in accordance with American Society of Mechanical Engineers Section XI as discussed in subsection 3.9.6.

Samples are taken to ensure oxygen levels are maintained within acceptable limits.

9.2.6.6 Instrumentation Applications

A level detection system is installed on the CST. Level signals are transmitted to the automatic tank level control devices. Level indication is provided in the control room and on the shutdown panels. A level recorder is located on the main control panel in the control room. Low- and high-level alarms are provided in the control room. A low-level alarm is provided on the turbine driven auxiliary feedwater panel.

A temperature sensor is provided for each CST with the temperature data transmitted to the plant computer. The plant computer provides an alarm function on low water temperature by a flashing readout on the Monitor display screen.

9.2.7 REACTOR MAKEUP WATER FACILITY

The reactor makeup water storage tank and degasifier system is designed to supply degasified and demineralized water to the various nuclear steam supply system auxiliaries, heating, ventilation, and air-conditioning system (HVAC) essential chillers, waste processing systems, fuel pool cooling and cleanup system, etc., for normal and emergency makeup. If necessary, the degasifier subsystem recirculates and deaerates the contents of the reactor makeup water storage tank (RMWST).

9.2.7.1 Design Bases

Protection of the system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against the dynamic effects associated with postulated rupture in piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.2.7.1.1 Safety Design Bases

The system provides:

A. A Seismic Category 1 source of water for the fuel handling building sumps.

B. A backup Seismic Category 1 makeup water supply for the spent fuel pool.

C. A backup Seismic Category 1 makeup water supply for the component and auxiliary component cooling water surge tanks and the engineered safety features (ESF) chiller expansion tanks.

9.2.7.1.2 Power Generation Design Bases

A. The degasifier subsystem of the reactor makeup water system is designed to recirculate and degasify the demineralized water in the RMWST, if necessary, to reduce the water oxygen content to meet plant specifications for primary plant usage.

B. The RMWST is sized to have sufficient total capacity to meet the water requirements of a plant shutdown to cold conditions late in core life and subsequent startup for the primary coolant system.

C. The RMWST also has a capacity to hold, as a minimum, the contents of one-half of the plant's total recycle holdup tank volume.

D. Each reactor makeup pump is sized to provide a flow equal to the normal operational (power generation) demand. This includes flows to the boric acid mixing tee equivalent to the operating letdown flow from the primary coolant system and other power generation primary makeup water requirements listed in table 9.2.7-1.

E. The reactor makeup pumps are also designed to provide quench cooling for the pressurizer relief tank following the design maximum pressurizer safety valve discharge.

F. The RMWST is provided with a diaphragm to prevent aeration of the tank contents.

9.2.7.1.3 Codes and Standards

Codes and standards applicable to the reactor makeup water facility are listed in table 3.2.2-1.

9.2.7.2 <u>System Description</u>

9.2.7.2.1 General Description

The reactor makeup water system is shown schematically in drawing 1X4DB184. The major components of the system are the RMWST, the reactor makeup pumps, a degasifier subsystem, and piping and valves.

9.2.7.2.2 Component Description

A. Reactor Makeup Water Storage Tank

The RMWST is a safety-related, Seismic Category 1 concrete tank with an austenitic stainless steel liner plate. The tank is designed for atmospheric pressure and 150°F and is sized to have 165,000 gal of usable storage. Sampling connections are installed to permit periodic analysis of the tank's contents. A diaphragm is provided to minimize the introduction of oxygen into the reactor makeup water. The volume between the tank roof and the water surface is vented to the atmosphere. The tank is surrounded by a dike to collect

overflow. The tank nozzles and level instrument piping are maintained above freezing temperature by heat tracing.

B. Reactor Makeup Pumps

Two nonsafety-grade, Seismic Category 1 pumps are supplied. Each pump is a 100%-capacity, horizontal, centrifugal unit with a flowrate of 200 gal/min and a head of 285 ft. Each pump is powered from a separate non-1E emergency bus which can be administratively loaded on the onsite power supply. All wetted surfaces of the pumps are austenitic stainless steel. The pumps are located in the auxiliary building.

C. Degasifier

The Seismic Category 2 degasifier subsystem consists of a degasifier, an air ejector and vacuum pumps, and three pumps (one for transferring water from the RMWST to the vacuum degasifier, one for returning water from the degasifier to the tank, and the third one being the common spare). Sampling connections are installed. All wetted surfaces of the degasifier subsystem are austenitic stainless steel. The degasifier subsystem is located outdoors at grade.

D. Piping and Valves

One Seismic Category 1 and one Seismic Category 2 header are provided to supply reactor makeup water to various applications. The Category 1 header is used to supply backup makeup to the component cooling water system, auxiliary component cooling water system, spent fuel pool cooling and purification system, and the essential chiller system. The headers are separated by two Seismic Category 1, air-operated isolation valves. The valves are operable from the control room and are also interlocked with the level in the tank. The piping and valves are austenitic stainless steel with a design pressure of 150 psig and a design temperature of 500°F for the Seismic Category 1 header and a design pressure of 275 psig and design temperature of 100°F for the Seismic Category 2 header. The piping and valves are welded except where flanged connections are used to facilitate maintenance.

9.2.7.2.3 System Operation

9.2.7.2.3.1 Normal Operation. The reactor makeup water system provides reactor makeup water to maintain the volume control tank level within a predetermined band and to act in conjunction with the chemical and volume control system (CVCS) to maintain the required reactor coolant system (RCS) boron concentration. When the reactor makeup control system (RMCS) is in the "auto makeup" mode, a selected reactor makeup pump starts automatically on a preset low level in the volume control tank and stops automatically on a preset high-level signal. In the "dilute" and "alternate dilute" modes of operation, the reactor makeup pumps are controlled by the RMCS and deliver water to the volume control tank or directly to the suction of the charging pumps. In the "borate" mode, reactor makeup pump operation is not required. The RMCS also has a "manual" mode which allows the operator to manually control the operation of the reactor makeup pumps for providing makeup water to systems other than the RCS.

A recirculation line from the reactor makeup pump discharge to the RMWST is provided to maintain continuous system operation. If the demand for reactor makeup water is in excess of

the pump's capacity, a flow switch automatically starts the second pump. This pump is shut down automatically when the demand for reactor makeup water returns to normal. In the manual mode of pump operation, the second pump will be manually started as necessary. The RMWST level is maintained above a preset minimum by automatic replenishment from the demineralized water system.

Periodic samples are taken to ensure that the quality of makeup water meets the chemical specifications for service in the primary coolant system, as described in the Technical Requirements Manual. The specifications are established by the Chemistry Department to minimize corrosion, formation of activation products, and formation of scale. Vendor and EPRI recommendations are both considered when establishing specifications. In case of conflicts, VEGP will evaluate both positions.

The degasifier subsystem receives demineralized water from the RMWST. The demineralized water is injected into the gas stripping portion of the degasifier body through a spray nozzle. Oxygen and other gases are removed from the water flowing into the degasifier by the stripping action of the spray in the partial vacuum of the degasifier. The stripped gases are drawn out of the degasifier via a line connecting the body of the degasifier to the throat of the degasifier air ejectors. Motive flow for the air ejectors is provided by vacuum pumps which take suction on the discharge of the associated air ejector; the vacuum pumps discharge to the atmosphere via a vent line on the tank dike sump. The degasifier transfer pump takes suction on the degasifier and returns the degasified water to the RMWST.

9.2.7.2.3.2 Emergency Operation. The reactor makeup water system is also designed to provide a backup source of makeup water for the spent fuel pool, component cooling water system, auxiliary component cooling water system, and the ESF chilled water systems. The water is delivered through manual operation of the reactor makeup pumps in conjunction with the seismically designed portion of the piping and valving. The pumps are manually loaded onto the non-1E emergency bus after all safety loads have been automatically sequenced. In addition, makeup water (20 gal/min) can be provided to the spent fuel pool via the Seismic Category 1 header, using gravity as the driving head instead of the pumps.

9.2.7.3 Safety Evaluation

The portion of the reactor makeup water system required to serve as a backup source of makeup water for the spent fuel pool, component cooling water system, auxiliary component cooling water system, and the engineered safety features (ESF) chilled water system is designed and built to Seismic Category 1 requirements. However, as discussed in subsections 9.2.2, 9.2.8, and 9.2.9, makeup water to the component cooling water system, auxiliary component cooling water system, and ESF chilled water system is not required for safe shutdown of the plant; and as discussed in subsection 9.1.3, the reactor makeup water storage tank is one of three sources of makeup water to the spent fuel pool. The other two sources are the refueling water storage tank (a seismic source) and the demineralized water system (a nonseismic source). Therefore, makeup water to the spent fuel pool is available from alternate sources if the reactor makeup water system fails and makeup water is required.

Even though failure of the reactor makeup water system will not compromise the safety of the plant, the piping between the safety-related reactor makeup water tank and other safety-related systems is Seismic Category 1. Two Seismic Category 1 air-operated isolation valves are provided to effectively separate the seismic piping from the nonseismic portion of the system. These valves receive train-related electrical power and are controllable from the main control

room. In addition, the Seismic Category 1 header is automatically isolated from the Seismic Category 2 header on a low-level signal from the reactor makeup water tank.

Since makeup water is not required immediately following a design basis event, the reactor makeup water pumps are not considered safety related. However, they are seismically designed and follow the material requirements of American Society of Mechanical Engineers III, Class 3. This ensures the integrity of the flow path and provides reasonable assurance of the operability of the pumps. Power for the pumps is supplied from train-related, non-1E electrical buses. In an emergency, these non-1E buses can be manually loaded onto the 1E onsite power source once the automatically started, safety-related loads are running. Should both motors fail, the Seismic Category 1 piping and pump casings provide a flow path to allow gravity-induced flow from the storage tank to the spent fuel pool.

9.2.7.4 Tests and Inspections

No special tests or features for unique inspection capability are provided since the system is normally in continuous operation and individual components are readily accessible.

Sample connections indicated in subsection 9.3.2 permit analysis of degasifier outlet water and RMWST contents.

9.2.7.5 Instrumentation Applications

Instrumentation is provided to measure water level in the RMWST and give main control room indication and annunciation of high and low levels. Automatic level control instrumentation is provided to initiate demineralized waterflow into the tank. An alarm is also installed to annunciate a preset abnormal low tank water level. Under this condition, the water supply to the nonseismic header is automatically discontinued, the operation of the degasifier is also automatically stopped, and the reactor makeup water system can only supply makeup water to those systems serviced by the Seismic Category 1 header. A low-low tank water level switch discontinues the operation of the reactor makeup pumps to protect these pumps.

Local pressure indicators are provided for the suction and discharge of the reactor makeup pumps.

Instrumentation is installed to measure flowrate in the common discharge line of the reactor makeup pumps to provide local indication and to start the backup reactor makeup pump when the flow requirement is higher than the design capacity of one reactor makeup pump.

9.2.8 AUXILIARY COMPONENT COOLING WATER (ACCW)

The ACCW system transfers heat from reactor auxiliary components to the nuclear service cooling water (NSCW) system. The ACCW system forms an intermediate system or barrier between components which could possibly release radioactivity and the NSCW which is open to the atmosphere.

9.2.8.1 Design Bases

9.2.8.1.1 Safety Design Bases

The safety-related portion of the ACCW system isolates the return from the reactor coolant pump (RCP) thermal barrier in the event of a crack in the thermal barriers.

9.2.8.1.2 Power Generation Design Bases

A. The ACCW furnishes cooling water, sufficient to remove all excess operating heat, to various reactor auxiliaries which are essential for normal power operation.

B. The ACCW system is designed so that leakage into or out of the system can be detected.

C. The ACCW system is designed in a manner which prevents long-term corrosion that may degrade system performance.

D. The ACCW system is designed with lower pressures than the NSCW system to prevent potential radioactive leakage into the NSCW system.

9.2.8.1.3 Codes and Standards

The codes and standards applicable to the ACCW system are listed in table 3.2.2-1.

9.2.8.2 System Description

9.2.8.2.1 General Description

The ACCW system is shown in drawings 1X4DB138-1, 1X4DB138-2, and 1X4DB139. The ACCW system consists of two 100%-capacity ACCW heat exchangers, two 100%-capacity ACCW pumps, one ACCW surge tank, and associated piping, valves, and instrumentation.

The components listed above are arranged so that the system can operate with either heat exchanger or either pump in operation. The heat exchangers are cooled by NSCW in the tube side of the exchangers. The ACCW flows in series through the two ACCW heat exchangers, which in turn are each cooled by one NSCW train. Thus, ACCW cooling is available irrespective of which NSCW train is in service.

9.2.8.2.2 Component Description

The ACCW heat exchangers are horizontal, shell and tube, single pass, counterflow type, each rated at 66.1 x 10^6 Btu/h.

The ACCW pumps are horizontal, centrifugal type, rated at 6000 gal/min at 275-ft head, and driven by 600-hp motors. Each ACCW pump is powered from separate Class 1E ac buses.

The ACCW surge tank is a horizontal, cylindrical tank with a capacity of 2200 gal.

The ACCW system heat loads and flows are shown in table 9.2.8-1. A summary of ACCW system parameters is presented in table 9.2.8-2.

9.2.8.2.3 System Operation

The ACCW system is essentially a closed loop system which circulates cooling water to the following components:

- The normal charging pump motor coolers.
- The seal water heat exchanger.
- The catalytic hydrogen recombiners.
- The waste gas compressors.
- The pressurizer sample coolers.
- The reactor coolant sample cooler.
- The reactor coolant drain tank heat exchanger.
- The RCP motor coolers, thermal barriers, and bearing lube oil coolers.
- The letdown heat exchanger.
- Excess letdown heat exchanger.
- The ACCW pump and motor coolers.

The ACCW system circulates cooling water through all these listed components and then to the ACCW heat exchanger where the heat is transferred to the NSCW system. The ACCW return flow to the pump suction passes in series through the two ACCW heat exchangers, either of which will satisfy 100% of the ACCW cooling requirements. Each ACCW heat exchanger is in turn cooled by one NSCW train, one of which is always in service. Thus ACCW cooling is available irrespective of the operating status of the NSCW system.

The ACCW system is not essential for safe plant shutdown under accident conditions but is necessary for normal startup power, operation, and normal cooldown (without an accident) with and without offsite power available.

The surge tank is connected to the main ACCW line on the suction side of the ACCW pumps; it functions to ensure that the system is kept filled and pump net positive suction head (NPSH) requirements are maintained. Makeup water is added to the surge tank as required from either the reactor makeup water storage tank, the demineralized water storage tank, and/or the component cooling water drain tank.

One ACCW pump is operated during normal operation. The second pump is started upon low system pressure. The pumps are automatically sequenced onto the diesel generators upon loss of offsite power, unless coincident with an engineered safety features (ESF) signal. Thus, unless an ESF signal (e.g., safety injection) is present, cooling water is supplied to the letdown

and seal water heat exchangers and to the RCP thermal barrier coolers during loss of offsite power conditions. If desired, the ACCW system can be manually loaded onto the diesel generator after an ESF signal.

9.2.8.3 Safety Evaluation

In case of a crack in an RCP thermal barrier, the return line for the barrier is automatically isolated. In each pump return line there is a motor-operated isolation valve which closes on high flow.

Downstream of these valves in the common return header is a redundant motor-operated isolation valve of the opposite train which closes on high pressure or high flow. This ensures that reactor coolant is isolated within the containment should a reactor coolant leak occur through an RCP thermal barrier.

9.2.8.4 Tests and Inspections

Preoperational testing is performed to verify that the system is installed in accordance with plans and specifications. Pipe welds are inspected in accordance with applicable codes.

The system is hydrostatically tested for leakage.

The pumps are tested to verify performance.

ACCW supply and return containment isolation valves are routinely tested during refueling outages. Testing of these valves while the reactor coolant pumps are operating introduces an unnecessary risk of costly damage to the reactor coolant pumps.

The ACCW System Carbon Steel Components Program is credited as a license renewal aging management program as described in subsection 19.2.1.

9.2.8.5 Instrumentation Applications

Instruments are provided for monitoring system parameters. Level instrumentation on the surge tank controls the addition of makeup water. On low-low level in the surge tank, the ACCW pumps are automatically tripped. Surge tank level is trended on the integrated plant computer. A high- and low-level alarm is provided as part of the surge tank instrumentation.

Safety-related flow instrumentation is provided on the ACCW return lines from the RCPs and alarms in the control room on high flow (indicative of a cracked thermal barrier). Also, high ACCW return flow from any RCP thermal barrier cooler or high pressure or high flow in the common thermal barrier return line will automatically isolate the flow in the affected lines.

Safety-related instrumentation to detect loss of ACCW to the reactor coolant pumps consists of surge tank level, ACCW pump discharge pressure, and containment isolation valve position. Low ACCW pump discharge pressure is alarmed in the control room.

Radiation monitors are provided in the ACCW pump suction line with alarm and indication in the control room.

Testing performed by Westinghouse has shown that the reactor coolant pumps will incur no damage with an ACCW flow interruption of 10 min. Based on the various instrumentation available to detect a loss of ACCW to the reactor coolant pumps, 10 min is considered an adequate operator response time to preclude damage to the RCPs.

9.2.8.6 Standard Review Plan Evaluation

The VEGP will provide safety-grade instrumentation to detect loss of ACCW to the RCP, but VEGP does not incorporate an RCP trip upon loss of ACCW.

As discussed in paragraphs 5.4.1.2.4 and 9.2.8.5, the RCPs will incur no damage as a result of an ACCW flow interruption for 10 min. To alert the operator of the need to manually trip the RCPs, safety-related ACCW flow, pressure, surge tank level, and valve position instrumentation are provided along with additional nonsafety-related instrumentation as described in paragraph 9.2.8.5

9.2.9 CHILLED WATER SYSTEMS

9.2.9.1 Essential Chilled Water System

9.2.9.1.1 Design Bases

9.2.9.1.1.1 Safety Design Bases.

A. The essential chilled water system is designed to remain functional during and following a safe shutdown earthquake (SSE).

B. The essential chilled water system is designed to maintain stipulated ambient air temperature of the engineered safety features (ESF) equipment rooms and the switchgear rooms during operation under accident conditions below the maximum design ambient air temperature of 104°F.

C. The essential chilled water system is designed so that a single failure of any active component, assuming loss of offsite power, cannot result in loss of ESF switchgear or the ability to operate at least one of the redundant emergency safeguard feature pumps. A failure mode and effects analysis of the system is provided in table 9.2.9-3.

9.2.9.1.1.2 Power Generation Design Bases.

A. During its operation the essential chilled water system is designed to maintain ambient air temperatures within the switchgear rooms, battery rooms, and control room as specified in table 9.4.1-2, within the limits recommended by the battery manufacturer, and in the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Comfort Standard 55-74, respectively.

B. The essential chilled water system is designed to permit periodic inspection, testing, and maintenance of principal components.

9.2.9.1.2 System Description

9.2.9.1.2.1 General Description. The essential chilled water system consists of two independent trains as shown schematically in drawings 1X4DB221, 1X4DB233, and 1X4DB234.

Each train is a closed looped system. Major components for each of the two independent trains include a centrifugal chilled water refrigeration machine (chiller), a full capacity chilled water pump, expansion tank, and a nonsafety-related, normally isolated chemical addition subsystem.

The essential chilled water system provides chilled water to the cooling coils of the various ESF areas such as the battery rooms, switchgear rooms, control rooms, ESF pump rooms, penetration areas, and the spent fuel pool heat exchanger and pump rooms. The air handling units for the ESF areas which operate during power generation have two sets of cooling coils, one of which is served by the normal chilled water system while the other is supplied by the essential chilled water system. During normal plant operation, chilled water to the air handling unit is supplied by the normal chilled water system, and during accident conditions, chilled water is supplied by the essential chilled water system. Air handling units serving areas which are only required following an accident, such as a safety injection and containment spray pump rooms are provided only with cooling coils supplied by the essential chilled water system.

9.2.9.1.2.2 Component Description. Design data for major components of the essential chilled water system are listed in table 9.2.9-1.

A. Chiller and Pumps

The nuclear service cooling water system provides a nominal 1100-gal/min flow of water through a 300-ton chiller condenser. The evaporator section of the chiller is designed to provide a nominal 600-gal/min flow of approximately 44°F chilled water to the coils of various cooling units associated with the essential chilled water system in the auxiliary, fuel handling, and control buildings.

B. Expansion Tank

The expansion tank is used to:

- Maintain system pressure by allowing water to expand when the water temperature increases.
- Provide a collection point for air bubbles released from the system.
- Provide makeup water to the system from the demineralized water storage system or the reactor makeup water storage tank.

C. Chemical Addition Tank

The chemical addition tank provides a means for chemical mixing and injection into the system to provide control against corrosion.

9.2.9.1.2.3 System Operation. During normal plant operation, both trains of the essential chilled water system are on standby, as the power plant cooling is provided by the normal chilled water system. On a safety injection signal, or control room isolation signal, both trains of the essential chilled water system are automatically actuated; however, on loss of offsite power the essential chilled water system is manually actuated. Each train is powered by the emergency bus associated with the equipment it cools. The essential chilled water system forms a link between the heat receiver of the essential air cooling units for the auxiliary, fuel handling, and control buildings and the heat sink of the nuclear service cooling water system. Heat picked up at the air cooling coils and transferred by the chilled water is piped past the chemical addition system feed input point and the tee, used as an air separator, to the suction of the chilled water pump. Chilled by the refrigeration circuit, the water leaves the evaporator at about 44°F to return to the coils.

The heat absorbed by the refrigerant in the chiller and compressor is removed in the condenser where cooling water flows continuously during normal plant operation and accident conditions. The chiller condenser uses nuclear service cooling water controlled by a modulating valve. This valve responds to the temperature differential controller maintaining the temperatures differential between the condenser and the evaporator.

9.2.9.1.3 Safety Evaluation

Safety evaluations are numbered to correspond with the safety design bases.

A. The chiller, chilled water pump, and piping are designed in accordance with Seismic Category 1 requirements as specified in section 3.2.

B. The essential chilled water system capacity is designed to provide adequate heat transfer to allow the coils to maintain design ambient air temperatures in essential areas.

C. Two separate 100%-capacity independent systems provide complete mechanical backup. Coupled with the redundancy of electrical design, a failure of any single active component cannot result in a complete loss of both trains of ESF equipment, thus ensuring a safe shutdown condition.

9.2.9.1.4 Tests and Inspections

The chilled water piping circuits are hydrostatically tested and balanced to provide design flowrates and temperatures within a tolerance of ±10%. Periodic inspections are performed to ensure proper performance of system components.

9.2.9.1.5 Instrumentation Applications

The chillers and pumps are operable from the main control room and the remote shutdown panel. Status indicators for the chillers and pumps are shown in the main control room and the remote shutdown panel. The following instrumentation is shown in the main control room:

- Indication for compressor operation and malfunction.
- Indication for pump operation and malfunction.
- Alarm to indicate low flow through chiller.
- Alarm to indicate high temperature for chilled water.
- Alarm to indicate high/low water level in the expansion tank.

Local pressure, flow, and temperature indicators display the system operational parameters associated with the chilled water system.

9.2.9.2 Normal Chilled Water System

9.2.9.2.1 Design Bases

9.2.9.2.1.1 Safety Design Bases. The normal chilled water system has no safety design basis.

9.2.9.2.1.2 Power Generation Design Bases.

A. During normal operation the normal chilled water system is designed to maintain normal design ambient air temperatures in various areas throughout the turbine, auxiliary, control, and fuel handling buildings.

B. The normal chilled water system is designed to permit periodic inspection, testing, and maintenance of principal components with a minimum loss of normal operation.

9.2.9.2.2 System Description

9.2.9.2.2.1 General Description. The normal chilled water system consists of three chillers shown schematically in drawings AX4DB218, AX4DB231, and AX4DB232. Major components include centrifugal chilled water refrigeration machines (chillers), chilled water pumps, expansion tank, air separator, and chemical feed system. The normal chilled water system is not a safety-related system as indicated in table 3.2.2-1.

The normal chilled water system supplies chilled water to the essential and nonessential cooling units during normal plant operation. During an accident or loss of offsite power, the normal chillers shut down, while the essential air cooling units are supplied with chilled water from the essential chilled water system for safe shutdown.

The normal chilled water system can be connected to the NSCW system by two removable expansion joints to provide chilled water to one auxiliary containment air cooling unit and one reactor cavity cooling unit. Approximately 1000 gpm of chilled water may be diverted for this purpose. This allows the containment to be cooled to a lower temperature than would normally be possible, if needed, to provide a reasonable working environment in the containment during outages.

9.2.9.2.2.2 Component Description. Design data for major components of the normal chilled water system are listed in table 9.2.9-2.

A. Chiller and Pumps

The turbine plant cooling water system provides a nominal 10,000-gal/min flow of water through series-connected 1500-ton chiller condensers. The series-connected evaporator sections of the chiller system are designed to provide a nominal 6050-gal/min flow of about 44°F chilled water to the coils of various cooling units located throughout the plant. Automatic standby operation is provided for both chiller and pumps.

B. Expansion Tank

The expansion tank is used to:

1. Maintain system pressure by allowing the water to expand when the water temperature increases.
2. Provide a collection point for air bubbles released from the system.
3. Provide makeup water to the system from the demineralized water storage system.

C. Chemical Feed Tank

The chemical feed tank provides chemical mixing in the system to provide control against corrosion.

9.2.9.2.2.3 System Operation. The normal chilled water system is designed to provide plant cooling during normal plant operation only; it does not operate during an accident or loss of offsite power, during which time the plant cooling is provided by the essential chilled water system. The normal chilled water system forms a link between the heat receiver of the various air cooling units throughout the plant and the heat sink of the turbine plant cooling water system. Heat picked up at the coils and transferred by the chilled water is pumped past the chemical addition feed input point and the air separator to the suction of the operating chilled water pump. The operating pump discharges to the evaporator section of the operating chiller. Chilled by the refrigeration circuit, the water leaves the evaporator at about 44°F to return to the coils.

The system has three complete chillers and pumps. Normally, two operate in series and one chiller is on standby. Any two of the three pumps in parallel operate with the chillers to provide chilled water to the single primary normal chilled water loop.

The condenser of the chiller is cooled by the turbine plant cooling water system.

9.2.9.2.3 Safety Evaluation

Because the normal chilled water system has no safety design basis, no safety evaluation is provided.

9.2.9.2.4 Tests and Inspections

The chilled water piping circuits are hydrostatically tested and balanced to provide design flowrates and temperatures within a tolerance of ±10%. Active component performance is monitored by various instruments on the chiller and piping.

9.2.9.2.5 Instrument Applications

The chiller and pumps are operable locally. The following instrumentation is available in the main control room.

- Alarm for compressor trip and malfunction.
- Alarm for pump trip.

- Flow indication and high alarm.
- Temperature indication and high alarm.
- High/low alarm for expansion tank water level.

Local pressure and temperature indicators display the system operational parameters associated with the chiller and pumps.

9.2.10 TURBINE PLANT CLOSED COOLING WATER SYSTEM

The function of the turbine plant closed cooling water system is to provide chemically treated, demineralized water for the removal of heat from nonsafety-related heat exchangers in the turbine building and to reject the heat to the turbine plant cooling water system.

9.2.10.1 Design Bases

9.2.10.1.1 Safety Design Bases

The turbine plant closed cooling water system is not required for the safe shutdown of the plant and has no safety design basis.

9.2.10.1.2 Power Generation Design Bases

The turbine plant closed cooling water system provides corrosion-inhibited, demineralized cooling water to the equipment shown in table 9.2.10-1 during all modes of normal plant operation.

During power operation the turbine plant closed cooling water system provides a continuous supply of cooling water to turbine plant equipment at a maximum temperature of 110°F, with a circulating water inlet temperature of 94°F.

The cooling water is treated with corrosion inhibitor and uses demineralized water for makeup. The system is equipped with a pot feeder to add chemicals to the system.

The heat sink for the turbine plant closed cooling water system is the turbine plant cooling water system. Turbine plant cooling water is provided on the tube side of the turbine plant closed heat exchangers.

Makeup to the system is provided at a rate of 1% of cooling waterflow.

The surge tank provides a minimum of 30 s of active storage.

Either pump or closed heat exchanger may be down for maintenance without impairing the function of the system.

The turbine plant closed cooling water pumps are provided ac power from the 480-V switchgear bus. The pumps are not required for safe shutdown of the plant; therefore, no connection to the emergency diesels is required.

9.2.10.2 System Description

9.2.10.2.1 General Description

The turbine plant closed cooling water system is shown in drawings 1X4DB154-1 and 1X4DB154-2. The system consists of one surge tank, one chemical addition pot, two pumps, two heat exchangers (connected in parallel), and associated piping, valves, controls, and instrumentation. Heat is removed from the turbine plant closed cooling water system via the closed cooling water heat exchanger by the turbine plant cooling water system, which is described in subsection 9.2.11.

The surge tank has a provision for a nitrogen blanket and provides storage to accommodate volumetric changes due to thermal expansion and contraction in the system. The system may be operated with or without a nitrogen blanket. Demineralized water is provided to the surge tank for makeup to the system.

9.2.10.2.2 Component Description

Codes and standards applicable to the turbine plant closed cooling water system are listed in table 3.2.2-1.

A. Turbine Plant Closed Cooling Water Surge Tank

The closed cooling water surge tank is constructed of carbon steel. The tank is located in the turbine building. Demineralized water makeup is provided by a level control valve. The capacity of the tank is 610 gal.

B. Turbine Plant Closed Cooling Water Chemical Addition Pot

The closed cooling water chemical addition tank is constructed of carbon steel. Provisions for makeup water and addition of the chemicals are included. The tank is located in the turbine building. The capacity of the tank is 12 gal.

C. Turbine Plant Closed Cooling Water Pumps

The closed cooling water pumps are constant speed, electric motor-driven, horizontal, centrifugal pumps. The two pumps are connected in parallel with common suction and discharge lines. The pumps operate at approximately 900 gal/min.

D. Turbine Plant Closed Cooling Water Heat Exchangers

The closed cooling water heat exchangers are of horizontal shell and straight tube design. The tube side is supplied with turbine plant cooling water, and the shell side is supplied with closed cooling water.

9.2.10.2.3 System Operation

During normal power operation, one of the two 100% capacity, closed cooling water pumps circulates demineralized water through the shell of the closed cooling water heat exchanger(s). The 100% capacity heat exchangers can be operated with one or both in service. The heat from the closed cooling water heat exchanger is rejected to the turbine plant cooling water passing through the tubes.

Cooling water flowrate to the electrohydraulic control coolers, steam generator feedwater pump turbine lube oil coolers, rotary air compressors, and reciprocating air compressors is regulated by automatic control valves. These control valves are throttled in response to temperature signals from the fluid being cooled.

The flowrate of cooling water to all of the other coolers or equipment is manually regulated by individual throttling valves located on the cooling water side of each cooler.

The closed cooling water makeup surge tank is located at an elevation above the highest component in the system and is connected to the pumps' suction. The surge tank provides a reservoir for small amounts of leakage from the system and for the expansion and contraction of the cooling fluid with changes in the system temperature.

Demineralized water makeup to the turbine plant closed cooling water system is controlled automatically by a level control valve which is actuated by sensing surge tank level. A corrosion inhibitor is manually added to the system.

9.2.10.3 Safety Evaluation

The turbine plant closed cooling water system does not serve a safety-related system.

9.2.10.4 Tests and Inspections

The performance, structural, and leaktight integrity of all system components is demonstrated by continuous operation.

9.2.10.5 Instrument Applications

Local indication of closed cooling water surge tank level is provided. Surge tank low- and high-level alarms are provided in the control room. Each pump discharge contains a pressure gauge.

Pressure indicator connections are provided where required for testing and balancing the system. Flow indicator taps are provided at strategic points in the system for initial balancing of the flows and for verifying flows during plant operation.

9.2.11 TURBINE PLANT COOLING WATER SYSTEM

The turbine plant cooling water system supplies cooling water to remove heat from nonsafety-related heat exchangers.

9.2.11.1 Design Bases

9.2.11.1.1 Safety Design Bases

The turbine plant cooling water system is not required for the safe shutdown of the plant and has no safety design basis.

9.2.11.1.2 Power Generation Design Bases

The turbine plant cooling water system provides cooling water to equipment shown in table 9.2.11-1 during all modes of normal plant operation and power generation.

9.2.11.2 System Description

9.2.11.2.1 General Description

The turbine plant cooling water system is shown in drawings 1X4DB151-1, 1X4DB151-2, and 1X4DB151-3. Applicable codes and standards are provided in table 3.2.2-1. The system consists of two 100%-capacity turbine plant cooling water pumps and associated piping, valves, controls, and instrumentation.

The turbine plant cooling water pumps are vertical, wet pit, centrifugal pumps driven by electric motors. The pumps take suction from the circulating water pumps basin, which receives water cooled by the turbine plant cooling tower. (See paragraph 10.4.5.2.)

Water from the turbine plant cooling water pumps is discharged to the turbine plant cooling water system supply pipes, passes through the equipment serviced by the turbine plant cooling water system, and is discharged into the circulating water system return pipes.

The turbine plant cooling tower acts as a heat sink for the turbine plant cooling water system. Supply temperature, chemical composition, makeup source, and other parameters for turbine plant cooling water system water are identical to those of the circulating water system. (See paragraph 10.4.5.2.)

All turbine plant cooling water system materials are compatible with the cooling water chemistry, long-term corrosion, and organic fouling and with the chemicals used for their control.

9.2.11.2.2 Component Description

A. Cooling Tower

   The cooling towers are discussed in paragraph 10.4.5.2.2.B.

B. Makeup Water Pumps

   The makeup water pumps for the turbine plant cooling water system are discussed in paragraph 10.4.5.2.2.C.

C. Turbine Plant Cooling Water Pumps

   The turbine plant cooling water pumps are vertical, centrifugal, wet pit, constant speed, electric motor-driven pumps; they are powered from the normal ac power system. Each pump is designed for 100% capacity, with the second pump as a full installed spare, and each pump is designed to operate over a range of 7000 – 24,000 gal/min. The pumps are connected to a common discharge header.

D. Piping and Valves

   All piping is standard weight or extra-strong schedule steel pipe, except for the circulating water pipes used to return water to the tower. All valves are designed for a minimum 150-psig pressure. Sufficient block valves are provided to isolate

equipment for maintenance while the turbine plant cooling water system is in operation. Relief valves are provided at each heat exchanger outlet to protect equipment and piping from local overpressure.

9.2.11.2.3 System Operation

Each of the two full-capacity turbine plant cooling water pumps takes suction from the turbine plant cooling tower basin outlet and discharges cooling water to the turbine plant cooling water system pipes, which in turn distribute it to equipment serviced by the system. The pumps are interlocked in such a way that trip of the operating pump will automatically start the spare pump. The system is designed so that either pump can be isolated for repair or maintenance while the second pump is in operation.

Each pump discharge pipe is provided with a pressure indicator, check valve, and shutoff valve. A freeze-protected minimum flow line is also provided to prevent fluid overheating during idle running. For a description of the cooling tower and basin operation, see paragraph 10.4.5.2.3.

Flowrates of cooling water to equipment serviced by the turbine plant cooling water system are regulated by throttling valves located on each loop serviced. Cooling water return from each cooler goes into the turbine plant cooling water system return pipes, which discharge into the circulating water system return pipes and from there to the cooling tower.

All turbine plant cooling water system components are designed so that the effect of pressure surges resulting from hydraulic transients during startup, shutdown, or accidental loss of one or both turbine plant cooling water pumps will not damage components. All component materials are suitable for the turbine plant cooling water system water chemistry and chemicals used to prevent organic fouling and corrosion.

Suitable freeze protection is provided for the turbine plant cooling water pumps minimum flow lines and for all exposed weather-sensitive instrumentation.

The turbine plant cooling water system will be available as a backup supply of lubricating and seal water to the circulating water pumps.

9.2.11.3 Safety Evaluation

The turbine plant cooling water system is not safety related; therefore, there is no safety evaluation.

9.2.11.4 Tests and Inspections

Preoperational testing is described in chapter 14. The performance, structural, and leaktight integrity of all system components is demonstrated by continuous operation.

9.2.11.5 Instrument Applications

Each pump discharge contains a pressure gauge. Each cooler discharge is provided with a pressure relief device.

Pressure indicator connections are provided where required for testing and balancing the system. Flow indicator taps are provided at strategic points in the system for initial balancing of the flows and for verifying flows during plant operation.

Suitable weather protection is provided to each exposed turbine plant cooling water system instrument loop.

TABLE 9.2.1-1 (SHEET 1 OF 2)

NUCLEAR SERVICE COOLING WATER SYSTEM HEAT LOADS AND FLOWS[a] [j]

Component	NSCW Flow per Train (gal/min) Minimum Required for Normal and Accident Conditions[d]	Heat Load per Train (10^6 Btu/h) Normal Power Generation Operation	Maximum Accident Conditions
Standby diesel generator coolers[h]	1500[b][c]	-	17.1
RHR pump motor	16[c]	-	0.37
Containment spray pump motor cooler	8[c]	-	0.07
Component cooling water pump motor coolers (3 pumps)	24	0.14	0.14
Safety injection pump motor and lube oil coolers	14.2[c]	-	0.10
Containment fan coolers	2800	10.4	282.8
Centrifugal charging pump motor and lube oil coolers	19.7	0.2	0.2
Essential chilled water chiller condensers[i]	1100[c]	-	5.15
Pipe penetration area cooler	250[c]	-	1.32
Component cooling water heat exchangers	7950[b]	29.49	184.06
Containment auxiliary air cooling coil	1400[e]	4.59	-
Reactor cavity cooling coil	220[e]	0.49	-
NSCW pump motor cooler (2 pumps)	4	0.14	0.14
NSCW pumping loss	-	3.56	3.56
NSCW transfer pump loss	-	-	0.08

TABLE 9.2.1-1 (SHEET 2 OF 2)

Component	NSCW Flow per Train (gal/min) Minimum Required for Normal and Accident Conditions[d]	Heat Load per Train (10^6 Btu/h) Normal Power Generation Operation	Maximum Accident Conditions
ACCW heat exchanger	9745[f]	24.46	-
NSCW tower blowdown	0	-	-
Total	15,600.9	73.47	440.7[g]

a. Nominal NSCW supply basin temperature for component design is 95°F. However, heat load values shown in this table may be based on other, conservative NSCW supply basin temperatures as appropriate.

b. These components operate in series with the ACCW system and are not included in the totals.

c. These components contribute no heat load in power generation operation.

d. The NSCW system component flowrates for certain components are less than the minimum flow requirements at empty basin condition; however, the flow requirement to remove the heat load when the empty basin level is reached is met for all the components. The actual flow received by the components during normal operation is higher since the basins are maintained full. A small variation exists between the flow values for each train of the NSCW due to the practical limitations on flow balancing the system. The flow values for normal power generation operation are presented in drawings 1X4DB149-1, 2X4DB149-1, 1X4DB149-2, 2X4DB149-2, 1X4DB149-3, 2X4DB149-3, 1X4DB149-4, and 2X4DB149-4.

e. These components are automatically isolated upon safety injection (and loss of offsite power on Unit 2) and thus contribute no heat load during faulted conditions. They can be manually isolated if required during a loss of offsite power incident for Unit 1.

f. Flow is maintained during loss of offsite power and safety injection operation, but there is no ACCW heat load during such conditions.

g. This value is the maximum total NSCW heat load during accident conditions. It is not the sum of the individual component maximums, since they do not occur concurrently.

h. Heat load corresponds to the rated output of 7000 kW for standby diesel generator.

i. Data shown corresponds to 100 percent rated condition. ESF chillers are activated on safety injection, control room isolation or loss of offsite power conditions and NSCW flow is modulated based on cooling load.

j. Values represent Unit 2 analysis. The Unit 2 analysis conservatively envelopes Unit 1.

TABLE 9.2.1-2 (SHEET 1 OF 34)

NUCLEAR SERVICE COOLING WATER FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
1	NSCW pump P4-001 (train A)	Pumps NSCW through train A containment coolers, control building essential chiller, ACCW and CCW heat exchangers, diesel generator jacket water cooler, and miscellaneous train A ESF pump coolers from NSCW tower W4-001 basin and back to the tower spray headers or basin.	A.	Mode 1	A1.	Fails to start upon command; pumps P4-003 and P4-005 not running	A1.	Pump status lights show green on HS-1602A on QMCB or HS-1602B on PSDA; FI-1640B and FI-1640A on QMCB or FI-1640C on PSDA indicate no flow	A1.	None; two additional 50 percent capacity train A pumps (P4-003 and P4-005) available to provide 100 percent of system flow; also, redundant train B available	During normal operation, two pumps in one train are in continuous operation, with the third pump on standby; train A pumps P4-001 and P4-003 are started upon any of the following: • Manually from either QMCB or PSDA • Automatically upon: - Loss of offsite power or safety injection - Auto trip of any other train A pump - Low discharge header pressure with at least one other train A pump running Pump stop is initiated by: • Manual control from QMCB or PSDA • Electrical protection • Loss of offsite power (Mode 2 does not result in a pump trip)

TABLE 9.2.1-2 (SHEET 2 OF 34)

Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
					A2.	Fails to start upon command with either P4-003 or P4-005 running	A2.	Pump status lights show green on HS-1602A on QMCB or HS-1602B on PSDA plus low discharge header pressure alarm PT-1636 (P4-003 running) or PT-1608 (P4-005 running)	A2.	None; same as item A1 except standby pump (P4-003 or P4-005) starts automatically upon low pump discharge header pressure	
					A3.	Trips for any reason; pump P4-003 or P4-005 running	A3.	Same as item A2 plus amber light on HS-1602A (QMCB)	A3.	None; same as item A2	
			B.	Modes 2, 3, and 4	B1.	Fails to start upon command; (pump P4-003 started simultaneously)	B1.	Same as item A2 except only PT-1636 will alarm low pump discharge header pressure	B1.	None; same as item A1 except pump P4-005 started automatically by sequencer, while pump P4-003 already running	
					B2.	Trips for any reason	B2.	Same as item A3	B2.	Same as item A2	
			C.	Mode 2, P4-005 running	C.	Starts running	C.	Pump status lights show red on HS-1602A (QMCB) or HS-1602B (PSDA)	C.	None; excess NSCW flow not a problem; one of the three pumps can be shut down with no effect on plant safety	
2	NSCW pump P4-003 (train A)	Same as item 1	A.	Mode 1	A1.	Fails to start upon command; pumps P4-001 and P4-005 not running	A1.	Same as item A1 except status lights on HS-1634A (QMCB) and HS-1634B (PSDA)	A1.	None; same as item A1 except backup train A pumps are P4-001 and P4-005	See item 1
					A2.	Fails to start upon command; pump P4-003 or P4-005 running	A2.	Same as item A2 except status lights on HS-1634A (QMCB) and HS-1634B (PSDA) and low header pressure alarms are PT-1602 (P4-001) and PT-1608 (P4-005)	A2.	None; same as item A2 except standby pump is P4-001 or P4-005	

TABLE 9.2.1-2 (SHEET 3 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
			B. Modes 2, 3, and 4	B1. Fails to start upon command; (pump P4-001 started simultaneously)	B1. Same as item A2	B1. None; same as item B1 except P4-001 already running	
				B2. Trips for any reason	B2. Same as item A3	B2. None; same as item A2	
			C. Mode 2, P4-005 running	C. Starts running	C. Pump status lights show red on HS-1634A (QMCB) or HS-1634B (PSDA)	C. None; same as item 1C	
3	NSCW pump P4-005 (train A)	Same as item 1	A. Mode 1	A1. Fails to start upon command; pumps P4-001 and P4-003 not running	A1. Same as item A1 except status lights on HS-1608A (QMCB) and HS-1608B (PSDA)	A1. None, same as item A1 except backup train A pumps are P4-001 and P4-003	Pump start logic same as in item 1 except as discussed in note c; P4-005 starts automatically during Modes 2, 3, and 4 only if either P4-001 or P4-003 not running; also, since pump P4-005 is normally called upon during Modes 2, 3, and 4 only if P4-001 or P4-003 not running, failure of P4-005 during Modes 2, 3, or 4 would constitute a double failure
				A2. Fails to start upon command; pump P4-001 or P4-003 running	A2. Same as item A2 except status lights on HS-1608A (QMCB) and HS-1608B (PSDA) and low pressure alarms are PT-1602 (P4-001) and PT-1636 (P4-003)	A2. None, same as item A2 except standby pump is P4-001 or P4-003	
				A3. Trips for any reason; pump P4-001 or P4-003 running	A3. Same as for A2 plus amber light on HS-1608A (QMCB)	A3. None, same as Item A2	
4	NSCW pump P4-002 (train B)	Same as item 1 except train B and NSCW tower W4-002	A. Mode 1	A1. Fails to start upon command; pumps P4-004 and P4-006 not running	A1. Pump status lights show green on HS-1603A (QMCB) or HS-1603B (PSDB); FI-1641A and FI-1641B on QMCB or FI-1641C on PSDB indicate no	A1. None; two additional 50 percent capacity train B pumps (P4-004 and P4-006) available to provide 100 percent of system flow; also, redundant train A available	Same as item 1, except for train B pumps P4-002 and P4-006; shutdown panel is PSDB

TABLE 9.2.1-2 (SHEET 4 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [a]	Failure Mode(s)	Method of Failure Detection[b]	Failure Effect on System Safety Function Capability	General Remarks[c]
					NSCW flow		
				A2. Fails to start upon command; with either pump P4-004 or P4-006 running	A2. Pump status lights show green on HS-1603A (QMCB) or HS-1603B (PSDB), plus low pump discharge header pressure alarm PT-1637 (P4-004 running) or PT-1609 (P4-006 running)	A2. None; same as item A1 except standby pump (P4-004 or P4-006) starts automatically upon low pump discharge header pressure	
				A3. Trips for any reason; pump P4-004 or P4-006 running	A3. Same as item A2 plus amber light on HS-1603A (QMCB)	A3. None; same as item A2	
			B. Modes 2, 3, and 4	B1. Fails to start upon command; (pump P4-004 started simultaneously)	B1. Same as item A2 except only PT-1637 will alarm low pump discharge header pressure	B1. None, same as item A1 except pump P4-006 started automatically by sequencer while pump P4-004 already running	
				B2. Trips for any reason	B2. Same as item A3	B2. None; same as item A2	
			C. Mode 2; P4-006 running	C. Starts running	C. Pump status lights show red on HS-1603A (QMCB) or HS-1603B (PSDB)	C. None; same as item 1C	
5	NSCW pump P4-004 (train B)	Same as item 4	A. Mode 1	A1. Fails to start upon command; pumps P4-002 and P4-006 not running	A1. Same as item A1 except status lights on HS-1635A (QMCB) and HS-1635B (PSDB)	A1. None; same as item A1 except backup train B pumps are P4-002 and P4-006	See items 1 and 4
				A2. Fails to start upon command with either P4-002 or P4-006 running	A2. Same as item A2 except status lights on HS-1635A (QMCB) and HS-1635B (PSDB), and low pressure alarms are PT-1603 (P4-002 running) and PT-1609	A2. None; same as item A2 except standby pump is P4-002 or P4-006	

Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
								(P4-006 running)			
					A3.	Trips for any reason; pump P4-002 or P4-006 running	A3.	Same as item A2 plus amber light on HS-1635A (QMCB)	A3.	None; same as item A2	
			B.	Modes 2, 3, and 4	B1.	Fails to start upon command; (pump P4-002 started simultaneously)	B1.	Same as item A2	B1.	None; same as item B1 except P4-002 already running	
					B2.	Trips for any reason	B2.	Same as item A3	B2.	None; same as item A2	
			C.	Mode 4; P4-006 running	C.	Starts running	C.	Pump status lights show red on HS-1635A (QMCB) or HS-1635B (PSDB)	C.	None; same as item 1C	
6	NSCW pump P4-006 (train B)	Same as item 4	A.	Mode 1 - (see general remarks)	A1.	Fails to start upon command; pumps P4-002 and P4-004 not running	A1.	Same as item A1 except status lights on HS-1609A (QMCB) and HS-1609B (PSDB)	A1.	None; same as item A1 except backup train B pumps are P4-002 and P4-004	See items 3 and 4; however, except as discussed in note c, P4-006 starts automatically during Modes 2, 3, and 4 only if either P4-002 or P4-004 is not running; also, since P4-006 is called upon during Modes 2, 3, and 4 only if P4-002 and P4-004 are not running for any reason, failure of pump P4-006 during Modes 2, 3, or 4 would constitute a double failure
					A2.	Fails to start upon command; pump P4-002 or P4-004 running	A2.	Same as item A2 except status lights on HS-1609A (QMCB) and HS-1609B (PSDB), and low pressure alarms are PT-1603 (P4-002) and PT-1637 (P4-004)	A2.	None, same as item A2 except standby pump is P4-002 or P4-004	
					A3.	Trips for any reason; pump P4-002 or P4-004 running	A3.	Same as item A2 plus amber light on HS-1609A (QMCB)	A3.	None, same as item A2	

TABLE 9.2.1-2 (SHEET 6 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
7	NSCW transfer pump P4-007 (train B, but located in train A NSCW tower basin)	Pumps NSCW from train A tower basin to train B tower basin to permit full utilization of inventory of both basins if only train B operable	All	A.	Fails to start upon command	A.	Pump status lights show green on HS-2166A (QMCB) or HS-2166B (PSDB) (see note d)	A.	None; train A transfer pump available; also, train B NSCW operable until basin depleted, at which time train A assumes 100 percent of system loads	The transfer pump is operated manually from either QMCB or PSDB as required to ensure full utilization of the NSCW inventory in the train A basin
				B.	Trips for any reason	B.	Same as item A plus amber light on HS-2166A on QMCB (note d not applicable)			
8	NSCW transfer pump P4-008 (train A, but located in train B NSCW tower basin)	Pumps NSCW from train B tower basin to train A tower basin to permit full utilization of inventory of both basins if only train A operable	All	A.	Fails to start upon command	A.	Pump status lights show green on HS-2167A (QMCB) or HS-2167B (PSDA) (see note d)	A.	None; train B transfer pump available; also, train A NSCW operable until basin depleted, at which time train B assumes 100 percent of system load	Same as item 7, except shutdown panel is PSDA and pump installed to ensure full utilization of water inventory in train B basin
				B.	Trips for any reason	B.	Same as item A plus amber light on HS-2167A (QMCB) (note d not applicable)	B.	None; same as A	
9	Well water makeup control valve LV-1600 to train A NSCW tower basin (normally open, fail closed air-operated globe valve)	Maintains water inventory in train A NSCW tower basin at level required to satisfy 30-day requirement	All	A.	Fails open or fails to close upon command	A.	High water level alarm LSH-1606 in control room	A.	None; overflow spilled to ground; overflow pipe located above nominal high water level to preclude siphoning of basin water	Valve operates automatically to maintain water level as set locally on LIC-1600
				B.	Fails closed or fails to open upon command (train A tower in service)	B.	Low-low water level alarm LSLL-1606 on QMCB plus decrease in basin water level indication LI-1606 on QMCB and LI-1606A on PSDA	B.	None; combined storage capacity of both NSCW basins adequate for 30-day operation post-accident; also, river water makeup available via manual valves 1402-U4-013 and –014	
10	Well water makeup control valve LV-1601 to train B NSCW tower basin (normally open, fail closed air-	Same as item 9 except for train B tower basin	All	A.	Fails open or fails to close upon command	A.	Same as item 9A except alarm is LSH-1607	A.	None; same as item 9A	Valve operates automatically to maintain water level as set locally on LIC-1601

TABLE 9.2.1-2 (SHEET 7 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
	operated globe valve)									
				B.	Fails closed or fails to open upon command (tower B in service)	B.	Same as item 9B except low-low level alarm is LSLL-1607 and level indicators are LI-1607 (QMCB) and LI-1607A (PSDB)	B.	None, same as item 9B except river makeup via manual valves 1402-U4-015 and –016	
11	NSCW pump P4-001 discharge check valve U4-025	Prevents backflow of NSCW through P4-001 when train A in service with P4-001 not running	All	A.	Fails open; train A in service but pump P4-001 not operating	A.	None	A.	None; Redundant NSCW train B available able. Pump discharge valve HV-11600 prevents backflow	
				B.	Fails closed; pump P4-001 and either P4-003 or P4-005 in service	B.	Flow indicators FI-1640A and FI-1640B on QMCB or FI-1640C on PSDA indicate reduced total NSCW flow, plus low header pres- sure alarms PT-1636 and PT-1608	B.	None; standby pump (P4-003 or P4-005) starts automatically on low discharge header pressure; also, redundant NSCW train B available	
				C.	Fails open; train B in service	C.	None	C.	None; pump discharge valve HV-11600 prevents backflow. Also redundant NSCW train B is available.	
12	NSCW pump P4-003 discharge check valve U4-035	Same as item 11 except pump is P4-003	All	A.	Fails open; train A in service but pump P4-003 not operating	A.	None	A.	None; same as item 11A except pump discharge valve HV-11606 will prevent backflow	
				B.	Fails closed; pump P4-003 and either P4-001 or P4-005 in service	B.	Same as item 11B except low pressure alarms are PT-1636 and PT-1602 or PT-1608	B.	None; same as item 11B except standby pump P4-001 or P4-005 will start automatically	
				C.	Fails open; train B in service	C.	None	C.	None; same as item 11C except HV-11606 prevents backflow	

TABLE 9.2.1-2 (SHEET 8 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
13	NSCW pump P4-005 discharge check valve U4-031	Same as item 11 except pump is P4-005	All	A.	Fails open; train A in service but pump P4-005 not operating	A.	None	A.	None; same as item 11A except pump discharge valve HV-11605 prevents backflow	
				B.	Fails closed; pump P4-005 and either P4-001 or P4-003 in service	B.	Same as item 11B except low pressure alarms are PT-1608 and PT-1636 or PT-1602	B.	None; same as item 11B except standby pump P4-001 or P4-003 will start automatically	
				C.	Fails open; train B in service	C.	None	C.	None; same as item 11C except HV-11605 prevents backflow	
14	NSCW pump P4-002 discharge check valve U4-027	Prevents backflow of NSCW through P4-002 when train B in service with P4-002 not running	All	A.	Fails open; train B in service but pump P4-002 not operating	A.	None	A.	None redundant NSCW train A available. Pump discharge valve HV-11607 will prevent backflow	
				B.	Fails closed; pump P4-002 and either P4-004 or P4-006 in service	B.	Flow indicators FI-1641A and FI-1641B on QMCB or FI-1641C on PSDB indicate reduced total NSCW flow, plus low header pressure alarms PT-1637 and PT-1609	B.	None; standby pump (P4-004 or P4-006) starts automatically on low header pressure, also, redundant NSCW train A available	
				C.	Fails open; train A in service	C.	None	C.	None; pump discharge valve HV-11607 prevents backflow. Also redundant NSCW train B available	
15	NSCW pump P4-004 discharge check valve U4-037	Same as item 14 except pump is P4-004	All	A.	Fails open; train B in service but pump P4-004 not operating	A.	None	A.	None; same as item 14A except pump discharge valve HV-11613 will prevent backflow	
				B.	Fails closed; P4-004 and either P4-002 or P4-006 in service	B.	Same as item 14B except low pressure alarms are PT-1637 and PT-1603 or PT-1609	B.	None; same as item 14B except standby pump is P4-002 or P4-006	

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
				C.	Fails open; train A in service	C.	None	C.	None; same as item 14C except HV-11613 prevents backflow	
16	NSCW pump P4-006 discharge check valve U4-033	Same as item 14 except pump is P4-006	All	A.	Fails open; train B in service but pump P4-006 not operating	A.	None	A.	None; same as item 14A except pump discharge valve HV-11612 will prevent backflow	
				B.	Fails closed; P4-006 and either P4-002 or P4-004 in service	B.	Same as item 14B except low pressure alarms are PT-1609 and PT-1637 or PT-1603	B.	None; same as item 14B except standby pump is P4-002 or P4-004	
				C.	Fails open; train A in service	C.	None	C.	None; same as item 14C except HV-11612 prevents backflow	
17	NSCW tower W4-001 blowdown control valve CV-9446 (normally open, fail closed air-operated globe valve) (train A)	Automatically modulates train A tower blowdown to control conductivity as set on CIC-9446 on PNSS; isolates train A tower blowdown upon safety	A. Mode 1	A1.	Fails closed or fails to open upon command	A1.	Position lights on HS-9446 (QMCB) plus zero flow indication (FR-1652) and high conductivity alarm (CITS-9446) on PNSS.	A1.	None; NSCW components designed for 30-day operation without blowdown; manual valve 048 can be opened to restore blowdown; also, redundant NSCW train B available	
				A2.	Fails open or fails to close upon command	A2.	Position lights on HS-9446 (QMCB) show valve open with conductivity indicator CITS-9446 (PNSS) within limits; low level alarm LSLL 1606 will alert operator	A2.	None; effect of 30-minute uncontrolled blowdown on basin inventory insignificant; blow- down can be isolated by closing manual valves 047 and 048; also, redundant NSCW train B available	
			B. Modes 2, 3, and 4	B.	Fails open or fails to close upon command	B.	Position lights on HS-9446 (QMCB)	B.	None; same as item A2.	
18	NSCW tower W4-002 blowdown control valve CV-9447 (normally open, fail closed air-operated globe valve) (train B)	Same as item 17 except for train B tower and controlled by CIC-9447 on PNSS	A. Mode 1	A1.	Fails closed or fails to open upon command	A1.	Same as item 17A1 except switch is HS-9447 (QMCB) and with FR-1653 and CITS-9447 on PNSS	A1.	None; same as item 17A1 except manual valve is 050 and redundant NSCW train is train A	

Item No.	Description of Component	Safety Function	Plant Operating Mode [a]		Failure Mode(s)		Method of Failure Detection[b]		Failure Effect on System Safety Function Capability	General Remarks[c]
				A2.	Fails open or fails to close upon command	A2.	Same as item 17A2 except for HS-9447 on QMCB and CITS-9447 on PNSS	A2.	None; same as item 17A2 except blowdown isolated by valves 049 and 050 and redundant NSCW train is train A	
			B. Modes 2, 3 and 4	B.	Fails open or fails to close upon command	B.	Position light on HS-9447 (QMCB)	B.	None; same as item A2	
19	Deleted.									
20	Deleted.									
21	Deleted.									
22	Deleted.									
23	Deleted.									
24	Deleted.									
25	Thermal relief valve PSV-1660 for CCW pump 1203-P4-001 motor air cooler	Prevents 1203-P4-001 motor air cooler damage due to NSCW thermal expansion with cooler isolated	All	A.	Fails to open when required; pump cooler isolated	A.	None	A.	None; potential cooler damage; remaining train A CCW pumps satisfy 100 percent requirements; also, redundant train B available	
				B.	Spurious opening; pump in service	B.	Train A CCW pump room R-A05 sump alarm from LSH-9780 (system 1218)	B.	None; affected CCW pump can be isolated for maintenance; see also item 25A	
26	Thermal relief valve PSV-1680 for CCW pump 1203-P4-003 motor air cooler	Same as item 25 except for CCW pump 1203-P4-003	All	A.	Fails to open when required; pump cooler isolated	A.	None	A.	None; same as item 25A	
				B.	Spurious opening; pump in service	B.	Same as item 25B	B.	None; same as item 25B	
27	Thermal relief valve PSV-1698 for CCW pump 1203-P4-005 motor air cooler	Same as item 25 except for CCW pump 1203-P4-005	All	A.	Fails to open when required; pump cooler isolated	A.	None	A.	None; same as item 25A	
				B.	Spurious opening; pump in service	B.	Same as item 25B	B.	None; same as item 25B	
28	Thermal relief valve PSV-1661 for CCW	Same as item 25 except for CCW pump 1203-P4-	All	A.	Fails to open when required;	A.	None	A.	None; potential cooler damage; remaining train B	

Item No.	Description of Component	Safety Function	Plant Operating Mode (a)		Failure Mode(s)		Method of Failure Detection(b)		Failure Effect on System Safety Function Capability	General Remarks(c)
	pump 1203-P4-002 motor air cooler	002			pump cooler isolated				CCW pumps satisfy 100 percent requirements; also, redundant train A available	
				B.	Spurious opening; pump in service	B.	Train B CCW pump room R-A03 sump alarm from LSH-9781 (system 1218)	B.	None; affected CCW pump can be isolated for maintenance; see also item 28A	
29	Thermal relief valve PSV-1681 for CCW pump 1203-P4-004 motor air cooler	Same as item 25 except for CCW pump 1203-P4-004	All	A.	Fails to open when required; pump cooler isolated	A.	None	A.	None; same as item 28A	
				B.	Spurious opening; pump in service	B.	Same as item 28B	B.	None; same as item 28B	
30	Thermal relief valve PSV-1699 for CCW pump 1203-P4-006 motor air cooler	Same as item 25 except for CCW pump 1203-P4-006	All	A.	Fails to open when required; pump cooler isolated	A.	None	A.	None; same as item 28A	
				B.	Spurious opening; pump in service	B.	Same as item 28B	B.	None; same as item 28B	
31	Thermal relief valve PSV-1718 for ACCW heat exchanger 1217-E4-001 tube (NSCW) side flow isolated	Prevents ACCW heat exchanger tube damage due to NSCW thermal expansion with NSCW	All	A.	Fails to open when required; ACCW in operation and NSCW isolated	A.	None	A.	None; isolation of NSCW from ACCW heat exchanger still permits train A NSCW to effect safe shutdown since ACCW not required for safety; also, redundant NSCW train B available	
				B.	Spurious opening; train A NSCW in service	B.	Train A ACCW heat exchanger room R-105 sump level alarm from LSH-9772	B.	None; ACCW heat exchanger can be isolated without affecting safe shutdown capability (see item 31A)	
32	Thermal relief valve PSV-1719 for ACCW heat exchanger 1217-E4-002 tube (NSCW) side	Same as item 31	All	A.	Same as item 31A	A.	None	A.	None; same as item 31A except NSCW trains are reversed	
				B.	Spurious	B.	Train B ACCW heat	B.	None; same as item 31B	

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Item No.	Description of Component	Safety Function	Plant Operating Mode (a)		Failure Mode(s)		Method of Failure Detection(b)		Failure Effect on System Safety Function Capability	General Remarks(c)
					opening; train B NSCW in service		exchanger room R-104 sump level alarm from LSH-9773		except NSCW trains are reversed	
33	Thermal relief valve PSV-1702 for CCW heat exchanger 1203-E4-001 tube (NSCW) side (PSV-1714 analogous)	Prevents damage to half of the tube (NSCW) side of the CCW heat exchanger due to NSCW thermal expansion with the corresponding half of the heat exchanger isolated	All	A.	Fails to open when required; CCW in operation but NSCW isolated	A.	None	A.	None; CCW heat exchanger capacity adequate for Mode 1 with half NSCW flow; redundant train B NSCW and CCW activate automatically during Modes 2, 3, and 4	
				B.	Spurious opening; train A NSCW and CCW in service	B.	Train A CCW heat exchanger room R-203 sump level alarm from LSH-9764	B.	None; affected half of CCW heat exchanger can be isolated with the results the same as item 33A	
34	Thermal relief valve PSV-1689 for CCW heat exchanger 1203-E4-002 tube (NSCW) side (PSV-1715 analogous)	Same as item 33	All	A.	Same as item 33A	A.	None	A.	None; same as item 33A except train A provides redundancy	
				B.	Same as item 33B except train B	B.	Train B CCW Heat exchanger room R-202 sump level alarm from LSH-9765	B.	None; same as item 33B except redundant train A NSCW and CCW available	
35	Thermal relief valve PSV-1648 for diesel generator 2303-G4-001-E03 jacket water cooler	Prevents train A diesel generator jacket water cooler damage due to NSCW thermal expansion with NSCW isolated	Modes 2, 3, and 4	A.	Fails to open when required; diesel generator running but NSCW isolated	A.	Diesel generator high jacket water temperature light and alarm.	A.	None; train B diesel generator available to provide 100 percent of plant emergency electrical power requirements	
				B.	Spurious opening; diesel generator and NSCW in service	B.	None	B.	None; negligible loss of NSCW inventory; also, redundant train B diesel generator available	
36	Thermal relief valve PSV-1649 for diesel generator 2303-G4-002-E03 jacket water cooler	Same as item 35 except for train B diesel generator jacket water cooler	Modes 2, 3, and 4	A.	Same as item 35A	A.	Same as item 35A	A.	None; same as item 35A except redundant diesel generator is train A	
				B.	Same as item 35B	B.	None	B.	None; same as item 35B except redundant diesel generator is train A	

TABLE 9.2.1-2 (SHEET 13 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
37	Control building essential chiller 1592-C7-001 NSCW outlet temperature control valve TV-11740 (train A) (normally open electrohydraulically operated valve)	Modulates NSCW through chiller condenser to maintain minimum refrigerant temperature for optimum chiller operation	Modes 2, 3, and 4 (see general remarks)	A.	Fails open	A.	None	A.	None; potential chiller operational problems at off-design conditions, but redundant train B chiller available	ESF chiller condenser is not used during Mode 1
				B.	Fails closed; train A NSCW in service	B.	Zero flow indication and low flow alarm from FIS-1802 on QHVC	B.	None; redundant train B chiller available	
38	Control building essential chiller 1592-C7-002 NSCW outlet temperature control valve TV-11675 (train B) (normally open electrohydraulically operated valve)	Same as item 37	Modes 2, 3, and 4 (see general remarks)	A.	Fails open	A.	None	A.	None; same as item 37A except redundant chiller is train A	Same as item 37
				B.	Fails closed; train B NSCW in service	B.	Same as item 37B except for FIS-1803	B.	None; redundant train A chiller available	
39	Thermal relief valve PSV-1800 for control building essential chiller condenser 1592-C7-001	Prevents chiller damage due to NSCW thermal expansion with NSCW isolated	Modes 2, 3, and 4 (see general remarks)	A.	Fails to open when required; chiller in service but NSCW isolated	A.	None	A.	None; redundant train B chiller available	Same as item 37
				B.	Spurious opening; train A chiller and NSCW in service	B.	None	B.	None; negligible loss of NSCW inventory; also, redundant train B systems available	
40	Thermal relief valve PSV-1801 for control building essential chiller condenser 1592-C7-002	Same as item 39	Modes 2, 3, and 4 (see general remarks)	A.	Same as item 39A	A.	None	A.	None; redundant train A chiller available	Same as item 37
				B.	Spurious opening; train B chiller and NSCW in service	B.	None	B.	None; same as item 39B except redundant systems are train A	
41	Thermal relief valves for centrifugal charging pump 1208-P6-002 lube oil and motor coolers (PSV-11743 and PSV-	Prevents cooler damage due to NSCW thermal expansion with NSCW isolated	All	A.	Fails closed when required; pump running but NSCW isolated	A.	None	A.	None; train B pump and NSCW available	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
	11744, respectively)			B. Fails open; train A pump and NSCW in service	B. Train A pump room R-C115 sump level alarm from LSH-9830	B. None; NSCW inventory loss negligible; also, redundant train B pump and NSCW available	
42	Thermal relief valves for centrifugal charging pump 1208-P6-003 lube oil and motor coolers (PSV-11749 and PSV-11750, respectively)	Same as item 41	All	A. Same as item 41A	A. None	A. None; train A pump and NSCW available	
				B. Same as item 41B	B. Train B pump room R-C118 sump level alarm from LSH-9831	B. None; same as item 41B except redundant train is train A	
43	Thermal relief valves for safety injection pump 1204-P6-003 lube oil and motor coolers (PSV-11745 and PSV-11746, respectively)	Same as item 41	Modes 2 and 3	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train A pump room R-B16 sump level alarm from LSH-9816	B. None; same as item 41B	
44	Thermal relief valves for safety injection pump 1204-P6-004 lube oil and motor coolers (PSV-11751 and PSV-11752, respectively)	Same as item 41	Modes 2 and 3	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train B pump room R-B19 sump level alarm from LSH-9817	B. None; same as item 41B	
45	Thermal relief valve PSV-11747 for containment spray pump 1206-P6-001 motor air cooler	Same as item 41	Modes 2 and 3	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train A pump room R-D076 sump level alarm from LSH-9872	B. None; same as item 41B	
46	Thermal relief valve PSV-11753 for containment spray pump 1206-P6-002 motor air cooler	Same as item 41	Modes 2 and 3	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train B pump room R-D077 sump level alarm from LSH-9873	B. None; same as item 41B	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
47	Thermal relief valve PSV-11748 for residual heat removal pump 1205-P6-001 motor air cooler	Same as item 41	All	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train A pump room R-D048 sump level alarm from LSH-9860	B. None; same as item 41B	
48	Thermal relief valve PSV-11754 for residual heat removal pump 1205-P6-002 motor air cooler	Same as item 41	All	A. Same as item 41A	A. None	A. None; same as item 41A	
				B. Same as item 41B	B. Train B pump room R-D049 sump level alarm from LSH-9861	B. None; same as item 41B	
49	Containment isolation valve HV-1806 on NSCW supply to containment fan coolers 1501-A7-001 and -002 (train A) (normally open motor-operated valve)	Isolates NSCW supply to containment coolers by remote manual control from QMCB; opens automatically upon safety injection	All	Fails to open upon command or fails closed with train A NSCW in service	Position light on HS-1806 (QMCB), zero flow indication on FIT-1818A and FIT-1818B (PNCA), and low flow alarm from FSL-1818	None; 50 percent of train A cooler capacity still available; also, redundant train B available	
50	Containment isolation valve HV-1808 on NSCW supply to containment fan coolers 1501-A7-005 and -006 (train A) (normally open motor-operated valve)	Same as item 49	All	Same as item 49	Position light on HS-1808 (QMCB), zero flow indication on FIT-1820A and FIT-1820B (PNCA), and low flow alarm from FSL-1820	None; same as item 49	
51	Containment isolation valve HV-1807 on NSCW supply to containment fan coolers 1501-A7-003 and -004 (train B) (normally open motor-operated valve)	Same as item 49	All	Same as item 49 except train B NSCW in service	Position light on HS-1807 (QMCB), zero flow indication on FIT-1819A and FIT-1819B (PNCA), and low flow alarm from FSL-1819	None; 50 percent of train B cooler capacity still available; also, redundant train A available	
52	Containment isolation valve HV-1809 on NSCW supply to containment fan	Same as item 49	All	Same as item 51	Position light on HS-1809 (QMCB), zero flow indication on FIT-1821A and FIT-	None; same as item 51	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
	coolers 1501-A7-007 and -008 (train B) (normally open motor-operated valve)				1821B (PNCA), and low flow alarm from FSL-1821		
53	Containment isolation valve HV-2134 on NSCW supply to containment building auxiliary air cooling coil 1515-A7-001 and reactor cavity cooling coil 1511-E7-001 (train A) (normally open motor-operated valve)	Isolates NSCW supply to auxiliary air and reactor cavity cooling coils manually by remote manual control from QMCB and automatically upon safety injection	A. Mode 1	A. Same as item 49	A. Position light on HS-2134 (QMCB), zero flow indication on FIT-2132A and FIT-2132B (PNCA), and low flow alarm from FSL-2132.	A. None; redundant train B coolers and NSCW available	These coolers are isolated upon safety injection only to increase NSCW flow through containment fan coolers during accident conditions; however, isolation not required to maintain NSCW piping integrity nor is credit taken for it
			B. Mode 4	B. Same as item 49	B. Same as item 53A	B. None; these coolers are not required during Mode 4	
			C. Modes 2 and 3	C. Fails open or fails to close upon command	C. Position light on HS-2134 plus normal flow indication on FIT-2132A and FIT-2132B (PNCA)	C. None; NSCW discharge valve HV-2138 closes automatically to effect isolation; also, no credit taken in safety analyses for isolation of this loop (see general remarks)	
54	Containment isolation valve HV-2135 on NSCW supply to containment building auxiliary air cooling coil 1515-A7-002 and reactor cavity cooling coil 1511-E7-002 (train B) (normally open motor-operated valve)	Same as item 53	A. Mode 1	A. Same as item 51	A. Position light on HS-2135 (QMCB), zero flow indication on FIT-2133A and FIT-2133B (PNCB), and low flow alarm from FSL-2133	A. None; redundant train A coolers and NSCW available	See item 53
			B. Mode 4	B. Same as item 51	B. Same as item 54A	B. None; same as item 53B	
			C. Modes 2 and 3	C. Same as item 53C	C. Position light on HS-2135 (QMCB) and normal flow indication on FIT-2133A and FIT-2133B (PNCB)	C. None; same as item 53C except HV-2139 closes automatically to effect isolation	

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Item No.	Description of Component	Safety Function	Plant Operating Mode (a)	Failure Mode(s)	Method of Failure Detection(b)	Failure Effect on System Safety Function Capability	General Remarks(c)
55	Containment isolation valve HV-1822 on NSCW return from containment fan coolers 1501-A7-001 and -002 (train A) (normally open motor-operated valve)	Same as item 49	All	Same as item 49	Same as item 49 except position lights on HS-1822 (QMCB)	None; same as item 49	
56	Containment isolation valve HV-1830 on NSCW return from containment fan coolers 1501-A7-005 and -006 (train A) (normally open motor-operated valve)	Same as item 49	All	Same as item 49	Same as item 50 except position lights on HS-1830 (QMCB)	None; same as item 49	
57	Containment isolation valve HV-1823 on NSCW return from containment fan coolers 1501-A7-003 and -004 (train B) (normally open motor-operated valve)	Same as item 51	All	Same as item 51	Same as item 51 except position lights on HS-1823 (QMCB)	None; same as item 51	
58	Containment isolation valve HV-1831 on NSCW return from containment fan coolers 1501-A7-007 and -008 (train B) (normally open motor-operated valve)	Same as item 51	All	Same as item 51	Same as item 52 except position lights on HS-1831 (QMCB)	None; same as item 52	
59	Containment isolation valve HV-2138 on NSCW return from containment building auxiliary air cooling coil 1515-A7-001 and reactor cavity cooling coil 1511-E7-001 (train A) (normally open motor-operated valve)	Same as item 53	A. Mode 1	A. Same as item 49	A. Same as item 53A except position light on HS-2138 (QMCB)	A. None; same as item 53A	See item 53
			B. Mode 4	B. Same as item 49	B. Same as item 59A	B. None; same as item 53B	
			C. Modes 2 and 3	C. Same as item 53C	C. Same as item 53C except position light on HS-2138 (QMCB)	C. None; same as item 53C except isolation effected by closure of HV-2134	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
60	Containment isolation valve HV-2139 on NSCW return from containment building auxiliary air cooling coil 1515-A7-002 and reactor cavity cooling coil 1511-E7-002 (train B) (normally open motor-operated valve)	Same as item 53	A. Mode 1	A. Same as item 51	A. Same as item 54A except position light on HS-2139 (QMCB)	A. None; same as item 54A	See item 53
			B. Mode 4	B. Same as item 51	B. Same as item 60A	B. None; same as item 53B	
			C. Modes 2 and 3	C. Same as item 53C	C. Same as item 54C except position light on HS-2139 (QMCB)	C. None; same as item 54C except isolation effected by closure of HV-2135	
61	Thermal relief valve PSV-1814 for containment fan coolers 1501-A7-001 and -002	Prevents cooler damage due to NSCW thermal expansion with cooler NSCW flow isolated	All	A. Fails to open when required	A. None	A. None; redundant train B coolers and NSCW available	
				B. Spurious opening; train A in service	B. Increased coil drain flow indicated by LIS-17090 on QPCP	B. None; negligible NSCW inventory loss; also, redundant train B available	
62	Thermal relief valve PSV-1816 for containment fan coolers 1501-A7-005 and -006	Same as item 61	All	A. Fails to open when required	A. None	A. None; same as item 61A	
				B. Spurious opening; train A in service	B. Same as item 61B; drain flow indicated by LIS-17094 on QPCP	B. None; same as item 61B	
63	Thermal relief valve PSV-1815 for containment fan coolers 1501-A7-003 and -004	Same as item 61	All	A. Fails to open when required	A. None	A. None; redundant train A coolers and NSCW available	
				B. Spurious opening; train B in service	B. Same as item 61B	B. None; same as item 61B except redundant train A available	
64	Thermal relief valve PSV-1817 for containment fan coolers 1501-A7-007 and -008	Same as item 61	All	A. Fails to open when required	A. None	A. None; same as item 63A	
				B. Spurious opening; train B in service	B. Same as item 62B	B. None; same as item 63B	
65	Thermal relief valve PSV-2136 for containment building auxiliary air cooling coil 1515-A7-001 and reactor cavity cooling coil 1511-E7-001	Same as item 61	All	A. Fails to open when required	A. None	A. None; same as item 61A	
				B. Spurious opening; train A in service	B. Same as item 61B	B. None; same as item 61B	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
66	Thermal relief valve PSV-2137 for containment building auxiliary air cooler 1515-A7-002 and reactor cavity cooling coil 1511-E7-002	Same as item 61	All	A.	Fails to open when required	A.	None	A.	None; same as item 63A	
				B.	Spurious opening; train B in service	B.	Same as item 62B	B.	None; same as item 63B	
				C.	Spurious opening during seismic event (Unit 2 only)	C.	None	C.	None; negligible NSCW inventory loss; also redundant train A available	
67	NSCW tower W4-001 spray header inlet valve HV-1668A (train A) (normally open motor-operated valve)	Opens on high NSCW return temperature to admit water to NSCW tower spray header for cooling; also, can be opened by remote manual control from either the control room or the shutdown panel	All (train A in service)	A.	Fails to open upon command; bypass valve open	A.	Position light on HS-1668A (QMCB) or HS-1668B (PSDA) coincident with high return temperature alarm from TE-1676; also, bypass valve HV-1668B remains open	A.	None; redundant NSCW train B available	The spray header inlet and tower bypass valves on each train are interlocked such that only when either valve is full open (as determined by return water temperature) will the other get a signal to close
				B.	Fails to close upon command or spurious opening; bypass valve open	B.	Position light on HS-1668A (QMCB) or HS-1668B (PSDA)	B.	None; train A tower operates at reduced capability, but redundant train B available	
				C.	Spurious closure; bypass valve closed	C.	Same as item 67B	C.	None; same as item 67A	
68	NSCW tower W4-001 spray header bypass valve HV-1668B (train A) (normally closed motor-operated valve)	Opens on low NSCW return temperature to bypass spray header and return NSCW directly to the tower basin; also can be opened by remote manual control from the control room or the shutdown panel	All (train A in service)	A.	Fails to open upon command; header valve open	A.	Position light on HS-1668A (QMCB) or HS-1668B (PSDA) coincident with low return temperature alarm from TE-1676; also, header valve HV-1668A remains open	A.	None; same as item 67A	See item 67
				B.	Fails to close upon command or spurious opening; header	B.	Same as item 67B	B.	None; same as item 67B	

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
				C. Spurious closure; header valve closed	C. Same as item 67C	C. None; same as item 67A	
69	NSCW tower W4-002 spray header inlet valve HV-1669A (train B) (normally open motor-operated valve)	Same as item 67	All (train B in service)	A. Fails to open upon command; bypass valve open	A. Position light on HS-1669A (QMCB) or HS-1669B (PSDB) coincident with high return temperature alarm from TE-1677; also, bypass valve HV-1669B remains open	A. None; redundant NSCW train A available	See item 67
				B. Fails to close upon command or spurious opening; bypass valve open	B. Position light on HS-1669A (QMCB) or HS-1669B (PSDB)	B. None; train B tower operates at reduced capability, but redundant train A NSCW available	
				C. Spurious closure; bypass valve closed	C. Same as item 69B	C. None; same as item A	
70	NSCW tower W4-002 spray header bypass valve HV-1669B (train B) (normally open motor-operated valve)	Same as item 68	All (train B in service)	A. Fails to open upon command; header valve open	A. Position light on HS-1669A (QMCB) or HS-1669B (PSDB) coincident with low return temperature alarm from TE-1677; also, header valve HV-1669A remains open	A. None; same as item 69A	See item 67
				B. Fails to close upon command or spurious opening; header valve open	B. Position light on HS-1669A (QMCB) or HS-1669B (PSDB)	B. None; same as item 69B	
				C. Spurious closure; header valve closed	C. Same as item 69B	C. None; same as item 69A	
71	NSCW tower W4-001	Induces ambient air	A. Modes 1	A1. Fails to start or	A1. Fan status light	A1. None; remaining three train A	On Unit 1, this fan is

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Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
	fan W4-001-F001 (train A) (normally activated but controlled by the spray valve on Unit 1 and process controlled on Unit 2.)	through NSCW discharge from tower spray header for NSCW cooling (controlled by the spray valve on Unit 1 and process controlled on Unit 2, or manually from control room or shutdown panel)		and 4		stops running; opens spray valve (Unit 1) or NSCW return temperature above setpoint (Unit 2)		shows green on HS-1610A (QMCB) or HS-1610B (PSDA)		fans provide adequate cooling; also, redundant train B available	interlocked to automatically start when the tower spray valve starts to open at NSCW return temperature of 75°F, and automatically stop when the spray valve reaches a fully close position. No fans operate after the spray valve is fully closed, and all fans operate above 87°F. On Unit 2, this fan is individually controlled by NSCW return temperature; no fans operate after the spray valve is fully closed, and all fans operate above 87°F.
					A2.	Continues to run; spray valve closed (Unit 1) or NSCW return temperature below setpoint (Unit 2)	A2.	Fan status light shows red on HS-1610A (QMCB) or HS-1610B (PSDA)	A2.	None; overcooling one cell not a problem; also, redundant NSCW train B available	
			B.	Modes 2 and 3	B1.	Same as item 71A1	B1	Same as item 71A1	B1.	None; train A tower still available but at reduced capacity; also, redundant train B also available	
					B2.	Same as item 71A2	B2.	Same as item 71A2	B2.	None; same as item 71A2	
72	NSCW tower W4-001 fan W4-001-F02 (train A) (normally activated but process controlled)	Induces ambient air through NSCW discharge from tower spray header for NSCW cooling (process controlled or manually from	A.	Modes 1 and 4	A1.	Fails to start or stops running; NSCW return temperature above setpoint	A1.	Fan status light shows green on HS-1616A (QMCB) or HS-1616B (PSDA)	A1.	None; same as item 71A1	This fan is individually controlled by NSCW return temperature; no fans operate when the spray valve is fully closed, and all fans operate above 87°F.

Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
		control room or shutdown panel)			A2.	Continues to run; NSCW return temperature below setpoint	A2.	Fan status light shows red on HS-1616A (QMCB) or HS-1616B (PSDA)	A2.	None; same as item 71A2	
			B.	Modes 2 and 3	B1.	Same as item 72A1	B1.	Same as item 72A1	B1.	None; same as item 71B1	
					B2.	Same as item 72A2	B2.	Same as item 72A2	B2.	None; same as item 71A2	
73	NSCW tower W4-001 fan W4-001-F03 (train A) (normally activated but controlled by the spray valve on Unit 2 and process controlled on Unit 1.)	Induces ambient air through NSCW discharge from tower spray header for NSCW cooling (controlled by the spray valve on Unit 2 and process controlled on Unit 1), or manually from control room or shutdown panel.	A.	Modes 1 and 4	A1.	Fails to start or stops running; spray valve opens (Unit 2) or NSCW return temperature above setpoint (Unit 1)	A1.	Fan status light shows green on HS-1622A (QMCB) or HS-1622B (PSDA)	A1.	None; same as item 71A1	On Unit 2, this fan is interlocked to automatically start when the tower spray valve starts to open at NSCW return temperature of 75°F, and automatically stop when the spray valve reaches a fully closed position. No fans operate after the spray valve is fully closed, and all fans operate above 87°F. On Unit 1, this fan is individually controlled by NSCW return temperature; no fans operate after the spray valve is fully closed, and all fans operate above 87°F.
					A2.	Continues to run; spray valve closed (Unit 2) or NSCW return temperature below setpoint (Unit 1).	A2.	Fan status light shows red on HS-1622A (QMCB) or HS-1622B (PSDA)	A2.	None; same as item 71A2	
			B.	Modes 2 and 3	B1.	Same as item 73A1	B1.	Same as item 73A1	B1.	None; same as item 71B1	
					B2.	Same as item 73A2	B2.	Same as item 73A2	B2.	Same as item 71A2	

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Item No.	Description of Component	Safety Function		Plant Operating Mode [a]		Failure Mode(s)		Method of Failure Detection[b]		Failure Effect on System Safety Function Capability	General Remarks[c]
74	NSCW tower W4-001 fan W4-001-F04 (train A) (normally activated but process controlled)	Same as item 72	A.	Modes 1 and 4	A1.	Same as item 72A1	A1.	Fan status light shows green on HS-1628A (QMCB) or HS-1628B (PSDA)	A1.	None; same as item 71A1	See item 72
					A2.	Same as item 72A2	A2.	Fan status light shows red on HS-1628A (QMCB) or HS-1628B (PSDA)	A2.	None; same as item 71A2	
			B.	Modes 2 and 3	B1.	Same as item 72A1	B1.	Same as Item 74A1	B1.	None; same as item 71B1	
					B2.	Same as item 72A2	B2.	Same as item 74A2	B2.	None; same as item 71A2	
75	NSCW tower W4-002 fan W4-002-F01 (train B) (normally activated but controlled by the spray valve on Unit 1 and process controlled on Unit 2.)	Same as item 71	A.	Modes 1 and 4	A1.	Same as item 71A1	A1.	Fan status light shows green on HS-1611A (QMCB) or HS-1611B (PSDB)	A1.	None; remaining three train B fans provide adequate cooling; also, redundant train A available	See item 71
					A2.	Same as item 71A2	A2.	Fan status light shows red on HS-1611A (QMCB) or HS-1611B (PSDB)	A2.	None; overcooling one cell not a problem; also, redundant NSCW train A available	
			B.	Modes 2 and 3	B1.	Same as item 71A1	B1.	Same as item 75A1	B1.	None; train B tower still available but at reduced capacity; also, redundant train A available	
					B2.	Same as item 71A2	B2.	Same as item 75A2	B2.	None; same as 75A2	
76	NSCW tower W4-002 fan W4-002-F02 (train B) (normally activated but process controlled)	Same as item 72	A.	Modes 1 and 4	A1.	Same as item 72A1	A1.	Fan status light shows green on HS-1617A (QMCB) or HS-1617B (PSDB)	A1.	None; same as item 75A1	See item 72
					A2.	Same as item 72A2	A2.	Fan status light shows red on HS-1617A (QMCB) or	A2.	None; same as item 75A2	

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Item No.	Description of Component	Safety Function		Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
								HS-1617B (PSDB)			
			B.	Modes 2 and 3	B1	Same as item 72A1	B1	Same as item 76A1	B1	None; same as item 75B1	
					B2.	Same as item 72A2	B2.	Same as item 76A2	B2.	None; same as item 75A2	
77	NSCW tower W4-002 fan W4-002-F03 (train B) (normally activated but controlled by the spray valve on Unit 2 and process controlled on Unit 1).	Same as item 73	A.	Modes 1 and 4	A1.	Same as item 73A1	A1.	Fan status light shows green on HS-1623A (QMCB) or HS-1623B (PSDB)	A1.	None; same as item 75A1	See item 73
					A2.	Same as item 73A2	A2.	Fan status light shows red on HS-1623A (QMCB) or HS-1623B (PSDB)	A2.	None; same as item 75A2	
			B.	Modes 2 and 3	B1.	Same as item 73A1	B1.	Same as item 77A1	B1.	None; same as item 75B1	
					B2.	Same as item 73A2	B2.	Same as item 77A2	B2.	None; same as item 75A2	
78	NSCW tower W4-002 fan W4-002-F04 (train B) (normally activated but process controlled)	Same as item 72	A.	Modes 1 and 4	A1.	Same as item 72A1	A1.	Fan status light shows green on HS-1629A (QMCB) or HS-1629B (PSDB)	A1.	None; same as item 75A1	See item 72
					A2.	Same as item 72A2	A2.	Fan status light shows red on HS-1629A (QMCB) or HS-1629B (PSDB)	A2.	None; same as item 75A2	
			B.	Modes 2 and 3	B1.	Same as item 72A1	B1.	Same as item 78A1	B1.	None; same as item 75B1	
					B2.	Same as item 72A2	B2.	Same as item 78A2	B2.	None; same as item 75A2	
79	NSCW pump P4-001 discharge valve HV-11600 (train A, motor-operated valve)	Opens during pump operation to allow water to the system; the valve closes when pump stops.		All (train A in service)	A.	Fails to open upon command and during pump start	A.	Position light for valve HV-11600 (ZLB-1) will show green on main control panel and pump P4-001 will trip	A.	None; two additional 50% capacity train A pumps (P4-003 and P4-005) available to provide the required system flow; also redundant NSCW train B available	

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Item No.	Description of Component	Safety Function	Plant Operating Mode (a)	Failure Mode(s)	Method of Failure Detection(b)	Failure Effect on System Safety Function Capability	General Remarks(c)
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11600 (ZLB-1) will show red on main control panel	B. None; check valve 1202-U4-025 will prevent backflow. Pump P4-001 will not start during system restart. However, two additional 50% capacity pumps will provide the required flow. Also redundant NSCW train B available.	The NSCW pump will not start if pump discharge valve is open. This is typical to all NSCW pumps
80	NSCW pump P4-003 discharge valve HV-11606 (train A, motor-operated valve)	Same as item 79	All (train A in service)	A. Fails to open upon command during pump start	A. Position light for valve HV-11606 (ZLB-1) will show green on main control panel and pump P4-003 will trip	A. None; two additional 50% capacity train A pumps (P4-001 and P4-005) available to provide required system flow; also redundant NSCW train B available	
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11606 (ZLB-1) will show red on main control panel	B. None; same as item 79B except the check valve 1202-U4-035 and pump P4-003 will not start	
81	NSCW pump P4-005 discharge valve HV-11605 (train A motor-operated valve)	Same as item 79	All (train A in service)	Fails to open upon command during pump start	A. Position light for valve HV-11605 (ZLB-1) will show green on main control panel and pump P4-005 will trip	A. None; two additional 50% capacity train A pumps (P4-001 and P4-003) available to provide the required system flow; also redundant NSCW train B available	
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11605 (ZLB-1) will show red on main control panel	B. None; same as item 79B except the check valve is 1202-U4-031 and pump P4-005 will not start	
82	NSCW pump P4-002 discharge valve HV-11607 (train B motor-operated valve)	Same as item 79	All (train B in service)	A. Fails to open upon command during pump start	A. Position light for valve HV-11607 (ZLB-1) will show green on main control panel and pump P4-002 will trip	A. None; two additional 50% capacity train B pumps (P4-004 and P4-006) available to provide the required system flow; also redundant NSCW train A available	
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11607 (ZLB-1) will show red on main control	B. Same as item 79B except the check valve Is 1202-U4-027 and pump P4-002 will not start and redundant NSCW	

Item No.	Description of Component	Safety Function	Plant Operating Mode (a)	Failure Mode(s)	Method of Failure Detection(b)	Failure Effect on System Safety Function Capability	General Remarks(c)
					panel	train A available	
83	NSCW pump P4-004 discharge valve HV-11613 (train B, motor-operated valve)	Same as item 79	A. All (train B in service)	A. Fails to open upon command during pump start	A. Position light for valve HV-11613 (ZLB-1) will show green on main control panel and pump P4-004 will trip	A. None; two additional 50% capacity train B pumps (P4-002 and P4-006) available to provide the required system flow; also redundant NSCW train A available	
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11613 (ZLB-1) will show red on main control panel	B. None; same as item 79B except the check valve is 1202-U4-037 and pump P4-004 will not start and redundant NSCW train A available	
84	NSCW pump P4-006 discharge valve HV-11612 (train B motor-operated valve)	Same as item 79	All (train B in service)	A. Fails to open upon command during pump start	A. Position light for valve HV-11613 (ZLB-1) will show green on main control panel and pump P4-006 will trip	A. None; two additional 50% capacity train B pumps (P4-002 and P4-004) available to provide the required system flow; also redundant NSCW train A available	
				B. Fails to close upon command during pump stop	B. Position light for valve HV-11613 (ZLB-1) will show red on main control panel	B. None; same as item 79B except the check valve is 1202-U4-033 and pump P4-006 will not start and redundant NSCW train A available	
85	NSCW pump P4-001 discharge bypass line check valve 1202-U4-A07	Prevents NSCW backflow through the slow-fill bypass line and pump P4-001 when pump P4-001 is not running	All	A. Fails open; train A in service but pump P4-001 not operating	A. Train A flow indicators FI-1640A and FI-1640B on QMCB or FI-1640C on PSDA indicate reduced total NSCW flow	A. None; Manual valve 1202-U4-A10 can be closed; also redundant NSCW train B available	
				B. Fails open; train B in service	B. Train intertie high-flow alarm FSH -11776 on QMCB	B. None; manual valve 1202-U4-A10 can be closed; also redundant NSCW train A available	
				C. Fails closed; pump P4-001 and either P4-003 or P4-005 in	C. Train A flow indicators FI-1640A and FI-1640B on QMCB or PI-1640C	C. None; standby pump (P4-003 or P4-005) starts automatically on low discharge header pressure;	

Item No.	Description of Component	Safety Function	Plant Operating Mode (a)		Failure Mode(s)		Method of Failure Detection(b)		Failure Effect on System Safety Function Capability	General Remarks(c)
					service		on PSDA indicate reduced total flow, plus low-header pressure alarms from PT-1636 & PT 1608		also redundant NSCW train B available	
86	NSCW pump P4-003 discharge bypass line check valve 1202-U4-A09	Same as item 85 except pump is P4-003	All	A.	Fails open; train A in service but pump P4-003 not operating	A.	Same as item 85A	A.	None; same as item 85A except manual valve 1202-U4-A12 can be closed	
				B.	Fails open; train B in service	B.	Same as item 85B	B.	None; same as item 85B except manual valve 1202-U4-A12 can be closed	
				C.	Fails closed; pump P4-003 and either P4-001 or P4-005 in service	C.	Same as 85C	C.	None; same as item 85C except standby pump P4-001 or P4-005 will start automatically	
87	NSCW pump P4-005 discharge bypass line check valve 1202-U4-A08	Same as item 85 except pump is P4-005	All	A.	Fails open; train A in service but pump P4-005 not operating	A.	Same as item 85A	A.	None; same as item 85A except manual valve 1202-U4-A11 can be closed	
				B.	Fails open; train B in service	B.	Same as 85B	B.	None; same as item 85B except manual valve 1202-U4-A11 can be closed	
				C.	Fails closed; pump P4-005 and either P4-001 or P4-003 in service	C.	Same as 85C	C.	None; same as item 85C except standby pump P4-001 or P4-003 will start automatically	
88	NSCW pump P4-002 discharge bypass line check valve 1202-U4-A13	Prevents NSCW backflow through the slow fill line and pump P4-002 when pump P4-002 is not running	All	A.	Fails open; train B in service but pump P4-002 is not operating	A.	Train B flow indicators FI-1641A and FI-1641B on QMCB or FI-1641C on PSDB indicate reduced total NSCW flow	A.	None; manual valve 1202-U4-A16 can be closed; also redundant NSCW train A available	
				B.	Fails open; train A in service	B.	Train intertie high-flow alarm FSH-	B.	None; manual valve 1202-U4-A16 can be closed; also	

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Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]		Failure Mode(s)		Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
							11734 on QMCB		redundant NSCW train B available	
				C.	Fails closed; pump P4-002 and either P4-004 or P4-006 in service	C.	Train B flow indicators FI-1641A and FI-1641B on QMCB or PI-1641C on PSDA indicate reduced flow plus low header pressure alarms from PT-1636 and PT-1608	C.	None; standby pump (P4-004 or P4-006) starts automatically on low discharge header pressure; also redundant NSCW train A available	
89	NSCW pump P4-004 discharge bypass line check valve 1202-U4-A15	Same as item 88 except pump is P4-004	All	A.	Fails open; train B in service but pump P4-004 not operating	A.	Same as item 88A	A.	None; same as item 88A manual valve 1202-U4-A18 can be closed	
				B.	Fails open; train A in service	B.	Same as item 88B	B.	None; same as item 88B except manual valve 1202-U4-A18 can be closed	
				C.	Fails closed; pump P4-004 and either P4-002 or P4-006 in service	C.	Same as 88C	C.	None; same as item 88C except standby pump P4-002 or P4-006 will start automatically	
90	NSCW pump P4-006 discharge bypass line check valve 1202-U4-A14	Same as item 88 except pump is P4-006	All	A.	Fails open; train B in service but pump P4-006 not operating	A.	Same as item 88A	A.	None; same as item 88A except manual valve 1202-U4-A17 can be closed	
				B.	Fails open; train A in service	B.	Same as item 88B	B.	None; same as item 88B except manual valve 1202-U4-A17 can be closed	
				C.	Fails closed; pump P4-006 and either P4-002 or P4-004 in service	C.	Same as 88C	C.	None; same as item 88C except standby pump P4-002 or P4-004 will start automatically	
91	NSCW pump discharge valves (train A) HV-11600, HV-11606, HV-11605	Same as item 79 In addition, the valves perform in accordance with the	Modes 3 and 5		At time T=30 sec after LOP, pump discharge valve does not close		Valve position lights in control room or on shutdown panel will show that valve is	A.	None; check valve on the discharge line will prevent backflow. The affected pump will not start during system	Items 91 through 103 address NSCW system control single failure Mode analysis

TABLE 9.2.1-2 (SHEET 29 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
	(See item 79, 80, 81)	control logic to prevent water hammer during pump start/restart		fully (see general remarks in column 8)	not closed (see items 79-81 for details)	restart. However, two additional 50% capacity pumps available. Also, redundant NSCW train B available	in association with the control logic for prevention of NSCW water hammer during system start or system restart at the LOP. Specifically this part of analysis is in addition to the preceding analyses made on the components whose performance is related to potential NSCW water hammer. This analysis is made in accordance with the logic sequence which will take place during system start or system restart after LOP.
92	NSCW pump discharge valves (train B): HV-11607, HV-11613, HV-11612) (See items 82, 83, 84)	Same as item 91	Modes 3 and 4	Same as item 91	Same as item 91 (see items 82-84 for details)	A. None; check valve on the discharge line will prevent backflow. The affected pump will not start during system restart; however, two additional 50% capacity pumps available. Also, redundant NCSW train A available	
93	NSCW train A tower spray valve HV-1668A and bypass valve HV-1668B (see also items 67, 68)	In addition to the function described in items 67 and 68, the valves are to perform in accordance with the control logic shown to prevent water hammer during pump starts/restarts	Modes 3 and 4	At time T=35 s after LOP tower spray valve and/or bypass valve do not close or remain open or partially open	Valve position lights in control room or on shutdown panel will show that valves are not closed	None; system will not fill when pumps start and fill the system through the bypass line. Water hammer may occur when pump discharge valve opens; however, redundant NSCW train B available	

TABLE 9.2.1-2 (SHEET 30 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]		Failure Effect on System Safety Function Capability	General Remarks[(c)]
94	NSCW train B tower spray HV-1669A and bypass valve HV-1669B	Same as item 93	Modes 3 and 4	Same as item 93	Same as item 93		None; same as item 93 except redundant NSCW train A available	
95	NSCW train A pumps P4-001, P4-003 NSCW train B pumps P4-002, P4-004	Same as item 1 or 4. In addition, the pump start/restart is to be in accordance with the control logic to prevent water hammer	Modes 1, 3, and 4	At system start, one NSCW pump starts but the second pump does not start, and/or at time T=40 s during system restart after LOP, one pump starts but the second pump does not start	Pump status lights show that pump is not running. Also reduced flow and low discharge header pressure will be indicated. (See items 1, 2, 4, 5 for details.)	A.	None; system fill rate delay will be less than 5 s because sensing that pump did not start, the third pump (P4-005) will start 5 s later. With the setting of spray and bypass valves, system fills in approximately 20 s compared to the provided time of 45 s in the control logic. Hence the delay of 5 s for starting the standby pump will not affect system fillup and system will start up normally. Also redundant NSCW train available	
96	NSCW tower spray and bypass valves (train A and train B, see items 93, 94)	Same as item 93	Modes 1, 3, and 4	At system start, NSCW pumps start but spray or bypass valves do not open due to failure and/or at time T=40 s during system restart after LOP, NSCW pumps start but spray or bypass valves does not start due to failure	Valve position lights in control room or on shutdown panel show that valve is not open. Also, zero flow will be indicated		None; failure of spray or bypass valve to open prevents system outflow and system fills up quickly resulting in water hammer. However, redundant NSCW train available	
97	NSCW pumps (P4-001, P4-002, P4-003, P4-004) discharge valves: train A: HV-11600, HV-11606; train B: HV-11607, HV-11613	Same as item 91	Modes 1, 3 and 4	At system start or at time T=40 s during system restart after LOP, pump discharge valve inadvertently opens	Valve position lights show that valve is open (see items 79, 80 for details)		None; system fills up quickly because spray or bypass valves are nearly closed and water hammer may occur. However, redundant NSCW train available	
98	Standby NSCW pump P4-005 (train A) P4-006 (train B)	Same as item 3 or 6	Modes 1, 3 and 4	At system start or at time T=45 s during system restart after LOP, standby pump inadvertently starts	Pump status lights will show that the standby pump is running		None; system fill rate will increase slightly; however, due to flat pump head characteristics curve at this point, the increase in flow is insignificant. The flow through each pump will be reduced	Running all three NSCW pumps at the same time will not have safety impact since all NSCW flow requirements are met

Item No.	Description of Component	Safety Function	Plant Operating Mode [(a)]	Failure Mode(s)	Method of Failure Detection[(b)]	Failure Effect on System Safety Function Capability	General Remarks[(c)]
						but the flow through the weakest pump is still above the mini mum pump flow requirement. Also, redundant NSCW train is available	
99	NSCW tower spray and bypass valves train A: HV-1668A, HV-1668B; train B: HV-1669A, HV-1669B	Same as item 93	Modes 1, 3, and 4	At system start or at time T=40 s during system restart after LOP, both spray and bypass valves open and stop in midposition or at time T=43 s after LOP, spray or bypass valve fails to stop in midposition and continues to full open position	Valve position lights in control room or on shutdown panel will show valve status. Also flow indicators will show higher than expected flow	None; due to excessive outflow through the spray or bypass valve, the system does not fill in required time; hence at time T=85 s pump discharge valve opens and system fills up quickly resulting in water hammer. However, redundant NSCW train available	
100	NSCW tower spray and bypass valves train A: HV-1668A, HV-1668B; train B: HV-1669A, HV-1669B	Same as item 93	Modes 1, 3, and 4	At time T=45 s during system start or at time T=85 s during system restart after LOP, spray or bypass does not go wide open but stays in midposition	Valve position lights in control room or on shutdown panel will show valve status. Also flow indicators will show reduced flow	None; system flow will be less than design due to higher resistance of spray or bypass valve in mid-position. However, the pump discharge valve will open with system full hence no water hammer will occur. Also, NSCW redundant train available	
101	NSCW pump discharge valves train A: HV-11600, HV-11606 11605; train B: HV-11607, HV-11613, HV-11612	Same as item 91	Modes 1, 3, and 4	At time T=45 s during system start or at time T=85 s during system restart after LOP, pump discharge valve opens before spray or bypass valve starts to go wide open	Valve position lights in control room or on shutdown panel will show valve status	None; same as item 100	
102	NSCW tower spray and bypass valves train A: HV-1668A, HV-1668B; train B: HV-1669A, HV-1669B	Same as item 93	Modes 1, 3, and 4	At time T=45 s during system start or at time T=85 s during system restart after LOP, tower spray or bypass valve starts to go wide open before pump discharge valve opens	Valve position lights in control room or on shutdown panel will show valve status	None; system will again start to drain down and depending on when the pump discharge valve opens, water hammer may occur. However, redundant NSCW train available	

Item No.	Description of Component	Safety Function	Plant Operating Mode [a]		Failure Mode(s)		Method of Failure Detection[b]		Failure Effect on System Safety Function Capability	General Remarks[c]
103	NSCW pump discharge valve train A: HV-11600, HV-11606 HV-11605; train B: HV-11607, HV-11613 HV-11612	Same as item 91	Modes 1, 3, and 4		At time T=45 s during system start or at time T=85 s during system restart after LOP, pump discharge valve fails to open		Valve position lights in control room or on shutdown panel will show valve status and pump will trip		None; if the pump discharge valve is not fully open within 65 s after pump start, the pump will trip and system will drain due to spray or by- pass valve going to full open position. No water hammer will occur because discharge valve does not open and system never fills. The spare pump will start due to low header pressure. Also, redundant NSCW train available for supplying the required flow	
104	NSCW pump P4-001 discharge bypass check valve 1202-U4-A07	Prevents NSCW backflow through the slow fill bypass line and pump P4-001 when pump P4-001 is not running	Modes 1, 3, and 4	A.	Fails open during system restart following extended station blackout. Pump P4-001 being started	A.	None	A.	The slow fill bypass line will be subjected to transient surge pressure for short duration. However, system function capability is not affected. In addition train B is available	Following station blackout with both NSCW trains down and check valve failed open, there is a potential for air pockets in the discharge bypass line downstream of the check valve
				B.	Fails closed during system restart following extended station blackout. Pump P4-001 being started	B.	None	B.	Standby pump will start to provide adequate fill rate. train B is available able	
105	NSCW pump P4-003 discharge bypass check valve 1202-U4-A09	Same as item 104 except pump is P4-003	Modes 1, 3, and 4	A.	Same as item 104A except pump is P4-003	A.	None	A.	Same as item 104A	
				B.	Same as item 104B except pump is P4-003	B.	None	B.	Same as item 104B	
106	NSCW pump P4-005 discharge bypass check valve 1202-U4-A08	Same as item 104 except pump is P4-005	Modes 1, 3, and 4	A.	Same as item 104A except pump is P4-005	A.	None	A.	Same as item 104A	
				B.	Same as item	B.	None	B.	Same as item 104B	

TABLE 9.2.1-2 (SHEET 33 OF 34)

Item No.	Description of Component	Safety Function	Plant Operating Mode (a)		Failure Mode(s)		Method of Failure Detection(b)		Failure Effect on System Safety Function Capability	General Remarks(c)
					104B except pump is P4-005					
107	NSCW pump P4-002 discharge bypass check valve 1202-U4-A13	Same as item 104 except pump is P4-002	Modes 1, 3, and 4	A.	Same as item 104A except pump is P4-002	A.	None	A.	Same as item 104A except train A is available	
				B.	Same as item 104B except pump is P4-002	B.	None	B.	Same as item 104B except train A is available	
108	NSCW pump P4-004 discharge bypass check valve 1202-U4-A15	Same as item 104 except pump is P4-004	Modes 1, 3, and 4	A.	Same as item 104A except pump is P4-004	A.	None	A.	Same as item 104A except train A is available	
				B.	Same as item 104B except pump is P4-004	B.	None	B.	Same as item 104B except train A is available	
109	NSCW pump P4-006 discharge bypass check valve 1202-U4-A14	Same as item 104 except pump is P4-006	Modes 1, 3, and 4	A.	Same as item 104A except pump is P4-006	A.	None	A.	Same as item 104A except train A is available	
				B.	Same as item 104B except pump is P4-006	B.	None	B.	Same as item 104B except train A is available	
110	Deleted.									

a. Plant operating Modes are as follows:

1 - Startup, normal shutdown, power generation, and refueling
2 - Safety injection (SI) with offsite power available
3 - SI with loss of offsite power (LOP)
4 - Station blackout (LOP) without SI (safe shutdown)

b. In general, equipment status lights will appear only on the panel (e.g., QMCB, PSDA, PSDB, etc.) which has control over the particular item (as determined by the control transfer switch on the shutdown panel) and then only if control power is available. In addition, the system status monitoring panel (system 1625) will indicate an NSCW train inoperable if any system pump (items 1 through 8), cooling tower fan (items 71 through 78), containment isolation valve (items 49 through 60), tower spray header inlet (items 67 and 69), or tower bypass (items 68 and 70) valves are inoperable due to loss of control or electrical power, transfer switches in the "local" position, or system in manual Mode.

c. For Mode 2 (SI with offsite power available) the diesels are started and the sequencer activates the NSCW system the same way as in Mode 3 (SI and LOP). Thus the referred pumps (P4-001 through P4-004) are started if not already running. However, ESF bus load shed does not occur under these conditions, and any NSCW components in operation at the time of the accident will continue to operate.

TABLE 9.2.1-2 (SHEET 34 OF 34)

Thus if the nominal standby pump(s) (P4-005 and P4-006) is in service at the time SI occurs, all three NSCW pumps in the respective train will operate simultaneously. This Mode of operation has no safety impact.

d. For the NSCW transfer pumps (P4-007 and P4-008, items 7 and 8, respectively) the status lights will show "red" on QMCB or the respective shutdown panel and the PSL in the pump discharge line will alarm if the starter closes but the pump fails to develop rated discharge pressure.

TABLE 9.2.1-3 (SHEET 1 OF 3)

NSCW SYSTEM COMPONENT DATA

NSCW pump (all data is per pump)	
Quantity	6 (50 percent each)
Type	Vertical centrifugal, 2 stages, self-lubricated, 18x27B VCM
Rated capacity (gal/min, each)	8600
Rated total differential head (ft)	230
NPSH required, low level basin (ft)	34
NPSH available (minimum ft)	39
Material	
Case	ASME SA-351 Gr. CF8M
Impeller	ASME SA-351 Gr. CF8M
Shaft	ASTM A-479 Gr. 316
Design codes	ASME Section III, Class 3
Driver	
Type	Electric motor
Horsepower	700
Revolutions/min	1170
Power supply	4160 V, 60 Hz, 3 phases, Class 1E
Design code	NEMA
Seismic design	Category 1
NSCW transfer pump (all data is per pump)	
Quantity	2 (100 percent each)
Type	Vertical centrifugal, self-lubricated 2 stages, 18x12A VCM
Rated capacity (gal/min, each)	600
Rated total differential head (ft)	110
NPSH required, low level basin (ft)	18

TABLE 9.2.1-3 (SHEET 2 OF 3)

NPSH available (minimum ft)	37
Material	
Case	ASME SA-351 Gr. CF8M
Impeller	ASME SA-351 Gr. CF8M
Shaft	ASTM A-479-316
Design codes	ASME Section III, Class 3
Driver	
Type	Electric motor
Horsepower	30
Revolutions/min	1760
Power supply	480 V, 60 Hz, 3 phases, Class 1E
Design code	NEMA
Seismic design	Category 1
NSCW Tower Fan	
Quantity (per tower)	4
Diameter (in.)	264
Speed (rpm)	164
Airflow (ACFM/fan)	531,100
Material	Fiberglass
Number of blades/fan	12
Tower design (one tower per train)	
Wet bulb temperature (°F)	82
Dry bulb temperature (°F max/min)	98/17
Approach (°F)	13
Range (°F)	34
Barometric pressure (psia)	14.7
Drift loss (percent)	0.01
KAV/L (fans on)	1.04
KAV/L (fans off)	0.375
L/G (fans on)	0.93
L/G (fans off)	5.2
Fan motor	
Quantity (per tower)	4
Horsepower	100
Revolutions/min	1800
Power supply	480 V, 60 Hz, 3 phases, Class 1E

TABLE 9.2.1-3 (SHEET 3 OF 3)

Design code	NEMA
Seismic design	Category 1
Piping, fittings, and valves	
Design pressure (psig)	Atmospheric to 200 depending on location
Design temperature (°F)	120 to 280 depending on location
Material	Stainless steel
Design code	
Outside containment	ASME Section III, Class 3
Inside containment	ASME Section III, Class 2

TABLE 9.2.2-1 (SHEET 1 OF 2)

CCW SYSTEM COMPONENT DATA

CCW Pump (all data is per pump)	
Quantity	6 (50 percent each)
Type	Horizontal centrifugal, split case dual volute with mechanical seals
Capacity (gal/min, each)	5000
Total differential head (TDH) (ft)	160
NPSH required (ft)	17
NPSH available (minimum ft)	65
Material	
Case	Carbon steel
Impeller	Bronze or stainless steel
Shaft	Alloy steel
Design codes	ASME Section III, Class 3
Driver	
Type	Electric motor
Horsepower	300
Revolutions/min	1800
Power supply	4160 V, 60 Hz, 3 phase, Class 1E
Design code	National Electrical Manufacturers' Association (NEMA)
Seismic design	Category 1
CCW Heat Exchangers (all data is per exchanger)	
Quantity	2 (100 percent each)
Type	Horizontal shell and straight tube
Rated duty (Btu/h, each)	129×10^6
U-Factor (Btu/h-ft^2-°F)	
Clean	533
Dirty	244
Area (ft^2)	35,010
Tube side	
Fluid	NSCW
Number of passes	2
Temperature, in/out (°F)	101/134 at rated duty
Flowrate (gal/min)	7950
Design pressure (psig)	200
Design temperature (°F)	200
Material	
Tubes	Copper-nickel 90/10
Tube sheet	Carbon steel
Codes and standards	ASME Section III, Class 3, Tubular Exchanger Manufacturers' Association(TEMA) R

TABLE 9.2.2-1 (SHEET 2 OF 2)

Seismic design	Category 1
Shell side	
Fluid	CCW
Number of passes	2
Temperature, in/out (°F)	147/118 at rated duty
Flowrate (gal/min)	9000
Design pressure (psig)	200
Design temperature (°F)	200
Material	Carbon steel
Codes and standards	ASME Section III, Class 3, TEMA R
Seismic design	Category 1
CCW Surge Tank	
Quantity	2 (1 tank per train)
Type	Horizontal
Capacity (gal, each)	2200
Operating pressure/temperature (psig/°F)	atm/120
Design pressure/temperature (psig/°F)	14 and full vacuum/200
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic design	Category 1
CCW Chemical Addition Tank	
Quantity	2 (1 tank per train)
Type	Vertical
Capacity (gal)	10
Operating pressure/temperature (psig/°F)	90/ambient
Design pressure/temperature (psig/°F)	175/120
Material	Carbon steel
Code	ASME Section VIII
Piping, Fittings, and Valves	
Design pressure (psig)	150
Design temperature (°F)	125 at pump discharge, 180 at CCW heat exchanger inlet
Material	Carbon steel
Design code	
Safety-related portion	ASME Section III, Class 3
Nonsafety-related portion	American National Standards Institute (ANSI) B31.1

TABLE 9.2.2-2

CCW SYSTEM HEAT LOADS AND FLOWS

Component	CCW Flow[a][b] Minimum Required Flow (gal/min)	Available Flow (gal/min)	Heat Load (Btu/h) Unit 1	Unit 2
SFP heat exchanger	4000	4540	17.4×10^{6}[c]	29.49×10^{6}[c]
RHR pump seal water cooler, each train	5	11	0.03×10^{6}	0.03×10^{6}
RHR heat exchanger (maximum)	5000	5750		
One-train cooldown			171×10^{6}	186.1×10^{6}
Two-train cooldown			116×10^{6}	125.2×10^{6}
One-train recirculation			157×10^{6}	157×10^{6}
Two-train recirculation			140×10^{6}	140×10^{6}

a. Nominal CCW supply temperature for component design is 105°F.

b. Data per train except as noted. Unit 1 values are for historical purposes only. The Unit 2 values are applicable and envelope Unit 1.

c. Total SFP heat load, independent of number of CCW trains in service.

TABLE 9.2.2-3 (SHEET 1 OF 13)

COMPONENT COOLING WATER SYSTEM FAILURE MODES AND EFFECTS ANALYSIS[a]

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
1	CCW surge tank T4-001 makeup valve LV-1850 (project class 415 but non-1E) (normally closed motor-operated valve (MOV))	Maintains water level in train A CCW surge tank T4-001 by admission of demineralized water automatically or by remote manual control from control room	1a) Modes 1 and 2	1a.1) Fails closed or fails to open upon command	1a.1) Position light on HS-1850 (control room) plus surge tank low level alarm from LIT-1846	1a.1) None; LV-1848 can be operated to provide makeup from reactor makeup water storage tank (RMWST); also, redundant CCW train B available (see column 8)	This valve, as well as the RMWST makeup valve, and associated instrumentation are not operable during LOP conditions (modes 3 and 4); CCW surge tank makeup not required for safe shutdown; for modes 3 and 4, a fail closed valve has no effect, since the makeup systems are inoperable
				1a.2) Fails open or fails to close upon command	1a.2) Position light on HS-1850 (control room) plus surge tank high level alarm from LIT-1846	1a.2) None; manual valve 120 can be closed to terminate makeup; also, check valve 119 prevents backflow of water to water to demineralized water system	
			1b) Modes 3 and 4	1b) Fails open (see column 8)	1b) None (see column 8)	1b) None; same as item 1a.2	
2	CCW surge tank T4-002 makeup valve LV-1851 (project class 415 but non-1E) (normally closed MOV) (see column 1 of item 1)	Same as item 1 except for train B surge tank T4-002	2a) Modes 1 and 2	2a.1) Same as 1a.1	2a.1) Position light on HS-1851 (control room) plus surge tank low level alarm from LIT-1847	2a.1) None; same as item 1a.1 except makeup from RMWST via LV-1849	See item 1
				2a.2) Same as item 1a.2	2a.2) Position light on HS-1851 (control room) plus surge tank low level alarm from LIT-1847	2a.2) None; same as 1a.1 except manual valve is 125 and check valve is 124	
			2b) Modes 3 and 4	2b) Fails open (see column 8 of item 1)	2b) None (see column 8 of item 1)	2b) None; same as item 2a.2	

TABLE 9.2.2-3 (SHEET 2 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
3	CCW surge tank T4-001 makeup valve LV-1848 (project class 415 but non-1E)	Provides backup source from RMWST for train A CCW surge tank T4-001 makeup by remote-manual control from control room	3a) Modes 1 and 2	3a.1) Same as item 1a.1	3a.1) Position light on HS-1848 (control room)	3a.1) None; LV-1850 provides automatic makeup; also, redundant CCW train B available	See item 1
				3a.2) Same as item 1a.2	3a.2) Position light on HS-1848 (control room)	3a.2) None; same as item 1a.2 except manual valve is 123, and check valve 122 prevents backflow of water to RMWST	
			3b) Modes 3 and 4	3b) Fails open (see column 8 of item 1)	3b) None (see column 8 of item 1)	3b) None; same as item 3a.2	
4	CCW surge tank makeup valve LV-1849 (project class 415 but non-1E) (normally closed MOV) (see column 8 of item 1)	Same as item 3 except for train B CCW surge tank T4-002	4a) Modes 1 and 2	4a.1) Same as item 1a.1	4a.1) Position light on HS-1849 (control room)	4a.1) None; LV-1851 provides automatic makeup; also, redundant CCW train A available	See item 1
				4a.2) Same as item 1a.2	4a.2) Position light on HS-1849 (control room)	4a.2) None; same as item 2a.2 except manual valve is 128, and check valve 127 prevents backflow of water to RMWST	
			4b) Modes 3 and 4	4b) Fails open (see column 8 of item 1)	4b) None (see column 8 of item 1)		
5	CCW pump P4-001 (train A) (see column 8 for normal operating mode and pump start logic)	Pumps CCW through train A spent fuel pit, RHR heat exchangers, and RHR pump seal cooler, through the train A CCW heat exchanger (for cooling by NSCW) and back to the pump suction	5a) Mode 1	5a.1) Fails to start upon command; pumps P4-003 and P4-005 not running	5a.1) Pump status lights show green on HS-1852A (control room), or HS-1852B (safe shutdown panel), FI-1876 (control room), or FI-1876A (safe shutdown panel) indicate no flow plus low flow alarm from FSL-1876	5a.1) None; two additional 50 percent capacity train A pumps (P4-003 and P4-005) available to provide 100 percent of system flow; also, redundant train B available	During normal operation, one or two pumps in one train are in continuous operation with the other pump(s) in the operating train and all three pumps in the other train on standby; train A pumps P4-001 and P4-003 are started upon any of the following: • Manually from either control room or safe shutdown panel • Automatically upon: - LOP or safety
				5a.2) Fails to start upon command, with either P4-003 or P4-005 running	5a.2) Pump status lights show green on HS-1852A (control room) or HS-1852B (safe shutdown panel) plus low discharge alarm PT-1854 (P4-003 running) or PT-1856	5a.2) None; same as item 5a.1 except standby pump (P4-003 or P4-005) starts automatically upon low discharge header pressure (PT-1854 for P4-003 or PT-1856 for P4-005)	

TABLE 9.2.2-3 (SHEET 3 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
					(P4-005 running)		injection - Auto trip of any other train A pump - Low discharge header pressure with at least one other train A pump running
				5a.3) Trips for any reason, pump P4-003 or P4-005 running	5a.3) Same as item 5a.2 plus amber light on HS-1852A indicates a nonoperator trip in control room	5a.3) None; same as item 5a.2	Pump stop is initiated by: • Manual control from control room or safe shutdown panel • Electrical protection • LOP • Low-low surge tank level (mode 2 does not result in pump trip)
			5b) Modes 2, 3, and 4	5b.1) Fails to start upon command (pump P4-003 started simultaneously)	5b.1) Same as item 5a.2 except only FT-1854 will alarm low pump discharge header pressure	5b.1) None; same as item 5a.1 except pump P4-005 started automatically by sequencer, while pump P4-003 already running	
				5b.2) Trips for any reason	5b.2) Same as item 5a.3	5b.2) None; same as item 5a.2	
			5c) Modes 2, P4-005 running	5c) Starts running	5c) Pump status lights show red on HS-1852A (control room) or HS-1852B (safe shutdown panel); FIS-1928 may alarm high flow	5c) None; excess CCW flowrate not a safety problem; superfluous pump can be shut down with no effect on plant safety	
6	CCW pump P4-003 (train A) (see column 8 of item 5)	Same as item 5.	6a) Mode 1	6a.1) Fails to start upon command, pumps P4-001 and P4-005 are running	6a.1) Same as item 5a.1 except status lights on HS-1854A (control room) or HS-1854B (safe shutdown panel)	6a.1) None; same as item 5a.1 except backup train A pumps are P4-001 and P4-005.	See item 5.
				6a.2) Fails to start upon command, pump P4-001 or P4-005 running	6a.2) Same as item 5a.2 except status lights on HS-1854A (control room) or HS-1854B (safe shutdown panel) and low header pressure alarms are PT-1852 (P4-001) and PT-1856 (P4-005)	6a.2) None; same as item 5a.2 except standby pump is P4-001 (started by PT-1852) or P4-005 (started by PT-1856)	
				6a.3) Trips for any reason, pump P4-001 or P4-005 running	6a.3) Same as item 5a.2 except amber light on HS-1854A indicates a nonoperator trip (control room)	6a.3 None; same as item 6a.2	

TABLE 9.2.2-3 (SHEET 4 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
			6b) Modes 2, 3, and 4	6b.1) Fails to start upon command (pump P4-001 started simultaneously)	6b.1) Same as item 6a.2	6b.1) None; same as item 5b.1	
				6b.2) Trips for any reason	6b.2) Same as item 6a.3	6b.2) None; same as item 2a.2	
			6c) Mode 2, P4-005 running	6c) Starts running	6c) Same as item 5c except pump status lights are HS-1854A (control room) and HS-1854B (safe shutdown panel)	6c) None; same as item 5c	
7	CCW pump P4-005 (train A) (see column 8)	Same as item 5	7) Mode 1 (see column 8)	7a) Fails to start upon command, pumps P4-001 and P4-003 not running	7a) Same as item 5a.1 except status lights on HS-1856A (control room) or HS-1856B (safe shutdown panel)	7a) None; same as item 5a.1 except backup train A pumps are P4-001 and P4-003	See item 5; however, as discussed in note 6, P4-005 starts automatically during modes 2, 3 and 4 only if P4-001 or P4-003 not running; also, as pump P4-005 is normally called upon during modes 2, 3, and 4 only if P4-001 or P4-003 is not running for any reason, failure of P4-005 during modes 2, 3 and 4 would constitute a double failure
				7b) Fails to start upon command, pumps P4-001 or P4-003 running	7b) Same as item 5a.2 except status lights on HS-1854A (control room) or HS-1854B (safe shutdown panel) and low pressure alarms are PT-1852 (P4-001) and PT-1854 (P4-003)	7b) None; same as item 5a.2 except standby pump is P4-001 (started by PT-1852) or P4-003 (started by PT-1854)	
				7c) Trips for any reason, P4-001 or P4-003 running	7c) Same as item 7b plus amber light on HS-1854A indicates a nonoperator trip (control room)	7c) None; same as item 7b	

TABLE 9.2.2-3 (SHEET 5 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(b)]	Failure Mode(s)	Method of Failure Detection[(c)]	Failure Effect on System Safety Function Capability	General Remarks[(d)]
8	CCW Pump P4-002 (train B) (see column 8)	Same as item 5 except for train B	8a) Mode 1	8a.1) Fails to start upon command, pumps P4-004 and P4-006 not running	8a.1) Pump status lights show green on HS-1853A (control room) or HS-1853B (safe shutdown panel); FI-1877 (control room) or FI-1877A (safe shutdown panel) indicate no flow, plus low flow alarm from FSL-1877	8a.1) None; two additional 50 percent capacity pumps (P4-004 and P4-006) available to provide 100 percent of system flow; also, redundant train A available	Same as item 5 except for train B pumps P4-002 and P4-006
				8a.2) Fail to start upon command, with either pump P4-004 or P4-006 running	8a.2) Pump status lights show green on HS-1853A (control room) or HS-1853B (safe shutdown panel) plus low discharge header pressure alarm PT-1855 (P4-004 running) on PT-1857 (P4-006 running)	8a.2) None; same as item 8a.1 except standby pump (P4-004 or P4-006) starts automatically upon low discharge header pressure (PT-1855 for pump P4-004 and PT-1857 for P4-006)	
				8a.3) Trips for any reason, pump P4-004 or P4-006 running	8a.3) Same as item 8a.2 plus amber light on HS-1853A (control room) (see item 5a.3 comments)	8a.3) None; same as item 8a.2	
			8b) Modes 2, 3, and 4	8b.1) Fails to start upon command (pump P4-004 started simultaneously)	8b.1) Same as item 8a.2 except only PT-1855 will alarm low discharge head pressure	8b.1) None; same as item 8a.1 except pump P4-006 started automatically by sequencer while pump P4-004 already running	
				8b.2) Trips for any reason	8b.2) Same as item 8a.3	8b.2) None; same as item 8a.2	
			8c) Mode 2, P4-006 running	8c) Starts running	8c) Pump status lights show red on HS-1853A (control room) or HS-1853B (safe shutdown panel); FIS-1929 may alarm high flow	8c) None; excess CCW flow not a safety problem; superfluous pump can be shut down with no effect on plant safety	

TABLE 9.2.2-3 (SHEET 6 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode(b)	Failure Mode(s)	Method of Failure Detection(c)	Failure Effect on System Safety Function Capability	General Remarks(d)
9	CCW pump P4-004 (train B) (see column 8 of items 5 and 8)	Same as item 8	9a) Mode 1	9a.1) Fails to start upon command, pumps P4-002 and P4-006 not running	9a.1) Same as item 8a.1 except status lights on HS-1855A (control room) or HS-1855B (safe shutdown panel)	9a.1) None; same as item 8a.1 except backup train B pumps are P4-002 and P4-006	See items 5 and 8
				9a.2) Fails to start upon command with either P4-002 or P4-006 running	9a.2) Same as item 8a.2 except status lights or HS-1855A (control room) or HS-1855B (safe shutdown panel) and low pressure alarms are PT-1853 (P4-002 running) and PT-1857 (P4-006 running)	9a.2) None; same as item 8a.2 except standby pump is P4-002 (started by PT-1853) or P4-006 (started by PT-1857)	
				9a.3) Trips for any reason, pump P4-002 or P4-006 running	9a.3) Same as item 9a.2 plus amber light on HS-1855A (control room) (see item 5a.3 comments)	9a.3) None; same as item 9a.2	
			9b) Modes 2, 3, and 4	9b.1) Fails to start upon command (pump P4-002 started simultaneously)	9b.1) Same as item 9a.2	9b.1) None; same as item 8b.1 except pump P4-002 already running	
				9b.2) Trips for any reason	9b.2) Same as item 9a.3	9b.2) None; same as item 9a.2	
			9c) Mode 2, P4-006 running	9c) Starts running	9c) Pump status lights show red on HS-1855A (control room) or HS-1855B (safe shutdown panel); FIS-1929 may alarm high flow	9c) None; same as item 8c	
10	CCW pump P4-006 (train B) (see column 8)	Same as item 8	10a) Mode 1 (see column 8)	10a) Fails to start upon command, pumps P4-002 and P4-004 not running	10a) Same as item 8a.1 except status lights on HS-1857A (control room) or HS-1857B (safe shutdown panel)	10a) None; same as item 8a.1 except backup train B pumps are P4-002 and P4-004	See items 7 and 8; however, as discussed in note 6, P4-006 starts automatically during modes 2, 3, and 4 only if either P4-002 or P4-004 is not running;

TABLE 9.2.2-3 (SHEET 7 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(b)]	Failure Mode(s)	Method of Failure Detection[(c)]	Failure Effect on System Safety Function Capability	General Remarks[(d)]
				10b) Fails to start upon command, pump P4-002 or P4-004 running	10b) Same as item 8a.2 except status lights on HS-1857A (control room) or HS-1857B (safe shutdown panel) and low pressure alarms are PT-1853 (P4-002 running) and PT-1855 (P4-004 running)	10b) None; same as item 8a.2 except standby pump is P4-002 (started by PT-1853) or P4-004 (started by PT-1855)	also, as P4-006 is called upon during modes 2, 3, and 4 only if P4-002 or P4-004 is not running for any reason, failure of pump P4-006 during modes 2, 3, and 4 would constitute a double failure
				10c) Trips for any reason, pump P4-002 or P4-004 running	10c) Same as item 10b plus amber light on HS-1857A (control room)	10c) None; same as item 10b	
11	Thermal relief valve PSV-1894 for Train A spent fuel pit heat exchanger (shell side)	Prevents train A spent fuel pit heat exchanger damage due to CCW thermal expansion with CCW flow isolated	All	11a) Fails to open when required, train A spent fuel pit heat exchanger in service but CCW flow isolated	11a) Visual inspection	11a) None; train B CCW and spent fuel pit heat exchanger available to provide 100 percent of spent fuel pit cooling requirements (see column 8)	This valve normally operates only if the process (hot side) fluid is introduced inadvertently with CCW isolated; however if CCW is isolated, the other CCW train is already in service as specified in the Technical Specifications
				11b) Spurious opening, train A spent fuel pit heat exchanger and CCW in service	11b) Visual inspection, may also cause surge tank low level alarm	11b) None; same as item 11a; however, reduction in train A spent fuel pit cooling capability is negligible	
12	Thermal relief valve PSV-1895 for train B spent fuel pit heat exchanger (shell side)	Same as item 11 except for train B spent fuel pit heat exchanger	All	12a) Same as item 11a except for train B spent fuel pit heat exchanger	12a) Visual inspection	12a) None; same as item 11a except backup spent fuel pit cooling provided by train A	See item 11

TABLE 9.2.2-3 (SHEET 8 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
				12b) Spurious opening, train B spent fuel pit heat exchanger and CCW in service	12b) Same as item 11b	12b) None; same as item 12a; however, reduction in train B spent fuel pit cooling capability is negligible	
13	Thermal relief valve PSV-1986 for train A RHR heat exchanger (shell side)	Prevents train A RHR heat exchanger damage due to CCW thermal expansion with CCW flow isolated	All	13a) Fails to open when required, train A RHR heat exchanger in service but CCW flow isolated	13a) Visual inspection	13a) None; Train B CCW and RHR heat exchanger available to provide 100 percent RHR cooling requirements	See item 11
				13b) Spurious opening, train A RHR and CCW in service	13b) Same as item 11b	13b) None; same as item 13a; however, reduction in train A RHR system performance is negligible	
14	Thermal relief valve PSV-1927 for train B RHR heat exchanger (shell side)	Same as item 13 except for train B RHR heat exchanger	All	14a) Same as item 13a except for train B RHR heat exchanger	14a) Visual inspection	14a) None; same as item 13a except backup RHR function provided by train A	See item 11
				14b) Spurious opening, train B RHR and CCW in service	14b) Same as item 11b	14b) None; same as item 14a; however, reduction in train B RHR performance is negligible	
15	Safety valve PSV-11824 for train A RHR pump seal water cooler	Prevents train A RHR pump seal water cooler damage due to overpressure at shutoff conditions	All	15a) Fails to open when required	15a) Visual inspection	15a) None; train B RHR and CCW systems available to provide 100 percent cooling capacity	Although provided for overpressure protection in the event of pump shutoff, this valve also serves as a thermal relief valve (see item 11)
				15b) Spurious opening, train A CCW in service	15b) Same as item 11b	15b) None; same as item 15a	

TABLE 9.2.2-3 (SHEET 9 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
16	Safety valve PSV-11825 for train B RHR pump seal water cooler	Same as item 15 except for train B RHR pump	All	16a) Fails to open when required	16a) Visual inspection	16a) None; train A RHR and CCW systems available to provide 100 percent cooling capacity	See item 15
				16b) Spurious opening, train B CCW in service	16b) Same as item 11b	16b) None; same as item 16a	
17	Check valve 119 in train A CCW surge tank T4-001 makeup line from demineralized water system	Prevents loss of CCW from train A surge tank into demineralized water system	All	17a) Fails closed when makeup required via LV-1850	17a) Surge tank low level alarm from LIT-1846	17a) None; same as item 1a.1	As noted in items 1 through 4, the makeup is inoperable during LOP conditions; therefore, a failed-open open check valve during modes 3 and 4 has no effect on system operation; also, makeup is not required for safe shutdown
				17b) Fails open	17b) None	17b) None; LV-1850 prevents backflow and loss of CCW surge tank inventory (see column 8)	
18	Check valve 124 in train B CCW surge tank T4-002 makeup line from demineralized water system	Same as item 17 except for train B CCW surge tank	All	18a) Fails closed when makeup required via LV-1851	18a) Surge tank low level alarm from LIT-1847	18a) None; same as item 2a.1	See item 17
				18b) Fails open	18b) None	18b) None; LV-1851 prevents backflow and loss of CCW surge tank inventory (see column 8)	
19	Check valve 122 in train A CCW surge tank T4-001 makeup line from reactor	Prevents loss of CCW from train A surge tank into reactor makeup	All	19a) Fails closed when makeup required via LV-1848	19a) Same as item 17a	19a) None; same as 3a.1	See item 17

TABLE 9.2.2-3 (SHEET 10 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode(b)	Failure Mode(s)	Method of Failure Detection(c)	Failure Effect on System Safety Function Capability	General Remarks(d)
	makeup water pumps	system	19b) Fails	19b) None open	19b) None; LV-1848 prevents backflow and loss of CCW surge tank inventory (see column 8)		
20	Check valve 127 in train B CCW surge tank T4-002 makeup line from reactor makeup water pumps	Same as item 19 except for train B CCW surge tank	All	20a) Fails closed when makeup required via LV-1849	20a) Same as item 18a	20b) None; same as item 4a.1	See item 17
				20b) Fails open	20b) None	20b) None; LV-1849 prevents backflow and loss of CCW surge tank inventory (see column 8)	
21	Check valve 030 in train A CCW pump P4-001 discharge	Prevents backflow of CCW through P4-001 when train A in service but P4-001 not running	All	21a) Fails open, train A in service but pump P4-001 not running	21a) Low system flow indication on FI-1876 (control room) or FI-1876A (safe shutdown panel) plus low flow alarm from FSL-1876	21a) None; pump P4-001 can be started to restore system capability; also, redundant train B available (see column 8)	For the case of a failed open check valve on an idle pump (item 21a), the pump (in this case P4-001) may start automatically due to low pump discharge pressure signal from PT-1852
				21b) Fails closed with CCW pump P4-001 running	21b) Same as item 21a plus low pressure alarm from PT-1852	21b) None; same as item 5a.1	
22	Check valve 032 in train A CCW pump P4-003 discharge	Same as item 21 except for CCW pump P4-003	All	22a) Fails open, train A in service but pump P4-003 not running	22a) Same as item 21a	22a) None; same as item 21a except P4-003 can be started to restore capability (see also column 8)	Same as item 21 except for pump P4-003 and PT-1854
				22b) Fails closed with CCW pump P4-003 running	22b) Same as item 21a plus low pressure alarm from PT-1854	22b) None; same as item 6a.1	

TABLE 9.2.2-3 (SHEET 11 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
23	Check valve 034 in train A CCW pump P4-005 discharge	Same as item 21 except for CCW pump P4-005	All	23a) Fails open, train A in service but pump P4-005 not running	23a) Same as item 21a	23a) None; same as item 21a except P4-005 can be started to restore capability (see also column 8)	Same as item 21 except for pump P4-005 and PT-1856
				23b) Fails closed with CCW pump P4-005 running	23b) Same as item 21a plus low pressure alarm from PT-1856	23b) None; same as item 7a.1	
24	Check valve 055 in train B CCW pump P4-002 discharge	Prevents backflow of CCW through P4-001 when train B in service but P4-002 not running	All	24a) Fails open, train B in service but pump P4-002 not running	24a) Low system flow indication on FI-1877 (control room) or FI-1877A (safe shutdown panel) plus low flow alarm from FSL-1877	24a) None; pump P4-002 can be started to restore system capability; also, redundant train A available (see column 8)	Same as item 21 except for pump P4-002 and PT-1853
				24b) Fails closed with CCW pump P4-002 running	24b) Same as item 24a plus low pressure alarm from PT-1853	24b) None; same as item 8a.1	
25	Check valve 057 in train B CCW pump P4-004 discharge	Same as item 24 except for CCW pump P4-004	All	25a) Fails open, train B in service, but pump P4-004 not running	25a) Same as item 24a	25a) None; same as item 29a except P4-004 can be started to restore system capability (see also column 8)	Same as item 21 except for pump P4-004 and PT-1855
				25b) Fails closed with CCW pump P4-004 running	25b) Same as item 24a plus low pressure alarm from PT-1855	25b) None; same as item 9a.1	

TABLE 9.2.2-3 (SHEET 12 OF 13)

Item No.	Description of Component	Safety Function	Plant Operating Mode[b]	Failure Mode(s)	Method of Failure Detection[c]	Failure Effect on System Safety Function Capability	General Remarks[d]
26	Check valve 059 in train B CCW pump P4-006 discharge	Same as item 24 except for CCW pump P4-006	All	26a) Fails open, train B in service, but pump P4-006 not running	26a) Same as item 24a	26a) None; same as item 24a except P4-006 can be started to restore system capability (see also column 8)	Same as item 21 except for pump P4-006 and PT-1857
				26b) Fails closed with CCW pump P4-006 running	26b) Same as item 24a plus low pressure alarm from PT-1857	26b) None; same as item 9a.1	
27	Thermal relief valve PSV-1872 for train A CCW heat exchanger (shell side)	Prevents train A CCW heat exchanger damage due to CCW thermal expansion with CCW flow isolated	All	27a) Fails to open when required	27a) None (see column 8)	27a) None; redundant CCW train B available	CCW heat exchanger isolation would be also noted by rise in temperatures of equipment cooled by CCW and low system flow alarm from FSL-1876
				27b) Spurious opening, train A CCW in service	27b) None	27b) None; same as item 27a; however, effect on train A CCW system performance is negligible	
28	Thermal relief valve PSV-1873 for train B CCW heat exchanger (shell side)	Same as item 27 except for train B CCW heat exchanger	All	28a) Fails to open when required	28a) None (see column 8)	28a) None; redundant CCW train A available	Same as item 27 except low flow alarm from FSL-1877
				28b) Spurious opening, train B CCW in service	28b) None	28b) None; same as item 28a; however, effect on train B CCW system performance is negligible	

TABLE 9.2.2-3 (SHEET 13 OF 13)

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a. Only safety-related active components, including check and relief valves, are addressed. Misposition of locked manual valves is not addressed, since administrative control is assumed over those valves and because there are two independent, 100 percent redundant CCW trains.

b. Plant operating modes:

1 Startup, normal shutdown, power generation, and refueling
2 Safety injection, offsite power available
3 Safety injection with loss of offsite power (LOP)
4 Station blackout (LOP) without safety injection

c. In general, component status lights will appear only on the panel (e.g., control room panels, safe shutdown panels, etc.) which has control over the particular item (as determined by the transfer switch on the shutdown panel) and then only if control power is available. In addition, the system status monitoring panel will indicate a CCW train inoperable if any CCW pump (items 5 through 10) is inoperable due to loss of control or electrical power, if any transfer switch (on shutdown panel) is in the local position, or if the system is in the manual mode.

d. For mode 2 (safety injection with offsite power available) the diesels are started and the sequencer operates the same as in mode 3. Thus the preferred pumps (P4-001 through P4-004) are started if not already running. However, ESF bus load start does not occur under these conditions, and thus the CCW pumps already running at the time of the accident will continue to run. Thus if the (nominal) standby pump(s) (P4-005 and P4-006) are running at the time safety injection occurs, all three pumps in the respective CCW train will be running simultaneously. This mode of operation has no safety impact.

TABLE 9.2.3-1

DEMINERALIZED WATER MAKEUP SYSTEM
COMPONENT DATA

Makeup Water Treatment Equipment	Design Data	Vessel
Demineralizer booster pumps (3)	240 gal/min vs. 245 ft, horizontal centrifugal	
Demineralizer filter backwash pump (1)	370 gal/min vs. 58 ft, horizontal centrifugal	See note a.

Water Treatment System	Capacity
(three multimedia filters, three cartridge filters, two reverse osmosis units, two electrodeionization units, two primary mixed bed demineralizer trains, catalytic oxygen removal subsystem, two polishing mixed bed demineralizer trains, chemical control subsystem)	400 gal/min

Demineralizer Equipment	Capacity
Neutralization sump transfer pump (4)	400 gal/min vs. 40 ft, vertical submerged, centrifugal
Demineralized water storage tank	250,000 gal, covered with a diaphragm Material specs: Plates – SA240TP304 Structural – SA479TP304
Demineralized water transfer pumps (3)	275 gal/min vs. 150 ft, horizontal centrifugal
Demineralized water transfer booster pumps (2)	310 gal/min vs. 130 ft, horizontal centrifugal

a. Pump has been removed from the system process. Pump remains in place for future use.

TABLE 9.2.4-1

POTABLE AND SANITARY WATER SYSTEM
COMPONENT DATA

Component	Pertinent Data	Quantity
Potable water storage tank	25,000 gal	1
Potable water booster pump	350 gal/min at 220 ft total differential head (TDH)	2
Potable water jockey pump	45 gal/min at 220 ft TDH	1
Chlorine metering pump	2.9 gal/h	1
Phosphate injection skid	Injection of phosphate to inhibit lead corrosion	1

TABLE 9.2.5-1

ULTIMATE HEAT SINK PROCESS PARAMETERS

Parameter	Value
Cooling towers	
Inside diameter (ft)	88
Basin depth at low-low level (ft)	80.25
Basin storage capacity, per tower (lb)	30.1×10^6
NSCW design flowrate, per train (gal/min)	15,600
Main component cooling water system flowrate, per train (gal/min)	9000
Auxiliary component cooling water system flowrate, per train (gal/min)	6100

TABLE 9.2.5-2

MAXIMUM ULTIMATE HEAT SINK HEAT LOADS[a]

Plant Operating Mode	Offsite Power Available	Peak NSCW[c] Heat Load Unit 1 (10^6 Btu/h)	Peak NSCW Heat Load Unit 2 (10^6 Btu/h)
Power Generation	Yes	80.1	92.7
Two-train cooldown	Yes	150.9	155.5[e]
Two-train cooldown	No	160.9	177.5
One-train cooldown	Yes	235.8	245.0[e]
One-train cooldown	No	236.2	260.3
Two-train post-LOCA[b]	No	369.3[d]	362.9
One-train post-LOCA[b]	No	434.1	440.7
Two-train post-MSLB	No	315.0	-
One-train post-MSLB	No	339.6	-

Notes

a. All data per tower.

b. These are the governing cases for maximum basin temperature and maximum inventory loss. Accordingly, other accident cases such as MSLB are not analyzed for Unit 2.

c. The Unit 2 values envelope Unit 1. The values listed as Unit 1 specific represent prepower uprate and SFP reracking conditions. These values are retained for historical purpose only.

d. This value was derived with prepower uprate Bechtel methodology. The current Unit 2 value was derived with a refined method and is bounding, although it is lower than the historical Unit 1 value.

e. This Unit 2 value represents prepower uprate conditions.

TABLE 9.2.5-3 (SHEET 1 OF 2)

ULTIMATE HEAT SINK DESIGN LOCA CASE[(a)]
(Two-Train Operation Post LOCA for 1 day, Followed by One-Train Operation for at Least 30 days)

	Ambient Temperatures		Cooling Tower Basin Data			
Time	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Heat Load (x 10^6 Btu/h)	Evaporation Loss (x 10^6 lbm)	Mass (x 10^6 lbm)	Temp (°F)
0 hr	73.0	106.0	73.62	0.0	59.23	90.0
1 hr	72.0	106.0	552.2	0.57	58.66	90.1
2 hrs	72.3	84.0	340.5	1.01	58.22	89.8
3 hrs	73.7	90.0	297.5	1.33	57.90	89.1
4 hrs	75.0	96.0	254.5	1.63	57.60	88.5
5 hrs	75.0	97.3	211.6	1.90	57.33	87.9
6 hrs	75.0	98.7	205.4	2.15	57.08	87.2
7 hrs	75.0	100.0	199.3	2.40	56.83	86.7
8 hrs	75.0	100.7	193.1	2.65	56.58	86.1
9 hrs	75.0	101.3	187.0	2.89	56.34	85.7
10 hrs	75.0	102.0	180.9	3.13	56.10	85.3
11 hrs	74.3	100.7	174.7	3.37	55.86	84.9
12 hrs	73.7	99.3	168.6	3.60	55.63	84.4
13 hrs	73.0	98.0	167.4	3.83	55.40	84.0
14 hrs	73.0	94.7	166.1	4.05	55.19	83.5
15 hrs	73.0	91.3	164.9	4.26	54.98	83.2
16 hrs	73.0	88.0	163.6	4.45	54.79	82.9
17 hrs	73.0	88.0	162.4	4.63	54.61	82.6
18 hrs	72.0	84.0	161.2	4.81	54.44	82.3
19 hrs	72.0	84.0	159.9	4.98	54.27	82.0
20 hrs	71.3	83.0	158.7	5.15	54.10	81.8
21 hrs	70.7	82.0	157.4	5.32	53.93	81.4
22 hrs	70.0	81.0	156.2	5.48	53.77	81.1
23 hrs	70.3	80.7	155.0	5.65	53.61	80.7
24 hrs	70.7	80.3	153.7	5.80	53.45	80.5
2 days	75.0	87.0	107.7	8.12	53.18	82.2
3 days	71.0	76.0	97.51	10.37	48.97	81.4
4 days	75.0	91.0	92.79	12.45	46.93	81.3
5 days	76.0	87.0	86.96	14.62	44.80	81.8
6 days	78.0	89.0	81.13	16.32	43.12	81.8
7 days	76.0	92.0	79.24	18.28	41.19	81.1
8 days	77.0	91.0	77.35	20.28	39.21	80.3
9 days	75.0	85.0	76.05	21.06	37.45	79.8
10 days	76.0	88.0	74.74	23.68	35.85	80.3
11 days	73.0	80.0	75.02	25.29	34.25	78.9

TABLE 9.2.5-3 (SHEET 2 OF 2)

	Ambient Temperatures		Cooling Tower Basin Data			
Time	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Heat Load (x 10^6 Btu/h)	Evaporation Loss (x 10^6 lbm)	Mass (x 10^6 lbm)	Temp (°F)
12 days	74.0	80.0	74.71	26.81	32.74	80.0
13 days	76.0	82.0	73.52	28.33	31.22	80.1
14 days	76.0	88.0	72.34	29.94	29.62	80.5
15 days	77.0	88.0	71.48	31.49	28.07	80.7
16 days	78.0	91.0	70.62	33.17	26.38	81.7
17 days	78.0	92.0	70.18	34.87	24.68	81.7
18 days	73.0	89.0	69.74	36.70	22.83	78.6
19 days	75.0	90.0	69.06	38.45	21.08	79.3
20 days	73.0	91.0	68.38	40.19	19.32	78.7
21 days	76.0	91.0	67.42	41.87	17.61	79.9
22 days	77.0	89.0	66.46	43.46	16.00	80.5
23 days	77.0	90.0	66.01	44.97	14.47	80.5
24 days	73.0	86.0	65.56	46.57	12.85	78.8
25 days	76.0	86.0	64.75	48.09	11.30	79.7
26 days	74.0	87.0	65.22	49.64	9.724	79.9
27 days	71.0	87.0	65.69	51.19	8.145	77.6
28 days	76.0	88.0	66.16	52.69	6.612	81.1
29 days	75.0	92.0	66.62	54.28	4.986	80.6
30 days	75.0	96.0	67.09	56.00	3.230	80.7

a. These values represent power uprate conditions.

TABLE 9.2.5-4 (Sheet 1 of 2)

ULTIMATE HEAT SINK PERFORMANCE (POST-LOCA)
(During two-train Post-LOCA Operation until Basin Depletion)
- UNIT 1
[HISTORICAL]

	Ambient Temperatures		Containment Conditions			Containment Cooler Data		Component Cooling Water Data	
Time	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Press (psia)	Vapor Temp (°F)	Sump Temp (°F)	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)
0 sec	73.0	106.0	14.7	120.0	120.0	17.6	-	18.3	-
50 sec	73.0	106.0	52.9	271.7	233.2	-	-	-	-
101 sec	73.0	106.0	58.1	310.0	211.6	273.8	285.9	9.2	9.2
116 sec	73.0	106.0	58.6	312.4	210.5	275.4	287.6	9.2	9.2
120 sec	73.0	106.0	57.3	289.3	210.2	265.2	277.3	9.2	9.2
126 sec	73.0	106.0	55.5	258.5	209.8	258.2	270.7	9.2	9.2
300 sec	72.9	106.0	49.6	248.2	225.5	242.0	254.4	9.2	9.2
800 sec	72.8	106.0	39.0	224.8	229.2	206.8	218.6	9.1	9.1
1180 sec	72.7	106.0	34.7	212.2	227.6	185.5	197.0	9.1	9.1
1182 sec	72.7	106.0	34.6	212.2	227.6	185.5	197.0	142.2	149.3
1200 sec	72.7	106.0	34.7	212.6	227.2	185.5	197.0	140.6	147.5
3600 sec	72.7	106.0	30.3	196.8	185.0	161.4	171.1	99.1	105.0
2 hrs	72.3	84.0	23.1	159.7	147.4	101.4	108.6	62.7	67.5
5 hrs	75.0	97.3	20.4	137.5	115.7	65.8	69.1	33.8	36.4
12 hrs	73.7	99.3	19.6	129.2	108.9	54.9	55.7	29.5	30.1
24 hrs	70.7	80.3	18.6	116.2	100.3	40.6	40.7	24.9	24.9
26 hrs	72.7	84.7	18.4	114.1	99.0	38.0	38.1	23.9	23.9
30 hrs	74.0	95.0	18.3	112.0	97.6	34.9	34.9	22.3	22.3
36 hrs	71.0	80.0	18.3	112.0	97.8	34.4	34.5	22.3	22.3
2 days	75.0	87.0	18.1	109.8	95.4	32.6	32.6	21.5	21.5
4 days	75.0	91.0	17.9	106.7	92.9	27.6	27.6	19.5	19.5
6 days	78.0	89.0	17.8	104.9	92.5	23.8	23.9	17.5	17.5
8 days	77.0	91.0	17.6	100.5	89.7	21.2	21.2	16.1	16.1
10 days	76.0	88.0	17.4	97.6	88.1	18.0	18.1	14.7	14.7
12 days	74.0	80.0	17.2	93.9	85.9	15.8	15.8	13.6	13.6
14 days	76.0	88.0	17.2	94.4	86.6	14.3	14.3	12.8	12.9
16 days	78.0	91.0	17.3	95.7	88.2	13.4	13.5	12.3	12.4
18 days	73.0	89.0	17.1	92.3	84.7	12.9	12.9	12.3	12.3

TABLE 9.2.5-4 (Sheet 2 of 2)
[HISTORICAL]

	NSCW System Data			Evaporation Losses			Cooling Tower Basin Data			
Time	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)	Heat Load Total (10^6 Btu/h)	Train A (10^6 Lbs/h)	Train B (10^6 Lbs/h)	Total (10^6 Lbs/h)	Basin Temp Train A (°F)	Basin Temp Train B (°F)	Basin Depth Train A (ft)	Basin Depth Train B (ft)
0 sec	86.6	-	86.6	-	-	-	90.0	82.0	80.25	80.25
50 sec	-	-	-	-	-	-	90.0	82.0	80.25	80.25
101 sec	309.5	321.5	631.0	0.297	0.262	0.559	90.0	82.0	80.25	80.25
116 sec	311.0	323.2	634.2	0.298	0.263	0.561	90.0	82.0	80.25	80.25
120 sec	300.8	312.9	613.7	0.292	0.257	0.549	90.0	82.0	80.25	80.25
126 sec	293.8	306.4	600.2	0.287	0.253	0.540	90.0	82.0	80.24	80.25
300 sec	277.7	290.0	567.7	0.276	0.243	0.519	90.0	82.1	80.21	80.21
800 sec	242.4	254.3	496.7	0.254	0.223	0.477	90.0	82.4	80.11	80.13
1180 sec	221.1	232.6	453.7	0.241	0.211	0.452	90.0	82.5	80.04	80.07
1182 sec	354.3	372.8	727.1	0.329	0.300	0.629	90.0	82.5	80.04	80.07
1200 sec	352.6	371.0	723.6	0.328	0.299	0.627	90.0	82.5	80.04	80.07
3600 sec	286.9	302.5	589.4	0.287	0.263	0.550	90.3	83.9	79.49	79.59
2 hrs	190.6	202.6	393.2	0.177	0.159	0.336	90.1	84.9	78.88	79.05
5 hrs	126.1	132.0	258.1	0.151	0.143	0.294	88.5	85.8	77.59	77.89
12 hrs	110.9	112.3	223.2	0.143	0.141	0.284	86.1	85.5	74.78	75.19
24 hrs	92.0	92.1	184.1	0.090	0.090	0.180	82.2	82.1	71.16	71.59
26 hrs	88.4	88.5	176.9	0.088	0.088	0.176	81.9	81.8	70.68	71.12
30 hrs	83.7	83.7	167.4	0.104	0.104	0.208	82.2	82.2	69.59	70.03
36 hrs	83.2	83.3	166.5	0.085	0.085	0.170	82.3	82.3	68.15	68.59
2 days	78.8	78.8	157.6	0.074	0.074	0.148	80.6	80.6	65.76	66.20
4 days	68.6	68.6	137.2	0.076	0.076	0.152	79.8	79.8	56.17	56.61
6 days	62.9	62.9	125.8	0.060	0.060	0.120	81.1	81.1	47.40	47.83
8 days	58.8	58.9	117.7	0.062	0.062	0.124	79.6	79.6	37.85	38.28
10 days	54.3	54.3	108.6	0.057	0.057	0.114	79.2	79.2	30.17	30.60
12 days	51.0	51.0	102.0	0.044	0.044	0.088	78.1	78.1	23.66	24.09
14 days	48.6	48.7	97.3	0.056	0.056	0.112	79.7	79.6	17.17	17.60
16 days	47.3	47.4	94.7	0.060	0.060	0.120	81.7	81.7	10.03	10.46
18 days	46.7	46.7	93.4	0.066	0.066	0.132	78.2	78.2	1.88	2.31

TABLE 9.2.5-5

ULTIMATE HEAT SINK MAXIMUM TEMPERATURE CASE[(a)]
(One-Train Operation Post LOCA Until Basin Depletion)

	Ambient Temperatures		Cooling Tower Basin Data			
Time	Wet Bulb Temp (°F)	Heat Load (x 10^6 Btu/h)	Dry Bulb Temp (°F)	Evaporation Loss (x 10^6 lbm)	Mass (x 10^6 lbm)	Temp (°F)
0 hr	82.0	90.0	322.1	0.00	29.84	90.0
1 hr	82.0	90.0	434.0	0.27	29.57	91.4
2 hrs	75.0	76.0	228.2	0.54	29.30	92.2
3 hrs	75.0	76.0	187.1	0.72	29.12	91.7
4 hrs	77.0	78.0	146.0	0.87	28.97	91.1
5 hrs	79.0	82.0	145.7	1.00	28.84	90.7
6 hrs	79.0	86.0	145.3	1.12	28.72	90.5
7 hrs	80.0	88.0	144.1	1.25	28.59	90.4
8 hrs	80.0	91.0	143.6	1.39	28.45	90.3
9 hrs	80.0	93.0	142.7	1.52	28.32	90.2
10 hrs	81.0	95.0	142.4	1.65	28.19	90.2
11 hrs	80.0	95.0	142.2	1.79	28.05	90.2
12 hrs	81.0	96.0	141.9	1.92	27.92	90.2
13 hrs	81.0	96.0	143.3	2.06	27.78	90.2
14 hrs	80.0	94.0	144.7	2.19	27.65	90.2
15 hrs	80.0	91.0	146.1	2.33	27.51	90.2
16 hrs	80.0	88.0	147.6	2.46	27.38	90.2
17 hrs	80.0	86.0	149.0	2.59	27.25	90.2
18 hrs	79.0	86.0	150.4	2.72	27.12	90.2
19 hrs	78.0	84.0	150.0	2.85	26.99	90.0
20 hrs	78.0	83.0	149.6	2.99	26.85	89.8
21 hrs	78.0	82.0	149.1	3.11	26.73	89.7
22 hrs	78.0	83.0	148.7	3.24	26.60	89.5
23 hrs	78.0	82.0	148.3	3.37	26.47	89.4
24 hrs	78.0	81.0	147.9	3.50	26.34	89.3
2 days	78.0	82.0	113.8	6.18	23.66	88.0
3 days	79.0	86.0	104.4	8.49	21.35	88.0
4 days	80.0	91.0	95.40	10.61	19.23	87.5
5 days	81.0	96.0	90.65	12.58	17.26	87.0
6 days	80.0	93.0	84.56	14.43	15.41	86.2
7 days	79.0	86.0	81.97	16.22	13.62	85.2
8 days	75.0	76.0	82.42	18.02	11.82	84.9
9 days	82.0	90.0	77.65	19.76	10.08	85.0
10 days	78.0	81.0	78.17	21.453	8.387	84.9

a. These values represent power uprate conditions.

TABLE 9.2.5-6 (Sheet 1 of 2)

ULTIMATE HEAT SINK DESIGN MSLBA CASE

(Two-Train Operation Post-MSLBA Inside Containment
for 1 Day Followed By One-Train Operation for 29 Days - Unit 1)
[HISTORICAL]

	Ambient Temperatures		Containment Conditions			Containment Cooler Data		Component Cooling Water Data	
Time	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Press (psia)	Vapor Temp (°F)	Sump Temp (°F)	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)
0 sec	73.0	106.0	14.7	120.0	120.0	17.6	-	18.3	-
50 sec	73.0	106.0	34.0	291.8	191.9	-	-	-	-
101 sec	73.0	106.0	38.1	317.3	201.2	219.1	230.5	9.2	9.2
228 sec	73.0	106.0	43.4	312.3	213.7	229.3	240.7	9.1	9.1
230 sec	73.0	106.0	42.7	295.3	213.8	231.5	243.2	9.1	9.1
240 sec	72.9	106.0	40.1	228.3	214.4	210.9	223.3	9.1	9.1
300 sec	72.9	106.0	42.7	234.4	217.1	220.0	232.3	9.1	9.1
600 sec	72.8	106.0	44.3	237.7	226.2	226.2	238.4	9.1	9.1
1200 sec	72.7	106.0	41.0	230.0	223.2	214.9	226.6	9.1	9.1
1800 sec	72.5	106.0	40.2	228.1	220.7	211.6	223.0	9.1	9.1
3706 sec	72.0	105.4	19.5	127.6	191.5	51.5	59.6	9.1	9.1
3707 sec	72.0	105.4	19.5	128.0	191.5	51.5	59.6	9.1	9.1
7300 sec	72.4	84.2	19.3	125.4	162.0	49.8	56.2	9.1	9.1
4.0 hrs	75.0	96.0	18.0	107.9	126.5	26.5	30.2	247.4	247.8
4.17 hrs	75.0	96.2	17.9	106.3	124.6	23.4	26.7	218.4	218.7
4.5 hrs	75.0	96.7	17.9	105.4	120.9	22.8	26.0	181.2	181.5
5.0 hrs	75.0	97.3	17.7	103.2	116.1	19.5	22.3	139.4	139.6
5.5 hrs	75.0	98.0	17.6	101.5	112.1	16.3	18.7	112.7	112.8
6.0 hrs	75.0	98.7	17.5	99.5	108.8	15.1	17.3	95.1	95.1
7.5 hrs	75.0	100.3	17.3	96.1	101.5	10.1	11.6	71.0	70.9
9.0 hrs	75.0	101.3	17.2	93.2	97.0	8.1	9.1	63.0	62.8
12.0 hrs	73.7	99.3	17.0	90.0	91.9	5.5	6.1	56.3	55.9
24.0 hrs	70.7	80.3	16.7	84.2	84.8	3.5	3.4	46.7	46.4
33.0 hrs	76.0	90.0	16.8	86.4	85.9	2.3	0.0	84.1	0.0
2.0 days	75.0	87.0	16.8	85.9	85.9	3.0	0.0	76.8	0.0
4.0 days	75.0	91.0	16.8	86.5	84.0	5.2	0.0	61.1	0.0
6.0 days	78.0	89.0	16.6	84.0	83.5	0.6	0.0	52.1	0.0
10.0 days	76.0	88.0	16.5	80.4	81.8	0.9	0.0	43.5	0.0
14.0 days	76.0	88.0	16.5	81.1	81.2	1.7	0.0	39.4	0.0
16.17 days	76.3	98.3	16.7	85.9	82.4	1.1	0.0	38.0	0.0
18.0 days	73.0	89.0	16.6	83.0	82.7	3.5	0.0	37.1	0.0
22.0 days	77.0	89.0	16.5	81.2	80.0	1.0	0.0	33.7	0.0
26.0 days	74.0	87.0	16.3	76.4	80.0	1.4	0.0	32.4	0.0
30.0 days	75.0	95.9	16.5	79.8	79.5	0.9	0.0	30.7	0.0

TABLE 9.2.5-6 (Sheet 2 of 2)
[HISTORICAL]

	NSCW System Data			Evaporation Losses			Cooling Tower Basin Date			
Time	Heat Load Train A (10^6 Btu/h)	Heat Load Train B (10^6 Btu/h)	Heat Load Total (10^6 Btu/h)	Train A (10^6 Lbs/h)	Train B (10^6 Lbs/h)	Total (10^6 Lbs/h)	Basin Temp Train A (°F)	Basin Temp Train B (°F)	Basin Depth Train A (ft) [(a)]	Basin Depth Train B (ft) [(a)]
0 sec	86.6	-	86.6	-	-	-	90.0	82.0	80.25	80.25
50 sec	-	-	-	-	-	-	90.0	82.0	80.25	80.25
101 sec	254.7	266.2	520.9	0.261	0.228	0.489	90.0	82.0	80.25	80.25
228 sec	264.9	276.4	541.3	0.268	0.234	0.502	90.0	82.1	80.23	80.23
230 sec	267.1	278.8	545.9	0.269	0.236	0.505	90.0	82.1	80.22	80.23
240 sec	246.5	258.9	505.4	0.256	0.224	0.480	90.0	82.1	80.21	80.23
300 sec	255.7	267.9	523.6	0.262	0.229	0.491	90.0	82.1	80.15	80.22
600 sec	261.8	274.0	535.8	0.266	0.234	0.500	90.0	82.3	80.03	80.17
1200 sec	250.5	262.2	512.7	0.260	0.229	0.489	90.0	82.5	79.92	80.07
1800 sec	236.4	277.1	513.5	0.251	0.240	0.491	90.0	82.8	79.64	79.97
3706 sec	77.8	111.9	189.7	0.160	0.151	0.311	89.5	83.2	79.64	79.72
3707 sec	77.8	111.9	189.7	0.160	0.151	0.311	89.5	83.2	79.26	79.72
7300 sec	78.4	106.0	184.4	0.108	0.102	0.210	88.3	83.2	78.66	79.37
4.0 hrs	296.3	315.0	611.3	0.239	0.234	0.473	86.3	83.1	78.56	78.83
4.17 hrs	264.6	282.3	546.9	0.220	0.216	0.436	86.5	83.5	78.58	78.73
4.5 hrs	227.1	243.9	471.0	0.199	0.196	0.393	86.8	84.0	78.14	78.56
5.0 hrs	182.5	197.6	380.1	0.176	0.173	0.349	87.1	84.7	77.91	78.32
5.5 hrs	153.1	166.8	319.9	0.161	0.159	0.320	87.2	85.0	77.70	78.11
6.0 hrs	134.6	147.0	281.6	0.153	0.151	0.304	87.2	85.3	77.12	77.90
7.5 hrs	106.6	115.7	222.3	0.140	0.139	0.279	86.8	85.5	76.56	77.33
9.0 hrs	97.1	104.0	201.1	0.135	0.135	0.270	86.2	85.4	75.48	76.78
12.0 hrs	88.5	92.6	181.1	0.128	0.129	0.257	85.1	84.7	75.48	75.71
24.0 hrs	77.1	78.0	155.1	0.079	0.080	0.159	80.9	80.9	72.31	72.51
33.0 hrs	115.1	0.0	115.1	0.107	0.000	0.107	84.1	80.9	72.31	69.88
2.0 days	106.7	0.0	106.7	0.095	0.000	0.095	82.8	80.9	72.31	65.95
4.0 days	90.1	0.0	90.1	0.091	0.000	0.091	81.3	80.9	72.31	54.32
6.0 days	76.5	0.0	76.5	0.069	0.000	0.069	82.0	80.9	72.31	44.21
10.0 days	68.2	0.0	68.2	0.065	0.000	0.065	80.1	N/A	72.31	24.60
14.0 days	64.8	0.0	64.8	0.064	0.000	0.064	80.1	N/A	72.31	8.96
16.17 days	62.8	0.0	62.8	0.092	0.000	0.092	82.0	N/A	72.03	0.00
18.0 days	60.9	0.0	60.9	0.072	0.000	0.072	78.2	N/A	63.39	0.00
22.0 days	57.4	0.0	57.4	0.058	0.000	0.058	79.9	N/A	44.95	0.00
26.0 days	56.1	0.0	56.1	0.065	0.000	0.065	79.2	N/A	28.45	0.00
30.0 days	54.5	0.0	54.5	0.081	0.000	0.081	79.8	N/A	11.57	0.00

TABLE 9.2.5-7 (Sheet 1 of 2)

ULTIMATE HEAT SINK PERFORMANCE (POST-MSLB)
(During One-Train Operation Post-MSLB Inside Containment - Unit 1)
[HISTORICAL]

	Ambient Temperatures		Containment Conditions			Containment Cooler Data		Heat Exchanger Heat Loads (10^6 Btu/h)	
Time	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Press (psia)	Vapor Temp (°F)	Sump Temp (°F)	Heat Load (10^6 Btu/h)	Cooling Water Outlet Temp (10^6 Btu/h)	CCW	ACCW
0 sec	82.0	90.0	14.7	120.0	120.0	17.6	101.3	18.3	41.7
50 sec	82.0	90.0	34.0	291.8	191.9	-	-	-	-
101 sec	82.0	90.0	38.1	317.3	201.2	219.1	229.7	18.3	-
222 sec	82.0	90.0	45.0	332.6	213.8	249.8	249.4	18.3	-
240 sec	82.0	90.0	42.8	263.1	215.1	222.8	232.2	18.3	-
260 sec	82.0	90.0	42.5	233.9	216.3	219.4	230.0	18.3	-
300 sec	82.0	90.0	44.7	238.7	219.2	227.2	235.1	18.3	-
600 sec	82.0	90.0	49.9	248.9	233.0	244.6	246.1	18.3	-
1200 sec	82.0	90.0	52.2	253.0	238.8	248.9	249.2	18.3	-
1800 sec	82.0	90.0	55.6	258.6	243.2	256.7	254.4	18.3	7.7
3920 sec	81.4	88.8	26.5	181.4	225.8	135.2	177.4	18.2	7.6
7166 sec	75.1	76.1	19.9	133.7	195.0	57.8	127.6	18.2	7.5
7168 sec	75.1	76.1	19.9	132.1	195.0	57.8	127.6	18.2	7.5
2 hrs	75.0	76.0	20.0	133.0	194.8	57.8	127.6	18.2	7.5
3 hrs	75.0	76.0	20.3	136.1	178.7	64.6	131.2	18.2	7.3
4 hrs	77.0	78.0	19.6	128.9	165.3	54.4	123.9	251.6	7.2
4.25 hrs	77.5	79.0	19.5	127.4	162.2	50.9	121.9	238.9	7.2
4.5 hrs	78.0	80.0	19.3	126.0	159.3	49.0	120.9	228.0	7.1
4.75 hrs	78.5	81.0	19.2	124.7	156.6	47.2	120.0	218.0	7.1
5.0 hrs	79.0	82.0	19.1	123.5	153.9	45.4	119.0	208.9	7.1
5.5 hrs	79.0	84.0	19.0	121.3	149.0	40.0	116.2	193.0	7.0
6.0 hrs	79.0	86.0	18.8	119.3	144.5	38.1	115.2	179.7	6.9
7.0 hrs	80.0	88.0	18.6	115.9	136.8	31.4	111.5	160.0	6.8
8.0 hrs	80.0	91.0	18.4	113.0	130.3	26.7	108.8	146.1	6.6
10.0 hrs	81.0	95.0	18.0	108.3	120.5	20.9	105.3	128.6	6.4
12.0 hrs	81.0	96.0	17.8	104.9	113.6	15.4	101.8	117.8	6.1
16.0 hrs	80.0	88.0	17.6	100.4	105.1	10.7	98.3	106.0	5.5
20.0 hrs	78.0	83.0	17.4	97.5	100.3	8.2	95.7	99.2	5.0
24.0 hrs	78.0	81.0	17.3	95.2	97.2	6.9	93.9	94.3	4.4
30.0 hrs	75.0	76.0	17.2	93.5	94.4	5.2	92.2	88.0	3.6
36.0 hrs	80.0	93.0	17.1	91.6	92.6	5.0	91.2	83.6	2.7
42.0 hrs	80.0	91.0	17.1	93.7	92.2	5.4	92.2	80.3	2.2
48.0 hrs	78.0	82.0	17.1	93.3	91.8	5.9	91.6	77.3	2.2

TABLE 9.2.5-7 (Sheet 2 of 2)
[HISTORICAL]

Time	TOTAL NSCW HEAT LOAD (10^6 Btu/h	COOLING TOWER AND BASIN DATA: HOT WATER TEMP (°F)	COOLING TOWER AND BASIN DATA: COLD WATER TEMP (°F)	COOLING TOWER AND BASIN DATA: BASIN TEMP (°F)	COOLING TOWER AND BASIN DATA: EVAP LOSSES (10^6 Btu/h)	BASIN WATER DEPTH (ft)	COMPONENT COOLING WATER TEMP (°F): SUPPLY	COMPONENT COOLING WATER TEMP (°F): RETURN
0 sec	86.6	-	-	90.0	-	80.25	99.1	103.2
50 sec	-	-	-	90.0	-	80.25	-	-
101 sec	263.8	122.3	94.4	90.0	0.196	80.25	91.5	95.6
222 sec	294.6	126.1	95.1	90.0	0.217	80.23	91.6	95.7
240 sec	267.6	122.5	94.5	90.0	0.199	80.23	91.6	95.7
260 sec	264.1	122.4	94.5	90.1	0.197	80.23	91.6	95.7
300 sec	271.9	123.3	94.6	90.1	0.202	80.22	91.6	95.7
600 sec	289.3	125.6	95.0	90.2	0.214	80.17	91.7	95.8
1200 sec	293.7	126.3	95.1	90.4	0.218	80.08	91.9	96.0
1800 sec	309.2	128.4	95.5	90.6	0.230	79.99	93.5	97.6
3920 sec	187.5	114.1	92.4	91.1	0.153	79.69	94.0	98.1
7166 sec	110.0	104.1	86.9	90.7	0.107	79.39	93.6	97.7
7168 sec	110.0	104.1	86.9	90.7	0.107	79.39	93.6	97.7
2 hrs	110.0	104.1	86.9	90.7	0.107	79.39	93.6	97.6
3 hrs	116.6	104.1	86.9	89.8	0.106	79.08	92.7	96.8
4 hrs	339.6	130.8	93.7	89.2	0.238	78.80	111.6	168.0
4.25 hrs	323.4	129.1	93.6	89.4	0.229	78.65	109.5	163.0
4.5 hrs	310.6	127.8	93.6	89.7	0.222	78.51	109.0	160.0
4.75 hrs	298.8	126.6	93.6	90.0	0.215	78.36	108.5	157.3
5.0 hrs	287.8	125.5	93.6	90.2	0.209	78.23	108.0	154.8
5.5 hrs	266.4	123.3	93.2	90.6	0.202	77.96	107.2	150.4
6.0 hrs	251.2	121.7	92.9	90.9	0.198	77.69	106.5	146.8
7.0 hrs	224.6	119.0	92.8	91.4	0.183	77.19	105.5	141.3
8.0 hrs	205.9	117.0	92.4	91.7	0.179	76.71	104.7	137.4
10.0 hrs	182.3	114.3	92.2	91.9	0.169	75.78	102.5	132.3
12.0 hrs	165.8	112.2	91.7	91.8	0.161	74.89	103.5	128.9
16.0 hrs	148.8	109.6	90.6	91.2	0.135	73.26	101.0	124.7
20.0 hrs	132.1	107.3	89.1	90.1	0.122	71.87	99.3	121.5
24.0 hrs	138.1	105.5	88.5	89.2	0.110	70.60	97.8	119.0
30.0 hrs	123.3	103.6	86.6	88.3	0.103	68.88	96.4	116.1
36.0 hrs	117.9	103.1	88.7	88.4	0.115	67.21	96.0	114.7
42.0 hrs	112.6	102.8	88.6	88.7	0.110	65.36	96.0	114.0
48.0 hrs	110.1	101.6	87.3	87.8	0.094	63.76	94.8	112.2

TABLE 9.2.5-8 (SHEET 1 OF 16)

METEOROLOGICAL DATA FOR AUGUSTA, GEORGIA, AIRPORT
(30-DAY COMPOSITE FOR CALCULATING MAXIMUM NSCW TEMPERATURE)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
.00	82.000	90.000	14.650
1.00	82.000	90.000	14.640
2.00	75.000	76.000	14.610
3.00	75.000	76.000	14.620
4.00	77.000	78.000	14.630
5.00	79.000	82.000	14.630
6.00	79.000	86.000	14.630
7.00	80.000	88.000	14.630
8.00	80.000	91.000	14.620
9.00	80.000	93.000	14.610
10.00	81.000	95.000	14.610
11.00	80.000	95.000	14.600
12.00	81.000	96.000	14.590
13.00	81.000	96.000	14.580
14.00	80.000	94.000	14.580
15.00	80.000	91.000	14.590
16.00	80.000	88.000	14.600
17.00	80.000	86.000	14.610
18.00	79.000	86.000	14.620
19.00	78.000	84.000	14.620
20.00	78.000	83.000	14.610
21.00	78.000	82.000	14.610
22.00	78.000	83.000	14.610
23.00	78.000	82.000	14.600
24.00	78.000	81.000	14.580
25.00	77.000	79.000	14.590
26.00	76.000	77.000	14.610
27.00	82.000	90.000	14.650
28.00	82.000	90.000	14.640
29.00	75.000	76.000	14.610
30.00	75.000	76.000	14.620
31.00	77.000	78.000	14.630
32.00	79.000	82.000	14.630
33.00	79.000	86.000	14.630
34.00	80.000	88.000	14.630
35.00	80.000	91.000	14.620
36.00	80.000	93.000	14.610
37.00	81.000	95.000	14.610
38.00	80.000	95.000	14.600
39.00	81.000	96.000	14.590
40.00	81.000	96.000	14.580
41.00	80.000	94.000	14.580
42.00	80.000	91.000	14.590

TABLE 9.2.5-8 (SHEET 2 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
43.00	80.000	88.000	14.600
44.00	80.000	86.000	14.610
45.00	79.000	86.000	14.620
46.00	78.000	84.000	14.620
47.00	78.000	83.000	14.610
48.00	78.000	82.000	14.610
49.00	78.000	83.000	14.610
50.00	78.000	82.000	14.600
51.00	78.000	81.000	14.580
52.00	77.000	79.000	14.590
53.00	76.000	77.000	14.610
54.00	82.000	90.000	14.650
55.00	82.000	90.000	14.640
56.00	75.000	76.000	14.610
57.00	75.000	76.000	14.620
58.00	77.000	78.000	14.630
59.00	79.000	82.000	14.630
60.00	79.000	86.000	14.630
61.00	80.000	88.000	14.630
62.00	80.000	91.000	14.620
63.00	80.000	93.000	14.610
64.00	81.000	95.000	14.610
65.00	80.000	95.000	14.600
66.00	81.000	96.000	14.590
67.00	81.000	96.000	14.580
68.00	80.000	94.000	14.580
69.00	80.000	91.000	14.590
70.00	80.000	88.000	14.600
71.00	80.000	86.000	14.610
72.00	79.000	86.000	14.620
73.00	78.000	84.000	14.620
74.00	78.000	83.000	14.610
75.00	78.000	82.000	14.610
76.00	78.000	83.000	14.610
77.00	78.000	82.000	14.600
78.00	78.000	81.000	14.580
79.00	77.000	79.000	14.590
80.00	76.000	77.000	14.610
81.00	82.000	90.000	14.650
82.00	82.000	90.000	14.640
83.00	75.000	76.000	14.610
84.00	75.000	76.000	14.620
85.00	77.000	78.000	14.630
86.00	79.000	82.000	14.630
87.00	79.000	86.000	14.630
88.00	80.000	88.000	14.630
89.00	80.000	91.000	14.620

TABLE 9.2.5-8 (SHEET 3 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
90.00	80.000	93.000	14.610
91.00	81.000	95.000	14.610
92.00	80.000	95.000	14.600
93.00	81.000	96.000	14.590
94.00	81.000	96.000	14.580
95.00	80.000	94.000	14.580
96.00	80.000	91.000	14.590
97.00	80.000	88.000	14.600
98.00	80.000	86.000	14.610
99.00	79.000	86.000	14.620
100.00	78.000	84.000	14.620
101.00	78.000	83.000	14.610
102.00	78.000	82.000	14.610
103.00	78.000	83.000	14.610
104.00	78.000	82.000	14.600
105.00	78.000	81.000	14.580
106.00	77.000	79.000	14.590
107.00	76.000	77.000	14.610
108.00	82.000	90.000	14.650
109.00	82.000	90.000	14.640
110.00	75.000	76.000	14.610
111.00	75.000	76.000	14.620
112.00	77.000	78.000	14.630
113.00	79.000	82.000	14.630
114.00	79.000	86.000	14.630
115.00	80.000	88.000	14.630
116.00	80.000	91.000	14.620
117.00	80.000	93.000	14.610
118.00	81.000	95.000	14.610
119.00	80.000	95.000	14.600
120.00	81.000	96.000	14.590
121.00	81.000	96.000	14.580
122.00	80.000	94.000	14.580
123.00	80.000	91.000	14.590
124.00	80.000	88.000	14.600
125.00	80.000	86.000	14.610
126.00	79.000	86.000	14.620
127.00	78.000	84.000	14.620
128.00	78.000	83.000	14.610
129.00	78.000	82.000	14.610
130.00	78.000	83.000	14.610
131.00	78.000	82.000	14.600
132.00	78.000	81.000	14.580
133.00	77.000	79.000	14.590
134.00	76.000	77.000	14.610
135.00	82.000	90.000	14.650
136.00	82.000	90.000	14.640

TABLE 9.2.5-8 (SHEET 4 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
137.00	75.000	76.000	14.610
138.00	75.000	76.000	14.620
139.00	77.000	78.000	14.630
140.00	79.000	82.000	14.630
141.00	79.000	86.000	14.630
142.00	80.000	88.000	14.630
143.00	80.000	91.000	14.620
144.00	80.000	93.000	14.610
145.00	81.000	95.000	14.610
146.00	80.000	95.000	14.600
147.00	81.000	96.000	14.590
148.00	81.000	96.000	14.580
149.00	80.000	94.000	14.580
150.00	80.000	91.000	14.590
151.00	80.000	88.000	14.600
152.00	80.000	86.000	14.610
153.00	79.000	86.000	14.620
154.00	78.000	84.000	14.620
155.00	78.000	83.000	14.610
156.00	78.000	82.000	14.610
157.00	78.000	83.000	14.610
158.00	78.000	82.000	14.600
159.00	78.000	81.000	14.580
160.00	77.000	79.000	14.590
161.00	76.000	77.000	14.610
162.00	82.000	90.000	14.650
163.00	82.000	90.000	14.640
164.00	75.000	76.000	14.610
165.00	75.000	76.000	14.620
166.00	77.000	78.000	14.630
167.00	79.000	82.000	14.630
168.00	79.000	86.000	14.630
169.00	80.000	88.000	14.630
170.00	80.000	91.000	14.620
171.00	80.000	93.000	14.610
172.00	81.000	95.000	14.610
173.00	80.000	95.000	14.600
174.00	81.000	96.000	14.590
175.00	81.000	96.000	14.580
176.00	80.000	94.000	14.580
177.00	80.000	91.000	14.590
178.00	80.000	88.000	14.600
179.00	80.000	88.000	14.610
180.00	79.000	86.000	14.620
181.00	78.000	84.000	14.620
182.00	78.000	83.000	14.610
183.00	78.000	82.000	14.610

TABLE 9.2.5-8 (SHEET 5 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
184.00	78.000	83.000	14.610
185.00	78.000	82.000	14.600
186.00	78.000	81.000	14.590
187.00	77.000	79.000	14.590
188.00	76.000	77.000	14.610
189.00	82.000	90.000	14.650
190.00	82.000	90.000	14.640
191.00	75.000	76.000	14.610
192.00	75.000	76.000	14.620
193.00	77.000	78.000	14.630
194.00	79.000	82.000	14.630
195.00	79.000	86.000	14.630
196.00	80.000	88.000	14.630
197.00	80.000	91.000	14.620
198.00	80.000	93.000	14.610
199.00	81.000	95.000	14.610
200.00	80.000	95.000	14.600
201.00	81.000	96.000	14.590
202.00	81.000	96.000	14.580
203.00	80.000	94.000	14.580
204.00	80.000	91.000	14.590
205.00	80.000	88.000	14.600
206.00	80.000	86.000	14.610
207.00	79.000	86.000	14.620
208.00	78.000	84.000	14.620
209.00	78.000	83.000	14.610
210.00	78.000	82.000	14.610
211.00	78.000	83.000	14.610
212.00	78.000	82.000	14.600
213.00	78.000	81.000	14.580
214.00	77.000	79.000	14.590
215.00	76.000	77.000	14.610
216.00	82.000	90.000	14.650
217.00	82.000	90.000	14.640
218.00	75.000	76.000	14.610
219.00	75.000	76.000	14.620
220.00	77.000	78.000	14.630
221.00	79.000	82.000	14.630
222.00	79.000	86.000	14.630
223.00	80.000	88.000	14.630
224.00	80.000	91.000	14.620
225.00	80.000	93.000	14.610
226.00	81.000	95.000	14.610
227.00	80.000	95.000	14.600
228.00	81.000	96.000	14.590
229.00	81.000	96.000	14.580
230.00	80.000	94.000	14.580

TABLE 9.2.5-8 (SHEET 6 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
231.00	80.000	91.000	14.590
232.00	90.000	88.000	14.600
233.00	80.000	86.000	14.610
234.00	79.000	86.000	14.620
235.00	78.000	84.000	14.620
236.00	78.000	83.000	14.610
237.00	78.000	82.000	14.610
238.00	78.000	83.000	14.610
239.00	78.000	82.000	14.600
240.00	78.000	81.000	14.580
241.00	77.000	79.000	14.590
242.00	76.000	77.000	14.610
243.00	82.000	90.000	14.650
244.00	82.000	90.000	14.640
245.00	75.000	76.000	14.610
246.00	75.000	76.000	14.620
247.00	77.000	78.000	14.630
248.00	79.000	82.000	14.630
249.00	79.000	86.000	14.630
250.00	80.000	88.000	14.630
251.00	80.000	91.000	14.620
252.00	80.000	93.000	14.610
253.00	81.000	95.000	14.610
254.00	80.000	95.000	14.600
255.00	81.000	96.000	14.590
256.00	81.000	96.000	14.580
257.00	80.000	94.000	14.580
258.00	80.000	91.000	14.590
259.00	80.000	88.000	14.600
260.00	80.000	86.000	14.610
261.00	79.000	86.000	14.620
262.00	78.000	84.000	14.620
263.00	78.000	83.000	14.610
264.00	78.000	82.000	14.610
265.00	78.000	83.000	14.610
266.00	78.000	82.000	14.600
267.00	78.000	81.000	14.580
268.00	77.000	79.000	14.590
269.00	76.000	77.000	14.610
270.00	82.000	90.000	14.650
271.00	82.000	90.000	14.640
272.00	75.000	76.000	14.610
273.00	75.000	76.000	14.620
274.00	77.000	78.000	14.630
275.00	79.000	82.000	14.630
276.00	79.000	86.000	14.630
277.00	80.000	88.000	14.630

TABLE 9.2.5-8 (SHEET 7 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
278.00	80.000	91.000	14.620
279.00	80.000	93.000	14.610
280.00	81.000	95.000	14.610
281.00	80.000	95.000	14.600
282.00	81.000	96.000	14.590
283.00	81.000	96.000	14.580
284.00	80.000	94.000	14.580
285.00	80.000	91.000	14.590
286.00	80.000	88.000	14.600
287.00	80.000	86.000	14.610
288.00	79.000	86.000	14.620
289.00	78.000	84.000	14.620
290.00	78.000	83.000	14.610
291.00	78.000	82.000	14.610
292.00	78.000	83.000	14.610
293.00	78.000	82.000	14.600
294.00	78.000	81.000	14.580
295.00	77.000	79.000	14.590
296.00	76.000	77.000	14.610
297.00	82.000	90.000	14.650
298.00	82.000	90.000	14.640
299.00	75.000	76.000	14.610
300.00	75.000	76.000	14.620
301.00	77.000	78.000	14.630
302.00	79.000	82.000	14.630
303.00	79.000	86.000	14.630
304.00	80.000	88.000	14.630
305.00	80.000	91.000	14.620
306.00	80.000	93.000	14.610
307.00	81.000	95.000	14.610
308.00	80.000	95.000	14.500
309.00	81.000	96.000	14.590
310.00	81.000	96.000	14.580
311.00	80.000	94.000	14.580
312.00	80.000	91.000	14.580
313.00	80.000	88.000	14.600
314.00	80.000	86.000	14.610
315.00	79.000	86.000	14.620
316.00	78.000	84.000	14.620
317.00	78.000	83.000	14.610
318.00	78.000	82.000	14.610
319.00	78.000	83.000	14.610
320.00	78.000	82.000	14.600
321.00	78.000	81.000	14.580
322.00	77.000	79.000	14.590
323.00	76.000	77.000	14.610
324.00	82.000	90.000	14.650

TABLE 9.2.5-8 (SHEET 8 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
325.00	82.000	90.000	14.640
326.00	75.000	76.000	14.610
327.00	75.000	76.000	14.620
328.00	77.000	78.000	14.630
329.00	79.000	82.000	14.630
330.00	79.000	86.000	14.630
331.00	80.000	88.000	14.630
332.00	80.000	91.000	14.620
333.00	80.000	93.000	14.610
334.00	81.000	95.000	14.610
335.00	80.000	95.000	14.600
336.00	81.000	98.000	14.590
337.00	81.000	96.000	14.580
338.00	80.000	94.000	14.580
339.00	80.000	91.000	14.590
340.00	80.000	88.000	14.600
341.00	80.000	86.000	14.610
342.00	79.000	86.000	14.620
343.00	78.000	84.000	14.620
344.00	78.000	83.000	14.610
345.00	78.000	82.000	14.610
346.00	78.000	83.000	14.610
347.00	78.000	82.000	14.600
348.00	78.000	81.000	14.580
349.00	77.000	79.000	14.590
350.00	76.000	77.000	14.610
351.00	82.000	90.000	14.650
352.00	82.000	90.000	14.640
353.00	75.000	76.000	14.610
354.00	75.000	76.000	14.620
355.00	77.000	78.000	14.630
356.00	78.000	82.000	14.630
357.00	79.000	86.000	14.630
358.00	80.000	88.000	14.630
359.00	80.000	91.000	14.620
360.00	80.000	93.000	14.610
361.00	81.000	95.000	14.610
362.00	80.000	95.000	14.600
363.00	81.000	96.000	14.550
364.00	81.000	96.000	14.580
365.00	80.000	94.000	14.580
366.00	80.000	91.000	14.590
367.00	80.000	88.000	14.600
368.00	80.000	86.000	14.610
369.00	79.000	86.000	14.620
370.00	78.000	84.000	14.620
371.00	78.000	83.000	14.610

TABLE 9.2.5-8 (SHEET 9 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
372.00	78.000	82.000	14.610
373.00	78.000	83.000	14.610
374.00	78.000	82.000	14.600
375.00	78.000	81.000	14.580
376.00	77.000	79.000	14.590
377.00	76.000	77.000	14.610
378.00	82.000	90.000	14.650
379.00	82.000	90.000	14.640
380.00	75.000	76.000	14.610
381.00	75.000	76.000	14.620
382.00	77.000	78.000	14.630
383.00	79.000	82.000	14.630
384.00	79.000	86.000	14.630
385.00	80.000	88.000	14.630
386.00	80.000	91.000	14.620
387.00	80.000	93.000	14.610
388.00	81.000	95.000	14.610
389.00	80.000	95.000	14.600
390.00	81.000	96.000	14.590
391.00	81.000	96.000	14.580
392.00	80.000	94.000	14.580
393.00	80.000	91.000	14.590
394.00	80.000	88.000	14.600
395.00	80.000	86.000	14.610
396.00	79.000	86.000	14.620
397.00	78.000	84.000	14.620
398.00	78.000	83.000	14.610
399.00	78.000	82.000	14.610
400.00	78.000	83.000	14.610
401.00	78.000	82.000	14.600
402.00	78.000	81.000	14.580
403.00	77.000	79.000	14.590
404.00	76.000	77.000	14.610
405.00	82.000	90.000	14.650
406.00	82.000	90.000	14.640
407.00	75.000	76.000	14.610
408.00	75.000	76.000	14.620
409.00	77.000	78.000	14.630
410.00	79.000	82.000	14.630
411.00	79.000	86.000	14.630
412.00	80.000	88.000	14.630
413.00	80.000	91.000	14.620
414.00	80.000	93.000	14.610
415.00	81.000	95.000	14.610
416.00	80.000	95.000	14.600
417.00	81.000	96.000	14.590
418.00	81.000	96.000	14.580

TABLE 9.2.5-8 (SHEET 10 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
419.00	80.000	94.000	14.580
420.00	80.000	91.000	14.590
421.00	80.000	88.000	14.600
422.00	80.000	86.000	14.610
423.00	79.000	86.000	14.620
424.00	79.000	84.000	14.620
425.00	78.000	83.000	14.610
426.00	78.000	82.000	14.610
427.00	78.000	83.000	14.610
428.00	78.000	82.000	14.600
429.00	78.000	81.000	14.580
430.00	77.000	79.000	14.590
431.00	76.000	77.000	14.610
432.00	82.000	90.000	14.650
433.00	82.000	90.000	14.640
434.00	75.000	76.000	14.610
435.00	75.000	76.000	14.620
436.00	77.000	78.000	14.630
437.00	79.000	82.000	14.630
438.00	79.000	86.000	14.630
439.00	80.000	88.000	14.630
440.00	80.000	91.000	14.620
441.00	80.000	93.000	14.610
442.00	81.000	95.000	14.610
443.00	80.000	95.000	14.600
444.00	81.000	96.000	14.590
445.00	81.000	96.000	14.580
446.00	80.000	94.000	14.580
447.00	80.000	91.000	14.590
448.00	80.000	88.000	14.600
449.00	80.000	86.000	14.610
450.00	79.000	86.000	14.620
451.00	78.000	84.000	14.620
452.00	78.000	83.000	14.610
453.00	78.000	82.000	14.610
454.00	78.000	83.000	14.610
455.00	78.000	82.000	14.600
456.00	78.000	81.000	14.580
457.00	77.000	79.000	14.590
458.00	76.000	77.000	14.610
459.00	82.000	90.000	14.650
460.00	82.000	90.000	14.640
461.00	75.000	76.000	14.610
462.00	75.000	76.000	14.620
463.00	77.000	78.000	14.630
464.00	79.000	82.000	14.630
465.00	79.000	86.000	14.630

TABLE 9.2.5-8 (SHEET 11 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
466.00	80.000	88.000	14.630
467.00	80.000	91.000	14.620
468.00	80.000	93.000	14.610
469.00	81.000	95.000	14.610
470.00	80.000	95.000	14.600
471.00	81.000	96.000	14.590
472.00	81.000	96.000	14.580
473.00	80.000	94.000	14.580
474.00	80.000	91.000	14.590
475.00	80.000	86.000	14.600
476.00	80.000	86.000	14.610
477.00	79.000	86.000	14.620
478.00	78.000	84.000	14.620
479.00	78.000	83.000	14.610
480.00	78.000	82.000	14.610
481.00	78.000	83.000	14.610
482.00	78.000	82.000	14.600
483.00	78.000	81.000	14.580
484.00	77.000	79.000	14.590
485.00	76.000	77.000	14.610
486.00	82.000	90.000	14.650
487.00	82.000	90.000	14.640
488.00	75.000	76.000	14.610
489.00	75.000	76.000	14.620
490.00	77.000	78.000	14.630
491.00	79.000	82.000	14.630
492.00	79.000	86.000	14.630
493.00	80.000	88.000	14.630
494.00	80.000	91.000	14.620
495.00	80.000	93.000	14.610
496.00	81.000	95.000	14.610
497.00	80.000	95.000	14.600
498.00	91.000	96.000	14.590
499.00	81.000	96.000	14.580
500.00	80.000	94.000	14.580
501.00	80.000	91.000	14.590
502.00	80.000	88.000	14.600
503.00	80.000	86.000	14.610
504.00	79.000	86.000	14.620
505.00	78.000	84.000	14.620
506.00	78.000	83.000	14.610
507.00	78.000	82.000	14.610
508.00	78.000	83.000	14.610
509.00	78.000	82.000	14.600
510.00	78.000	81.000	14.580
511.00	77.000	79.000	14.590
512.00	76.000	77.000	14.610

TABLE 9.2.5-8 (SHEET 12 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
513.00	82.000	90.000	14.650
514.00	82.000	90.000	14.640
515.00	75.000	76.000	14.610
516.00	75.000	76.000	14.620
517.00	77.000	78.000	14.630
518.00	79.000	82.000	14.630
519.00	79.000	86.000	14.630
520.00	80.000	88.000	14.630
521.00	30.000	91.000	14.620
522.00	80.000	93.000	14.610
523.00	81.000	95.000	14.610
524.00	80.000	95.000	14.600
525.00	81.000	96.000	14.590
526.00	81.000	96.000	14.580
527.00	80.000	94.000	14.580
528.00	80.000	91.000	14.590
529.00	80.000	88.000	14.600
530.00	80.000	86.000	14.610
531.00	79.000	86.000	14.620
532.00	78.000	84.000	14.620
533.00	78.000	83.000	14.610
534.00	78.000	82.000	14.610
535.00	78.000	83.000	14.610
536.00	78.000	82.000	14.600
537.00	78.000	81.000	14.580
538.00	77.000	79.000	14.590
539.00	76.000	77.000	14.610
540.00	82.000	90.000	14.650
541.00	82.000	90.000	14.640
542.00	75.000	76.000	14.610
543.00	75.000	76.000	14.620
544.00	77.000	78.000	14.630
545.00	79.000	82.000	14.630
546.00	79.000	86.000	14.630
547.00	80.000	88.000	14.630
548.00	80.000	91.000	14.620
549.00	80.000	93.000	14.610
550.00	81.000	95.000	14.610
551.00	80.000	95.000	14.600
552.00	81.000	96.000	14.590
553.00	81.000	96.000	14.580
554.00	80.000	94.000	14.580
555.00	80.000	91.000	14.590
556.00	80.000	88.000	14.600
557.00	80.000	86.000	14.610
558.00	79.000	86.000	14.620
559.00	78.000	84.000	14.620

TABLE 9.2.5-8 (SHEET 13 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
560.00	78.000	83.000	14.610
561.00	78.000	82.000	14.610
562.00	78.000	83.000	14.610
563.00	78.000	82.000	14.600
564.00	78.000	81.000	14.580
565.00	77.000	79.000	14.590
566.00	76.000	77.000	14.610
567.00	82.000	90.000	14.650
568.00	82.000	90.000	14.640
569.00	75.000	76.000	14.610
570.00	75.000	76.000	14.620
571.00	77.000	78.000	14.630
572.00	79.000	82.000	14.630
573.00	79.000	86.000	14.630
574.00	80.000	88.000	14.630
575.00	80.000	91.000	14.620
576.00	80.000	93.000	14.610
577.00	81.000	95.000	14.610
578.00	80.000	95.000	14.600
579.00	81.000	96.000	14.590
580.00	81.000	96.000	14.590
581.00	80.000	94.000	14.580
582.00	80.000	91.000	14.590
583.00	80.000	88.000	14.600
584.00	80.000	86.000	14.610
585.00	79.000	86.000	14.620
586.00	78.000	84.000	14.620
587.00	78.000	83.000	14.610
588.00	73.000	82.000	14.610
589.00	78.000	83.000	14.610
590.00	78.000	82.000	14.600
591.00	78.000	81.000	14.580
592.00	77.000	79.000	14.590
593.00	76.000	77.000	14.610
594.00	82.000	90.000	14.650
595.00	62.000	90.000	14.640
596.00	75.000	76.000	14.610
597.00	75.000	76.000	14.620
598.00	77.000	78.000	14.630
599.00	79.000	82.000	14.630
600.00	79.000	86.000	14.630
601.00	80.000	88.000	14.630
602.00	80.000	91.000	14.620
603.00	80.000	93.000	14.610
604.00	81.000	95.000	14.610
605.00	80.000	95.000	14.600
606.00	81.000	96.000	14.590

TABLE 9.2.5-8 (SHEET 14 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
607.00	81.000	96.000	14.580
608.00	80.000	94.000	14.580
609.00	80.000	91.000	14.590
610.00	80.000	88.000	14.600
611.00	80.000	86.000	14.610
612.00	79.000	88.000	14.620
613.00	78.000	84.000	14.620
614.00	78.000	83.000	14.610
615.00	78.000	82.610	14.610
616.00	78.000	83.000	14.610
617.00	78.000	82.000	14.600
618.00	78.000	81.000	14.580
619.00	77.000	79.000	14.590
620.00	76.000	77.000	14.610
621.00	82.000	90.000	14.650
622.00	82.000	90.000	14.640
623.00	75.000	76.000	14.610
624.00	75.000	76.000	14.620
625.00	77.000	78.000	14.630
626.00	79.000	82.000	14.630
627.00	79.000	86.000	14.630
628.00	80.000	88.000	14.630
629.00	80.000	91.000	14.620
630.00	30.000	93.000	14.610
631.00	81.000	95.000	14.610
632.00	80.000	95.000	14.600
633.00	81.000	96.000	14.590
634.00	81.000	96.000	14.580
635.00	80.000	94.000	14.580
636.00	80.000	91.000	14.590
637.00	80.000	88.000	14.600
638.00	80.000	86.000	14.610
639.00	79.000	86.000	14.620
640.00	78.000	84.000	14.620
641.00	78.000	83.000	14.610
642.00	78.000	82.000	14.610
643.00	78.000	83.000	14.610
644.00	78.000	82.000	14.600
645.00	78.000	81.000	14.580
646.00	77.000	75.000	14.590
647.00	76.000	77.000	14.610
648.00	82.000	90.000	14.650
649.00	82.000	90.000	14.640
650.00	75.000	76.000	14.610
651.00	75.000	76.000	14.620
652.00	77.000	78.000	14.630
653.00	79.000	82.000	14.630

TABLE 9.2.5-8 (SHEET 15 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
654.00	79.000	86.000	14.630
655.00	80.000	88.000	14.630
656.00	80.000	91.000	14.620
657.00	80.000	93.000	14.610
658.00	81.000	95.000	14.610
659.00	80.000	95.000	14.600
660.00	81.000	96.000	14.590
661.00	81.000	96.000	14.580
662.00	80.000	94.000	14.580
663.00	80.000	91.000	14.590
664.00	80.000	88.000	14.600
665.00	80.000	86.000	14.610
666.00	79.000	86.000	14.620
667.00	78.000	84.000	14.620
668.00	78.000	83.000	14.610
669.00	78.000	82.000	14.610
670.00	78.000	83.000	14.610
671.00	78.000	82.000	14.600
672.00	78.000	81.000	14.580
673.00	77.000	79.000	14.590
674.00	76.000	77.000	14.610
675.00	82.000	90.000	14.650
676.00	82.000	90.000	14.640
677.00	75.000	76.000	14.610
678.00	75.000	76.000	14.620
679.00	77.000	78.000	14.630
680.00	79.000	82.000	14.630
681.00	79.000	86.000	14.630
682.00	80.000	88.000	14.630
683.00	80.000	91.000	14.620
684.00	80.000	93.000	14.610
685.00	81.000	95.000	14.610
686.00	80.000	95.000	14.600
687.00	81.000	96.000	14.590
688.00	81.000	96.000	14.580
689.00	80.000	94.000	14.580
690.00	80.000	91.000	14.590
691.00	80.000	88.000	14.600
692.00	80.000	86.000	14.610
693.00	79.000	86.000	14.620
694.00	78.000	84.000	14.620
695.00	78.000	83.000	14.610
696.00	78.000	82.000	14.610
697.00	78.000	83.000	14.610
698.00	78.000	82.000	14.600
699.00	78.000	81.000	14.580
700.00	77.000	79.000	14.590

TABLE 9.2.5-8 (SHEET 16 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
701.00	76.000	77.000	14.610
702.00	82.000	90.000	14.650
703.00	82.000	90.000	14.640
704.00	75.000	76.000	14.610
705.00	75.000	76.000	14.620
706.00	77.000	78.000	14.630
707.00	79.000	82.000	14.630
708.00	79.000	86.000	14.630
709.00	80.000	88.000	14.630
710.00	80.000	91.000	14.620
711.00	80.000	93.000	14.610
712.00	81.000	95.000	14.610
713.00	80.000	95.000	14.600
714.00	81.000	96.000	14.590
715.00	81.000	96.000	14.580
716.00	80.000	94.000	14.580
717.00	80.000	91.000	14.590
718.00	80.000	88.000	14.600
719.00	80.000	86.000	14.610
720.00	79.000	86.000	14.620

TABLE 9.2.5-9 (SHEET 1 OF 16)

METEOROLOGICAL DATA FOR AUGUSTA, GEORGIA, AIRPORT
(JUNE 22, 1977 TO JULY 22, 1977)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
.00	73.000	106.000	14.617
1.00	72.000	106.000	14.612
2.00	72.333	83.999	14.689
3.00	73.667	90.001	14.693
4.00	75.000	96.000	14.696
5.00	75.000	97.333	14.689
6.00	75.000	98.667	14.683
7.00	75.000	100.000	14.676
8.00	75.000	100.670	14.665
9.00	75.000	101.330	14.653
10.00	75.000	102.000	14.642
11.00	74.333	100.670	14.637
12.00	73.667	99.333	14.632
13.00	73.000	98.000	14.627
14.00	73.000	94.667	14.634
15.00	73.000	91.333	14.640
16.00	73.000	88.000	14.647
17.00	73.000	88.000	14.647
18.00	72.000	84.000	14.647
19.00	72.000	84.000	14.647
20.00	71.333	83.000	14.647
21.00	70.667	82.000	14.647
22.00	70.000	81.000	14.647
23.00	70.333	80.667	14.650
24.00	70.667	80.333	14.653
25.00	71.000	80.000	14.656
26.00	72.667	84.666	14.656
27.00	74.000	95.000	14.681
28.00	74.000	95.000	14.674
29.00	74.000	95.000	14.668
30.00	74.000	95.000	14.661
31.00	74.667	93.333	14.661
32.00	75.333	91.666	14.661
33.00	76.000	90.000	14.661
34.00	74.333	86.667	14.676
35.00	72.666	83.333	14.690
36.00	71.000	80.000	14.705
37.00	71.000	80.000	14.705
38.00	70.000	76.000	14.691
39.00	70.000	76.000	14.691

TABLE 9.2.5-9 (SHEET 2 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
40.00	70.000	75.667	14.691
41.00	70.000	75.333	14.691
42.00	70.000	75.000	14.691
43.00	70.000	75.333	14.696
44.00	70.000	75.667	14.700
45.00	70.000	76.000	14.705
46.00	71.667	79.666	14.704
47.00	73.334	83.334	14.702
48.00	75.000	87.000	14.701
49.00	75.333	89.333	14.698
50.00	75.667	91.667	14.694
51.00	76.000	94.000	14.691
52.00	76.333	95.000	14.679
53.00	76.667	96.000	14.668
54.00	77.000	97.000	14.656
55.00	75.333	94.000	14.661
56.00	73.666	91.000	14.666
57.00	72.000	88.000	14.671
58.00	71.667	84.000	14.679
59.00	71.333	80.000	14.688
60.00	71.000	76.000	14.696
61.00	71.000	76.000	14.696
62.00	69.000	74.000	14.691
63.00	69.000	74.000	14.691
64.00	69.000	73.000	14.691
65.00	69.000	72.000	14.691
66.00	69.000	71.000	14.691
67.00	69.667	72.000	14.697
68.00	70.333	73.000	14.704
69.00	71.000	74.000	14.710
70.00	71.000	74.667	14.712
71.00	71.000	75.333	14.713
72.00	71.000	76.000	14.715
73.00	72.333	80.333	14.709
74.00	73.667	84.667	14.702
75.00	75.000	89.000	14.696
76.00	75.333	91.000	14.681
77.00	75.667	93.000	14.666
78.00	76.000	95.000	14.651
79.00	75.667	93.333	14.648
80.00	75.333	91.666	14.645
81.00	75.000	90.000	14.642
82.00	74.000	86.334	14.648
83.00	73.000	82.666	14.655
84.00	72.000	79.000	14.661
85.00	72.000	79.000	14.661
86.00	70.000	75.000	14.651

TABLE 9.2.5-9 (SHEET 3 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
87.00	70.000	75.000	14.651
88.00	69.333	73.333	14.648
89.00	68.667	71.666	14.645
90.00	68.000	70.000	14.642
91.00	69.000	71.667	14.645
92.00	70.000	73.334	14.648
93.00	71.000	75.000	14.651
94.00	72.333	80.333	14.650
95.00	73.667	85.667	14.648
96.00	75.000	91.000	14.647
97.00	75.333	93.000	14.640
98.00	75.667	95.000	14.634
99.00	76.000	97.000	14.627
100.00	76.333	98.000	14.614
101.00	76.667	99.000	14.601
102.00	77.000	100.000	14.588
103.00	75.667	98.333	14.588
104.00	74.333	96.666	14.588
105.00	73.000	95.000	14.588
106.00	73.000	92.000	14.594
107.00	73.000	89.000	14.601
108.00	73.000	86.000	14.607
109.00	73.000	86.000	14.607
110.00	71.000	78.000	14.612
111.00	71.000	78.000	14.612
112.00	70.667	77.667	14.610
113.00	70.333	77.333	14.609
114.00	70.000	77.000	14.607
115.00	71.000	78.000	14.614
116.00	72.000	79.000	14.620
117.00	73.000	80.000	14.627
118.00	74.000	82.333	14.629
119.00	75.000	84.667	14.630
120.00	76.000	87.000	14.632
121.00	76.333	85.667	14.630
122.00	76.667	84.333	14.629
123.00	77.000	83.000	14.627
124.00	76.667	83.333	14.619
125.00	76.333	83.667	14.610
126.00	76.000	84.000	14.602
127.00	74.333	80.334	14.609
128.00	72.666	76.666	14.615
129.00	71.000	73.000	14.622
130.00	71.667	73.667	14.624
131.00	72.333	74.333	14.625
132.00	73.000	75.000	14.627
133.00	73.000	75.000	14.627

TABLE 9.2.5-9 (SHEET 4 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
134.00	72.000	74.000	14.622
135.00	72.000	74.000	14.622
136.00	71.667	74.000	14.620
137.00	71.333	74.000	14.619
138.00	71.000	74.000	14.617
139.00	71.667	74.667	14.627
140.00	72.333	75.333	14.637
141.00	73.000	76.000	14.647
142.00	74.667	80.333	14.648
143.00	76.334	84.667	14.650
144.00	78.000	89.000	14.651
145.00	77.000	91.000	14.650
146.00	76.000	93.000	14.648
147.00	75.000	95.000	14.647
148.00	74.667	96.000	14.639
149.00	74.333	97.000	14.630
150.00	74.000	98.000	14.622
151.00	74.667	96.333	14.624
152.00	75.333	94.666	14.625
153.00	76.000	93.000	14.627
154.00	75.000	88.334	14.632
155.00	74.000	83.666	14.637
156.00	73.000	79.000	14.642
157.00	73.000	79.000	14.642
158.00	72.000	76.000	14.637
159.00	72.000	76.000	14.637
160.00	71.667	76.333	14.635
161.00	71.333	76.667	14.634
162.00	71.000	77.000	14.632
163.00	71.000	78.000	14.642
164.00	71.000	79.000	14.651
165.00	71.000	80.000	14.661
166.00	72.667	84.000	14.663
167.00	74.334	88.000	14.664
169.00	76.000	92.000	14.666
169.00	75.333	93.667	14.661
170.00	74.667	95.334	14.656
171.00	74.000	97.000	14.651
172.00	74.000	97.333	14.638
173.00	74.000	97.667	14.625
174.00	74.000	98.000	14.612
175.00	74.333	96.667	14.614
176.00	74.667	95.333	14.615
177.00	75.000	94.000	14.617
178.00	74.000	89.334	14.622
179.00	73.000	84.666	14.627
180.00	72.000	80.000	14.632

TABLE 9.2.5-9 (SHEET 5 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
181.00	72.000	80.000	14.632
182.00	68.000	80.000	14.632
183.00	68.000	80.000	14.632
184.00	68.333	79.000	14.627
185.00	68.667	78.000	14.622
186.00	69.000	77.000	14.617
187.00	69.667	78.000	14.630
188.00	70.333	79.000	14.643
189.00	71.000	80.000	14.656
190.00	73.000	83.666	14.656
191.00	75.000	87.334	14.656
192.00	77.000	91.000	14.656
193.00	76.667	92.667	14.650
194.00	76.333	94.334	14.643
195.00	76.000	96.000	14.637
196.00	75.333	96.333	14.629
197.00	74.667	96.667	14.620
198.00	74.000	97.000	14.612
199.00	73.667	91.001	14.625
200.00	73.333	84.999	14.638
201.00	73.000	79.000	14.651
202.00	72.667	79.000	14.650
203.00	72.333	79.000	14.648
204.00	72.000	79.000	14.647
205.00	72.000	79.000	14.647
206.00	69.000	74.000	14.656
207.00	69.000	74.000	14.656
208.00	68.667	73.000	14.658
209.00	68.333	72.000	14.659
210.00	68.000	71.000	14.661
211.00	68.667	72.000	14.671
212.00	69.333	73.000	14.681
213.00	70.000	74.000	14.691
214.00	71.667	77.666	14.689
215.00	73.334	81.334	14.688
216.00	75.000	85.000	14.686
217.00	75.333	87.666	14.683
218.00	75.667	90.334	14.679
219.00	76.000	93.000	14.676
220.00	76.000	90.667	14.669
221.00	76.000	88.333	14.663
222.00	76.000	86.000	14.656
223.00	74.667	83.667	14.661
224.00	73.333	81.333	14.666
225.00	72.000	79.000	14.671
226.00	72.000	78.000	14.674
227.00	72.000	77.000	14.678

TABLE 9.2.5-9 (SHEET 6 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
228.00	72.000	76.000	14.681
229.00	72.000	76.000	14.681
230.00	70.000	73.000	14.686
231.00	70.000	73.000	14.686
232.00	70.000	73.000	14.683
233.00	70.000	73.000	14.679
234.00	70.000	73.000	14.676
235.00	70.333	73.667	14.686
236.00	70.667	74.333	14.695
237.00	71.000	75.000	14.705
238.00	72.667	79.333	14.704
239.00	74.334	83.667	14.702
240.00	76.000	88.000	14.701
241.00	75.667	90.000	14.694
242.00	75.333	92.000	14.688
243.00	75.000	94.000	14.681
244.00	74.000	89.667	14.679
245.00	73.000	85.333	14.678
246.00	72.000	81.000	14.676
247.00	71.333	78.334	14.671
248.00	70.667	75.666	14.666
249.00	70.000	73.000	14.661
250.00	70.000	73.000	14.679
251.00	70.000	73.000	14.697
252.00	70.000	73.000	14.715
253.00	70.000	73.000	14.715
254.00	68.000	71.000	14.696
255.00	68.000	71.000	14.696
256.00	68.333	71.333	14.696
257.00	68.667	71.667	14.696
258.00	69.000	72.000	14.696
259.00	69.000	71.667	14.696
260.00	69.000	71.333	14.696
261.00	69.000	71.000	14.696
262.00	70.333	74.000	14.698
263.00	71.667	77.000	14.699
264.00	73.000	80.000	14.701
265.00	73.333	82.000	14.698
266.00	73.667	84.000	14.694
267.00	74.000	86.000	14.691
268.00	74.667	86.333	14.683
269.00	75.333	86.667	14.674
270.00	76.000	87.000	14.666
271.00	75.667	85.667	14.666
272.00	75.333	84.333	14.666
273.00	75.000	83.000	14.666
274.00	74.333	80.667	14.676

TABLE 9.2.5-9 (SHEET 7 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
275.00	73.667	78.333	14.686
276.00	73.000	76.000	14.696
277.00	73.000	76.000	14.696
278.00	72.000	74.000	14.696
279.00	72.000	74.000	14.696
280.00	71.333	73.000	14.694
281.00	70.667	72.000	14.693
282.00	70.000	71.000	14.691
283.00	70.000	71.000	14.697
284.00	70.000	71.000	14.704
285.00	70.000	71.000	14.710
286.00	71.333	74.000	14.713
287.00	72.667	77.000	14.717
288.00	74.000	80.000	14.720
289.00	75.000	82.666	14.718
290.00	76.000	85.334	14.717
291.00	77.000	88.000	14.715
292.00	76.333	89.333	14.705
293.00	75.667	90.667	14.696
294.00	75.000	92.000	14.686
295.00	74.000	86.334	14.691
296.00	73.000	80.666	14.696
297.00	72.000	75.000	14.701
298.00	71.667	74.667	14.709
299.00	71.333	74.333	14.717
300.00	71.000	74.000	14.725
301.00	71.000	74.000	14.725
302.00	71.000	72.000	14.725
303.00	71.000	72.000	14.725
304.00	70.333	71.333	14.723
305.00	69.667	70.667	14.722
306.00	69.000	70.000	14.720
307.00	69.667	70.667	14.730
308.00	70.333	71.333	14.740
309.00	71.000	72.000	14.750
310.00	72.667	75.333	14.750
311.00	74.334	78.667	14.750
312.00	76.000	82.000	14.750
313.00	76.000	84.666	14.745
314.00	76.000	87.334	14.740
315.00	76.000	90.000	14.735
316.00	76.000	90.667	14.727
317.00	76.000	91.333	14.718
318.00	76.000	92.000	14.710
319.00	75.333	91.000	14.707
320.00	74.667	90.000	14.704
321.00	74.000	89.000	14.701

TABLE 9.2.5-9 (SHEET 8 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
322.00	73.667	85.334	14.707
323.00	73.333	81.666	14.714
324.00	73.000	78.000	14.720
325.00	73.000	78.000	14.720
326.00	71.000	74.000	14.715
327.00	71.000	74.000	14.715
328.00	70.667	73.000	14.712
329.00	70.333	72.000	14.708
330.00	70.000	71.000	14.705
331.00	70.667	72.000	14.710
332.00	71.333	73.000	14.715
333.00	72.000	74.000	14.720
334.00	73.333	78.666	14.718
335.00	74.667	83.334	14.717
336.00	76.000	88.000	14.715
337.00	76.333	89.667	14.709
338.00	76.667	91.334	14.702
339.00	77.000	93.000	14.696
340.00	76.333	91.667	14.686
341.00	75.667	90.333	14.676
342.00	75.000	69.000	14.666
343.00	75.000	86.667	14.666
344.00	75.000	84.333	14.666
345.00	75.000	82.000	14.666
346.00	74.333	80.000	14.666
347.00	73.667	78.000	14.666
348.00	73.000	76.000	14.666
349.00	73.000	76.000	14.666
350.00	72.000	75.000	14.656
351.00	72.000	75.000	14.656
352.00	71.333	74.000	14.654
353.00	70.667	73.000	14.653
354.00	70.000	72.000	14.651
355.00	70.667	72.667	14.654
356.00	71.333	73.333	14.658
357.00	72.000	74.000	14.661
358.00	73.667	78.666	14.659
359.00	75.334	83.334	14.658
360.00	77.000	88.000	14.656
361.00	77.000	90.333	14.650
362.00	77.000	92.667	14.643
363.00	77.000	95.000	14.637
364.00	76.667	96.000	14.630
365.00	76.333	97.000	14.624
366.00	76.000	98.000	14.617
367.00	75.667	96.667	14.612
368.00	75.333	95.333	14.607

TABLE 9.2.5-9 (SHEET 9 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
369.00	75.000	94.000	14.602
370.00	74.667	89.334	14.605
371.00	74.333	84.666	14.609
372.00	74.000	80.000	14.612
373.00	74.000	80.000	14.612
374.00	73.000	76.000	14.612
375.00	73.000	76.000	14.612
376.00	72.667	75.333	14.612
377.00	72.333	74.667	14.612
378.00	72.000	74.000	14.612
379.00	72.667	76.333	14.617
380.00	73.333	78.667	14.622
381.00	74.000	81.000	14.627
382.00	75.333	84.333	14.625
383.00	76.667	87.667	14.624
384.00	78.000	91.000	14.622
385.00	77.333	93.333	14.619
386.00	76.667	95.667	14.615
387.00	76.000	98.000	14.612
388.00	76.333	98.333	14.606
389.00	76.667	98.667	14.599
390.00	77.000	99.000	14.593
391.00	77.667	97.000	14.594
392.00	78.333	95.000	14.596
393.00	79.000	93.000	14.597
394.00	78.000	90.000	14.602
395.00	77.000	87.000	14.607
396.00	76.000	84.000	14.612
397.00	76.000	84.000	14.612
398.00	72.000	79.000	14.622
399.00	72.000	79.000	14.622
400.00	71.667	77.333	14.624
401.00	71.333	75.666	14.625
402.00	71.000	74.000	14.627
403.00	72.000	75.000	14.635
404.00	73.000	76.000	14.643
405.00	74.000	77.000	14.651
406.00	75.333	82.000	14.651
407.00	76.667	87.001	14.651
408.00	78.000	92.000	14.651
409.00	78.333	94.666	14.650
410.00	78.667	97.334	14.648
411.00	79.000	100.000	14.647
412.00	78.333	101.000	14.635
413.00	77.667	102.000	14.624
414.00	77.000	103.000	14.612
415.00	76.667	100.330	14.615

TABLE 9.2.5-9 (SHEET 10 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
416.00	76.333	97.666	14.619
417.00	76.000	95.000	14.622
418.00	74.667	91.667	14.640
419.00	73.333	88.333	14.658
420.00	72.000	85.000	14.676
421.00	72.000	85.000	14.676
422.00	70.000	80.000	14.671
423.00	70.000	80.000	14.671
424.00	69.333	77.334	14.669
425.00	68.667	74.666	14.668
426.00	68.000	72.000	14.666
427.00	68.333	73.000	14.671
428.00	68.667	74.000	14.676
429.00	69.000	75.000	14.681
430.00	70.333	79.666	14.684
431.00	71.667	84.334	14.688
432.00	73.000	89.000	14.691
433.00	73.667	92.000	14.688
434.00	74.333	95.000	14.684
435.00	75.000	98.000	14.681
436.00	75.333	98.667	14.670
437.00	75.667	99.333	14.658
438.00	76.000	100.000	14.647
439.00	75.000	98.667	14.648
440.00	74.000	97.333	14.650
441.00	73.000	96.000	14.651
442.00	73.000	91.334	14.659
443.00	73.000	86.666	14.668
444.00	73.000	82.000	14.676
445.00	73.000	82.000	14.676
446.00	71.000	80.000	14.686
447.00	71.000	80.000	14.686
448.00	70.333	77.334	14.686
449.00	69.667	74.666	14.686
450.00	69.000	72.000	14.686
451.00	69.333	73.667	14.689
452.00	69.667	75.334	14.693
453.00	70.000	77.000	14.696
454.00	71.667	81.333	14.698
455.00	73.334	85.667	14.699
456.00	75.000	90.000	14.701
457.00	74.667	92.333	14.698
458.00	74.333	94.667	14.694
459.00	74.000	97.000	14.691
460.00	74.000	97.667	14.681
461.00	74.000	98.333	14.671
462.00	74.000	99.000	14.661

TABLE 9.2.5-9 (SHEET 11 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
463.00	73.667	97.667	14.661
464.00	73.333	96.333	14.661
465.00	73.000	95.000	14.661
466.00	72.000	90.000	14.669
467.00	71.000	84.999	14.678
468.00	70.000	80.000	14.686
469.00	70.000	80.000	14.686
470.00	69.000	77.000	14.691
471.00	69.000	77.000	14.691
472.00	68.667	75.000	14.691
473.00	68.333	73.000	14.691
474.00	68.000	71.000	14.691
475.00	69.000	73.333	14.696
476.00	70.000	75.667	14.700
477.00	71.000	78.000	14.705
478.00	71.667	82.333	14.707
479.00	72.333	86.667	14.708
480.00	73.000	91.000	14.710
481.00	73.333	93.000	14.705
482.00	73.667	95.000	14.701
483.00	74.000	97.000	14.696
484.00	73.667	97.667	14.683
485.00	73.333	98.333	14.669
486.00	73.000	99.000	14.656
487.00	72.333	97.000	14.656
488.00	71.667	95.000	14.656
489.00	71.000	93.000	14.656
490.00	71.333	90.334	14.668
491.00	71.667	87.666	14.679
492.00	72.000	85.000	14.691
493.00	72.000	85.000	14.691
494.00	71.000	78.000	14.686
495.00	71.000	78.000	14.686
496.00	70.667	76.000	14.684
497.00	70.333	74.000	14.683
498.00	70.000	72.000	14.681
499.00	70.333	73.333	14.688
500.00	70.667	74.667	14.694
501.00	71.000	76.000	14.701
502.00	72.667	81.000	14.704
503.00	74.334	86.001	14.707
504.00	76.000	91.000	14.710
505.00	75.667	92.000	14.705
506.00	75.333	93.000	14.701
507.00	75.000	94.000	14.696
508.00	74.667	95.333	14.689
509.00	74.333	96.667	14.683

TABLE 9.2.5-9 (SHEET 12 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
510.00	74.000	98.000	14.676
511.00	74.333	96.000	14.678
512.00	74.667	94.000	14.679
513.00	75.000	92.000	14.681
514.00	74.000	88.334	14.691
515.00	73.000	84.666	14.700
516.00	72.000	81.000	14.710
517.00	72.000	81.000	14.710
518.00	70.000	73.000	14.705
519.00	70.000	73.000	14.705
520.00	70.000	72.667	14.705
521.00	70.000	72.333	14.705
522.00	70.000	72.000	14.705
523.00	70.667	73.000	14.710
524.00	71.333	74.000	14.715
525.00	72.000	75.000	14.720
526.00	73.667	79.666	14.723
527.00	75.334	84.334	14.727
528.00	77.000	89.000	14.730
529.00	76.667	92.000	14.723
530.00	76.333	95.000	14.717
531.00	76.000	98.000	14.710
532.00	75.000	95.000	14.705
533.00	74.000	92.000	14.701
534.00	73.000	89.000	14.696
535.00	73.667	88.333	14.698
536.00	74.333	87.667	14.699
537.00	75.000	87.000	14.701
538.00	74.333	84.000	14.711
539.00	73.667	81.000	14.720
540.00	73.000	78.000	14.730
541.00	73.000	78.000	14.730
542.00	72.000	74.000	14.715
543.00	72.000	74.000	14.715
544.00	71.333	73.000	14.715
545.00	70.667	72.000	14.715
546.00	70.000	71.000	14.715
547.00	70.333	72.000	14.722
548.00	70.667	73.000	14.728
549.00	71.000	74.000	14.735
550.00	73.000	79.333	14.733
551.00	75.000	84.667	14.732
552.00	77.000	90.000	14.730
553.00	77.000	92.333	14.723
554.00	77.000	94.667	14.717
555.00	77.000	97.000	14.710
556.00	76.667	98.000	14.700

TABLE 9.2.5-9 (SHEET 13 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
557.00	76.333	99.000	14.691
558.00	76.000	100.000	14.681
559.00	75.333	96.667	14.683
560.00	74.667	93.333	14.684
561.00	74.000	90.000	14.686
562.00	73.333	86.334	14.694
563.00	72.667	82.666	14.702
564.00	72.000	79.000	14.710
565.00	72.000	79.000	14.710
566.00	70.000	74.000	14.705
567.00	70.000	74.000	14.705
568.00	70.000	73.667	14.705
569.00	70.000	73.333	14.705
570.00	70.000	73.000	14.705
571.00	70.000	73.667	14.713
572.00	70.000	74.333	14.722
573.00	70.000	75.000	14.730
574.00	71.000	78.666	14.733
575.00	72.000	82.334	14.737
576.00	73.000	86.000	14.740
577.00	74.000	89.000	14.733
578.00	75.000	92.000	14.727
579.00	76.000	95.000	14.720
580.00	75.667	96.333	14.709
581.00	75.333	97.667	14.697
582.00	75.000	99.000	14.686
583.00	74.667	96.334	14.686
584.00	74.333	93.666	14.686
585.00	74.000	91.000	14.686
586.00	73.667	87.000	14.697
587.00	73.333	83.000	14.709
588.00	73.000	79.000	14.720
589.00	73.000	79.000	14.720
590.00	71.000	73.000	14.725
591.00	71.000	73.000	14.725
592.00	70.000	72.000	14.725
593.00	69.000	71.000	14.725
594.00	68.000	70.000	14.725
595.00	68.667	71.000	14.730
596.00	69.333	72.000	14.735
597.00	70.000	73.000	14.740
598.00	72.000	77.333	14.742
599.00	74.000	81.667	14.743
600.00	76.000	86.000	14.745
601.00	75.667	88.666	14.740
602.00	75.333	91.334	14.735
603.00	75.000	94.000	14.730

TABLE 9.2.5-9 (SHEET 14 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
604.00	74.333	94.667	14.719
605.00	73.667	95.333	14.707
606.00	73.000	96.000	14.696
607.00	73.000	94.667	14.696
608.00	73.000	93.333	14.696
609.00	73.000	92.000	14.696
610.00	73.000	88.334	14.707
611.00	73.000	84.666	14.719
612.00	73.000	81.000	14.730
613.00	73.000	81.000	14.730
614.00	72.000	76.000	14.730
615.00	72.000	76.000	14.730
616.00	71.333	75.000	14.728
617.00	70.667	74.000	14.727
618.00	70.000	73.000	14.725
619.00	70.667	73.667	14.728
620.00	71.333	74.333	14.732
621.00	72.000	75.000	14.735
622.00	72.667	79.000	14.737
623.00	73.333	83.000	14.738
624.00	74.000	87.000	14.740
625.00	73.667	88.333	14.735
626.00	73.333	89.667	14.730
627.00	73.000	91.000	14.725
628.00	73.000	92.000	14.715
629.00	73.000	93.000	14.706
630.00	73.000	94.000	14.696
631.00	73.000	92.333	14.699
632.00	73.000	90.666	14.702
633.00	73.000	89.000	14.705
634.00	72.667	86.000	14.710
635.00	72.333	83.000	14.715
636.00	72.000	80.000	14.720
637.00	72.000	80.000	14.720
638.00	68.000	72.000	14.730
639.00	68.000	72.000	14.730
640.00	67.333	71.000	14.728
641.00	66.667	70.000	14.727
642.00	66.000	69.000	14.725
643.00	67.000	70.333	14.728
644.00	68.000	71.667	14.732
645.00	69.000	73.000	14.735
646.00	69.667	77.666	14.737
647.00	70.333	82.334	14.738
648.00	71.000	87.000	14.740
649.00	72.333	89.000	14.733
650.00	73.667	91.000	14.727

TABLE 9.2.5-9 (SHEET 15 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
651.00	75.000	93.000	14.720
652.00	74.667	93.667	14.710
653.00	74.333	94.333	14.701
654.00	74.000	95.000	14.691
655.00	74.333	93.000	14.694
656.00	74.667	91.000	14.698
657.00	75.000	89.000	14.701
658.00	74.333	86.000	14.709
659.00	73.667	83.000	14.717
660.00	73.000	80.000	14.725
661.00	73.000	80.000	14.725
662.00	71.000	74.000	14.730
663.00	71.000	74.000	14.730
664.00	70.667	73.333	14.727
665.00	70.333	72.667	14.723
666.00	70.000	72.000	14.720
667.00	70.667	72.667	14.723
668.00	71.333	73.333	14.727
669.00	72.000	74.000	14.730
670.00	73.333	78.666	14.730
671.00	74.667	83.334	14.730
672.00	76.000	88.000	14.730
673.00	75.667	90.000	14.725
674.00	75.333	92.000	14.720
675.00	75.000	94.000	14.715
676.00	74.667	94.667	14.704
677.00	74.333	95.333	14.692
678.00	74.000	96.000	14.681
679.00	74.333	94.333	14.683
680.00	74.667	92.666	14.684
681.00	75.000	91.000	14.686
682.00	74.333	88.000	14.691
683.00	73.667	85.000	14.696
684.00	73.000	82.000	14.701
685.00	73.000	82.000	14.701
686.00	71.000	76.000	14.710
687.00	71.000	76.000	14.710
688.00	70.333	74.667	14.705
689.00	69.667	73.333	14.701
690.00	69.000	72.000	14.696
691.00	69.667	73.333	14.702
692.00	70.333	74.667	14.709
693.00	71.000	76.000	14.715
694.00	72.333	81.333	14.720
695.00	73.667	86.667	14.725
696.00	75.000	92.000	14.730
697.00	75.000	93.000	14.720

TABLE 9.2.5-9 (SHEET 16 OF 16)

Time (h)	Wet Bulb Temperature (°F)	Dry Bulb Temperature (°F)	Barometric Pressure (psia)
698.00	75.000	94.000	14.711
699.00	75.000	95.000	14.701
700.00	74.667	96.333	14.689
701.00	74.333	97.667	14.678
702.00	74.000	99.000	14.666
703.00	74.000	98.000	14.664
704.00	74.000	97.000	14.663
705.00	74.000	96.000	14.661
706.00	73.000	92.000	14.671
707.00	72.000	88.000	14.681
708.00	71.000	84.000	14.691
709.00	71.000	84.000	14.691
710.00	72.000	80.000	14.691
711.00	72.000	80.000	14.691
712.00	71.667	78.667	14.688
713.00	71.333	77.333	14.684
714.00	71.000	76.000	14.681
715.00	71.000	76.667	14.683
716.00	71.000	77.333	14.684
717.00	71.000	78.000	14.686
718.00	72.333	83.999	14.689
719.00	73.667	90.001	14.693
720.00	75.000	96.000	14.696

TABLE 9.2.5-10

TOTAL NSCW HEAT LOADS FOR SHUTDOWN
WITH LOSS OF OFFSITE POWER[(a)]

Time from Reactor Shutdown (h)	Total NSCW System Heat Load, per Tower (10^6 Btu/h) Unit 1[(d)] Two-Train Cooldown[(c)]	Unit 1[(d)] One-Train Cooldown	Unit 2[(b)] Two Train Cooldown[(c)]	Unit 2[(b)] One-Train Cooldown
0	47.7	69.6		
2	46.5	67.2		
4	160.9	236.2	177.5	260.3
6	156.5	226.5	167.5	248.1
8	115.9	208.1	122.5	224.3
10	101.8	188.6	112.5	203.9
12	93.2	177.6	105.0	191.8
14	85.8	170.7	95.0	183.9
16	83.1	165.9	90.0	178.2
17	82.2	164.1	89.0	176.0
18		162.4	87.5	174.0
20		159.5		170.8
22		156.9		168.2
24		154.6		166.1
26		152.5		164.1
28		150.6		162.3
30		148.7		160.9
32		147.1		158.8
34		145.6		158.2
35				157.7

a. Assumes RHR cut-in 4 h after reactor shutdown.

b. These values represent Unit 1 and Unit 2.

c. Cold shutdown (T_{RCS} <140°F) after 18 h for two-train cooldown.

d. These Unit 1 specific values are retained for historical purpose. The Unit 2 values envelope and are applicable to Unit 1.

TABLE 9.2.7-1

SUMMARY OF PRIMARY MAKEUP WATER REQUIREMENTS

Connection to System	Required Flow[a]	Purpose
Spent resin storage tank (waste processing system)	20 gal/min	To flush waste from drumming line back into tank
Boric acid mixing tee[b]	130 gal/min	To dilute concentrated boric acid as required
Chemical mixing tank	1 gal/min	For chemical addition
Pressurizer relief tank	150 gal/min	For alternate cooling
Reactor coolant pump standpipes[c]	1 gal/min	To provide degassed purge water to No. 3 seal
Boric acid batching tank	80 gal/min	To use in production of boric acid solution
Boron thermal regeneration system	60 gal/min	For alternate bed regeneration
Recycle evaporator condensate demineralizer	55 gal/min	For water cleanup in RMWST
Catalytic recombiner package	1 gal/min	To force gases out of equipment prior to maintenance
Waste gas compressor package[c]	5 gal/min	For compressor seal usage
Gas decay tanks	30 gal/min	To displace gas in decay tanks prior to maintenance

a. Intermittent services.

b. Maximum letdown rate.

c. May require periodic makeup on demand.

TABLE 9.2.8-1

AUXILIARY COMPONENT COOLING WATER SYSTEM HEAT LOADS AND FLOWS

Component	No. of Units	Flow (gal/min) Each	Flow (gal/min) Total	Heat Load (10^6 Btu/h) Startup	Heat Load (10^6 Btu/h) Power Gen.	Heat Load (10^6 Btu/h) Cooldown	Heat Load (10^6 Btu/h) Refueling
Reactor coolant pump	4	514	2056	11.49	11.49	2.88	(c)
Excess letdown heat exchanger	1	260	260	5.2	(c)	(c)	(c)
Letdown heat exchanger	1	1003[(e)]	1003	15.9	6.53	4.8	0.93
Seal water heat exchanger	1	252	252	1.98	1.98	1.98	1.98
Normal charging pump motor cooler	2	10	20	0.10	0.10	0.10	0.10
Reactor coolant sample cooler	1	15	15	0.19	0.19	0.19	(c)
Pressurizer liquid sample cooler	1	15	15	0.21	0.21	0.21	(c)
Pressurizer steam sample cooler	1	15	15	0.26	0.26	0.26	(c)
ACCW pump motor cooler	2	30	60	0.21	0.21	0.21	0.21
Waste evaporator (abandoned in place)	1	1118	1118	(f)	(f)	(f)	(f)
Reactor coolant drain tank heat exchanger	1	226	226	0.64	2.23	(c)	(c)
Waste gas compressor package	2	50	100	0.14	0.14	0.14	(c)
Catalytic hydrogen recombiner	(a)	10	20	0.07	0.07	0.07	(c)
Pumping system loss	-	-	-	1.05	1.05	1.05	1.05
			4756	37.41	24.43	11.86	4.24

a. There is one catalytic hydrogen recombiner per unit, plus a common one served by either Unit 1 or Unit 2 ACCW systems.

b. With offsite power available and one reactor coolant pump in service.

c. Flow maintained without heat load.

d. Deleted.

e. The flow rate corresponds to the temperature control valve at full open.

f. Flow is bypassed around evaporator.

TABLE 9.2.8-2 (SHEET 1 OF 3)

AUXILIARY COMPONENT COOLING WATER SYSTEM
COMPONENT DATA

ACCW Pump (all data is per pump)

Quantity	2 (100 percent each)
Type	Horizontal centrifugal, split case dual volute with mechanical seals
Capacity (gal/min, each)	6000
Total differential head (ft)	275
NPSH required (ft)	20
NPSH available (minimum ft)	98
Material	
Case	Carbon steel
Impeller	Bronze or stainless steel
Shaft	Alloy steel
Design codes	ASME Section III, Class 3 (ANSI for installation)
Driver	
Type	Electric motor
hp	600
Revolutions/min	1761
Power supply	4000 V, 60 Hz, 3 phase, Class 1E
Design code	National Electrical Manufacturers' Association (NEMA)
Seismic design	Category 1

ACCW Heat Exchangers (all data is per exchanger)

Quantity	2 (100 percent each)
Type	Horizontal shell and straight tube
Design duty normal operation(Btu/h, each train in generation)	66.1×10^6
U-Factor (Btu/h-ft^2, °F)	
Clear	576
Dirty	252.6
Area (ft^2)	14,220
Tube side	
Fluid	NSCW
Number of passes	1
Temperature, in/out (°F)	88.5/102
Flowrate (gal/min)	9745
Design pressure (psig)	200

TABLE 9.2.8-2 (SHEET 2 OF 3)

Design temperature (°F)	200
Material	
Tubes	Copper-nickel 90/10
Tube sheet	Carbon steel
Codes and standards	ASME Section III, Class 3, Tubular Exchanger Manufacturers' Association (TEMA) R
Seismic design	Category 1
Shell side	
Fluid	ACCW
Number of passes	1
Temperature, in/out (°F)	126.5/102.1
Flowrate (gal/min)	5420
Design pressure (psig)	200
Design temperature (°F)	200
Material	Carbon steel
Codes and standards	ASME Section III, Class 3, TEMA R
Seismic design	Category 1

ACCW Surge Tank

Quantity	1
Type	Horizontal
Capacity (gal, each)	2200
Operating pressure/temperature (psig/°F)	atm/120
Design pressure/temperature (psig/°F)	14 and full vacuum/200
Material	Carbon steel
Code	ASME Section III, Class 3 (ANSI for installation)
Seismic design	Category 1

ACCW Chemical Addition Tank

Quantity	1
Type	Vertical
Capacity (gal)	10
Operating pressure/temperature (psig/°F)	90/ambient
Design pressure/temperature (psig/°F)	175/120
Material	Carbon steel
Code	ASME Section VIII

TABLE 9.2.8-2 (SHEET 3 OF 3)

Piping, Fittings, and Valves

Design pressure (psig)	170
Design temperature (°F)	105 at pump discharge, 130 at ACCW heat exchanger inlet
Material	Carbon steel
Design code	
Safety-related portion	ASME Section III, Class 3
Nonsafety-related portion	ANSI B31.1

TABLE 9.2.9-1

ESSENTIAL CHILLED WATER SYSTEM
DESIGN DATA

Water Chiller	
Quantity (trains A and B)	2
Cooling capacity (tons, each)	300
Compressor	
Type	Centrifugal
Motor drive (hp, each)	400
Evaporator	
Entering water temperature (°F)	56
Exiting water temperature (°F)	44
Waterflow (gal/min, each)	600
Condenser	
Entering water temperature (°F)	95
Exiting water temperature (°F)	104.4
Waterflow (gal/min, each)	1100
Chilled Water Pump	
Quantity (trains A and B)	2
Type	Horizontal, centrifugal
Flow capacity (gal/min, each)	600
Pump head (ft of water, each)	125
Motor drive (hp, each)	30

TABLE 9.2.9-2

NORMAL CHILLED WATER SYSTEM DESIGN DATA

Water Chiller[a]

Quantity (Units 1 and 2, one unit on standby)	3
Cooling capacity (tons, each)	1500
Compressor	
Type	Centrifugal
Motor drive (hp, each)	1550

Evaporator	Lead Chiller	Lag Chiller
Entering water temperature (°F)	56	50
Exiting water temperature (°F)	50	44
Waterflow (gal/min, each)	6050	6050
Condenser		
Entering water temperature (°F)	99	95
Exiting water temperature (°F)	104	99
Waterflow (gal/min, each)	10,000	10,000

Chilled Water Pump

Quantity (Units 1 and 2, one pump on standby)	3
Type	Horizontal, centrifugal
Flow capacity/pump (gal/min)	3027
Pump head (ft of water, each)	155
Motor drive (hp, each)	150

a. Two chillers operate in series for Units 1 and 2; one chiller is standby for Units 1 and 2.

TABLE 9.2.9-3 (SHEET 1 OF 2)

ESSENTIAL CHILLED WATER SYSTEM FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
1	No. 15 breaker on 1ABA 480-V 1E bus. Train A normally closed (NC)	Provide continuity and protection to motor starter, item 2	A	Inadvertent open; fail to close when required	MCC alarm	None; loss of train A; train B available
2	No. 15 motor starter for item 3, normally open (NO)	Provide continuity to chilled water (CW) pump motor	A	Fail to close or remain closed	Pump motor Indicating light	None; loss of train A (only if fails to close); train B available
3	1-1592-P7-001-M01, control building (CB) ESF CW pump and motor, normally deenergized (ND), train A	Provide motive power to circulate cooling water	A	Fail to start and operate	Flow alarm low-control room MCC alarm Flow indicator- control room Pump motor indicating light	None; loss of train A; train B available
5	No. 6 breaker on 1AA02 4.16-kV bus, train A	Provide continuity and protection to motor, item 6	A	Fail to close or remain closed	Switchgear alarm Breaker position indicating light Chiller panel indicating light	None; loss of train A (only if fails to close); train B available
6	1-1592-C7-001-000, CB ESF chiller, train A, ND	Provide chilled water for cooling	A	Fail to operate	Temperature alarm high-control room Chiller panel indicating light Temperature indicator-control room Switchgear alarm Flow indicating switch in control room	None; loss of train A; train B available

TABLE 9.2.9-3 (SHEET 2 OF 2)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
7	No. 15 breaker on 1BBA, 480-V 1E bus; train B NC	Provide continuity and protection to motor starter, item 2	A	Inadvertent open	MCC alarm	None; loss of train B; train A available
8	No. 15 motor starter for item 9; NO	Provide continuity to chilled water pump motor	A	Fail to close or remain closed	Pump motor indicating light	None; loss of train B (only if fails to close); train A available
9	1-1592-P7-002-M01; No. 15 motor starter; item 3; train B	Provide motive power to circulate cooling water	A	Fail to start and operate	Flow alarm low-control room MCC alarm Flow indicator- control room pump motor indicating light	None; loss of train B; train A available
11	No. 22 breaker on 1BA03; 4.16-kV bus, train B	Provide continuity and protection to ESF chiller, item 12	A	Fail to close or remain closed	Switchgear alarm Breaker position indicating light Chiller panel indicating light	None; loss of train B (only if fails to close); train A available
12	1-1592-C7-002-000, CB ESF chiller, train B, ND	Provide chilled water for cooling	A	Fail to operate	Temperature alarm high-control room Chiller panel indicating light Temperature indicator-control room Switchgear alarm Flow indicating switch in control room	None; loss of train B; train A available
13	Chilled water pump 1-1592-P7-001-000	Provide chilled water for cooling	A	Mechanical failure	Flow alarm low; flow indicating switch in control room Temperature alarm high	None; loss of train A; train B available
14	Chiller water pump 1-1592-P7-002-000	Provide chilled water for cooling	A	Mechanical failure	Flow alarm low; flow indicating switch in control room Temperature alarm high	None; loss of train B; train A available

a. A - Both trains start and operate on safety injection signal.

TABLE 9.2.10-1

TURBINE PLANT CLOSED COOLING WATER SYSTEM FLOW REQUIREMENTS
NORMAL POWER GENERATION OPERATION

Component	Flow Each (gal/min)	Total Flow (gal/min)	Duty Each ($x\ 10^6$ Btu/h)	Total Duty ($x\ 10^6$ Btu/h)
Rotary air compressor	68	136	0.55	1.10
Reciprocating air compressor	41	82	0.45	0.90
Condensate pump motor oil coolers[(a)]	27	54	0.14	0.28
Heater drain pumps	20	40	0.10	0.20
Turbine plant sampling system	200	400	0.6	1.20
Electrohydraulic control coolers	30	30	0.04	0.04
Air ejector gas radiation monitor air cooler	15	15	0.007	0.007
Steam generator primary-to-secondary noble gas leak detection air cooler (Unit 2 only)[(b)]	10	10	0.099	0.099
Steam generator feedwater pump turbine lube oil coolers	40	80	0.50	1.00
Auxiliary steam drain sample cooler	12	12	0.06	0.06
SJAE condenser sample	12	12	0.06	0.06
Dissolved oxygen analyzer	7	7	0.04	0.04
TOTAL				
Unit 1		868		4.88
Unit 2		878		4.98

a. Two in normal operation.
b. Unit 1 primary-to-secondary noble gas leak detection air cooler is cooled by the normal chilled water system.

TABLE 9.2.11-1

TURBINE PLANT COOLING WATER SYSTEM
FLOW REQUIREMENTS - NORMAL POWER GENERATION OPERATION

Component	Flow Each (gal/min)	Total Flow (gal/min)	Duty Each (x 10^6 Btu/h)	Total Duty (x 10^6 Btu/h)
Turbine plant closed loop cooling water heat exchangers (Unit 1 only)[C]	790 640[b]	790[b] 1,280[b]	4.88	4.88
Turbine plant closed loop cooling water heat exchangers (Unit 2 only)[C]	800 650[b]	800[b] 1,300[b]	4.98	4.98
Main turbine lube oil coolers	2,900	2,900	11.28	11.28
Normal central water chillers	10,000[a]	10,000[a]	44.19	44.19
Steam generator blowdown trim heat exchanger	540	540	5.40	5.40
Chemical and volume control system chillers	414	414	2.07	2.07
Generator hydrogen coolers	1,706	3,411	11.76	23.52
Isophase bus cooling unit	154	154	1.52	1.52
Vacuum pump seal water coolers	700	1,400	0.91	1.82
Generator stator coolers	1,000	2,000	8.70	17.40
		21,619 22,119[b]		112.08

a. Series flow rate requirement when both units are in operation.

b. The flow rate for one exchanger in service is 800 gal/min. The flow rate for parallel operation is 650 gal/min per heat exchanger.

c. Unit 1 primary-to-secondary noble gas leak detection air cooler is cooled by the normal chilled water system.

9.3 PROCESS AUXILIARIES

9.3.1 COMPRESSED AIR SYSTEM

9.3.1.1 Design Bases

9.3.1.1.1 Safety Design Basis

The VEGP is designed such that no plant equipment relies upon the compressed air system to perform its safety function; thus there is no safety design basis for the system. The service air system contains connections for allowing dilution of the post-loss-of-coolant accident containment environment. See subsection 6.2.5 for further discussion of this function.

9.3.1.1.2 Power Generation Design Basis

The compressed air system is designed to provide normally filtered and dried compressed air for service outlets located throughout the plant and a continuous supply of filtered, dried, and essentially oil-free air for pneumatic instruments.

A total of seven compressors are powered from a combination of seven switchgear, with four switchgear associated with Unit 1 and three switchgear associated with Unit 2.

An independent breathing air system, separate from the service/instrument air system, provides clean, oil-free, low pressure air to various locations in the containment building for breathing protection against airborne contamination while performing certain maintenance and cleaning operations.

9.3.1.2 System Description

9.3.1.2.1 General Description

Codes and standards applicable to the compressed air system are listed in table 3.2.2-1. The compressed air system for Units 1 and 2 includes a total of seven air compressors, four rotary compressors and three reciprocating compressors. Each rotary compressor train consists of an air intake filter, the compressor, an air/coolant receiver separator, an aftercooler, a moisture separator, a contaminant filter, and an air receiver. Each reciprocating compressor train consists of an air intake filter, the compressor, an aftercooler, a moisture separator, and an air receiver.

There are two rotary compressor trains and one reciprocating compressor train located in each plant unit. The outlets from the air receivers of these three trains are connected to a common line which is the compressed air supply line for that unit. The Unit 1 air compressors operate independently of the Unit 2 air compressors. The third reciprocating compressor train, which is

located in Unit 1, is piped so that it can be aligned to either the Unit 1 or Unit 2 compressed air supply line.

The compressed air supply line in each unit branches to supply both the service air system and the instrument air system for that unit. The service air system consists of a prefilter, a dryer, and an afterfilter, from which the air flows to the various service air loops. A bypass line around the dryer and filters allows for maintenance and also provides overflow protection during periods of high plant maintenance activity, such as refueling. The instrument air system consists of two dryers in parallel, each having a prefilter and afterfilter. The air from the system flows to the various instrument air loops in the plant unit.

The instrument air line to the containment is normally open; however, airflow to the containment shall be monitored with an excess flow element with associated alarm in the event of branch rupture inside containment.

The compressed air system is shown schematically in drawings 1X4DB175-1, 1X4DB175-2, 1X4DB175-3, 1X4DB175-4, 1X4DB185-6, 1X4DB186-1, 1X4DB186-4, 1X4DB186-5, 1X4DB186-6, 1X4DB186-7, 1X4DB186-8, 1X4DB186-9, AX4DB186-3, and 1X4DB188. Major system components are described in table 9.3.1-1. Safety-related air-operated valves that are supplied by the system are identified in table 9.3.1-2. As shown in the table, none of these devices require a source of air in order to perform their safety-related function.

The air breathing system is shown on drawing 1X4DB186-1. Containment breathing air is supplied by a portable rotary, dry-type compressor. A backup air supply is provided by a receiver tank located near the compressor or portable air bottles which will be located near the user stations when the system is in use.

9.3.1.2.2 Component Description

The rotary compressors are rated at 750 sf^3/min with a discharge pressure of 117 psig. The reciprocating compressors are rated at 885 sf^3/min with a discharge pressure of 125 psig. All of the compressors are driven by 200-hp motors.

The service air dryer is procured with a rated capacity of 1200 sf^3/min at -60°F dewpoint at 120 psig. The test acceptance criteria shall be -15°F dewpoint at line pressure, per Regulatory Guide 1.68.3 recommendations.

Each of the two instrument air dryers are procured with a rated capacity of 740 sf^3/min at 120 psig and -60°F dewpoint.

The test acceptance criteria shall be -15°F dewpoint at line pressure, per Regulatory Guide 1.68.3 recommendations.

The breathing air system is sized on the basis of 20-man usage at 15 sf^3/min each, a total of 300 sf^3/min. This system is normally supplied at a minimum of 80 psig at the user station. A receiver tank or portable bottle backup supply provides sufficient air to allow workers to leave the work area and remove the air-supplied suit or respirator. Carbon monoxide levels are continuously monitored and workers are removed from the work area, and air-supplied suits or respirators are removed in the event of a carbon monoxide monitor alarm.

9.3.1.2.3 System Operation

The compressors are operated by locally mounted controllers. Normally one or two compressors are in operation on each unit, with the remaining compressors aligned to

automatically start if a compressor fails or if demand exceeds the capacity of the operating compressors. Starting and stopping of the compressors is also possible from the main control room. Low air pressure is annunciated in the main control room.

The air from the compressors flows through aftercoolers and moisture separators to the receivers and into the supply line as required by usage in either the service air or instrument air subsystem. Air flows through the service air dryer to the various service air outlets throughout the plant. The instrument air subsystem, which supplies air to the pneumatic spring-loaded valves and pneumatically operated instruments, also takes its supply from this common supply line through the instrument air dryers and filters, which process the air to the required cleanliness and dewpoint. Instrument air then passes through a separate instrument air header for distribution to the instrument air piping system. Instrument air pressure is then reduced by pressure regulators as required, and its quality can be maintained by branch line filters, if required.

A pressure switch installed in the service air supply line provides the actuation signal for an isolation valve in the service air supply line and stops service air supply whenever service air pressure falls below approximately 80 psig. Manual control of the isolation valve is also possible. This arrangement provides for the conservation of compressed air in the event of excessive service air demand.

In the event of a loss of breathing air, sufficient breathing air is supplied to the worker through the use of a receiver tank or a portable bottle supply to enable the respirator wearer to escape the containment. Carbon monoxide levels are continuously monitored and workers are removed from the work area and air-supplied suits or respirators are removed in the event of a carbon monoxide monitor alarm.

9.3.1.3 Safety Evaluation

The compressed air system is required for normal operation and startup of the plant; however, pneumatically operated valves in the plant which are essential for safe shutdown and accident mitigation are designed to assume a fail-safe position upon loss of air pressure. Therefore, a supply of compressed air is not essential following a design basis event or for safe shutdown of the plant. The compressed air system is not designed to meet Seismic Category 1 requirements or the single failure criterion, except for the containment penetration piping and isolation valves.

The compressed air system is classified as a moderate-energy system since system operating pressure is less than 275 psig. There are no adverse environmental effects associated with a crack in the system piping. Therefore, a crack in the compressed air piping will not compromise the integrity of any safety-related component.

The breathing air system is not essential following a design basis accident or for safe shutdown of the plant.

9.3.1.4 Tests and Inspections

The compressors, aftercoolers, receivers, prefilters, desiccant chambers, afterfilters, and the control panel are inspected, or tested, prior to installation. The complete, installed compressed air system is inspected, tested, and then operated to verify its performance requirements, including operational sequences and alarm functions. The preoperational testing is described in chapter 14.

Air compressors and associated components on standby are checked and operated periodically. Air filters are inspected for cleanliness, and the desiccant is changed when it no longer performs according to the manufacturer's specifications.

During the initial plant testing prior to reactor startup, all engineered safety features systems utilizing compressed air will be tested to ensure fail-safe operation upon loss of compressed air or reduction of air pressure as described in Instrument Society of America (ISA)-S7.3. Section 1.9 summarizes conformance with Regulatory Guide 1.68.3.

The breathing air system is inspected, tested, and then operated to verify its performance requirements.

9.3.1.5 Instrumentation Applications

An instrumentation package accompanies each of the air compressors. Each package consists of locally mounted temperature and pressure switches, indicators, and automatic protection devices. The temperature and pressure switches support the automatic control modes of compressor operation. A manual mode of operation is also provided for each control system. Remote control and indication are provided in the control room. The compressed air system also includes additional local instrumentation and controls necessary to ensure the ability of the system to perform its design functions.

The breathing air system includes pressure and carbon monoxide instrumentation to ensure the ability of the system to perform its design functions.

9.3.2 PROCESS SAMPLING SYSTEMS

The process sampling systems consist of the following subsystems:

- The nuclear sampling system, which is further divided into the liquid sampling system (NSSL), and the gaseous sampling system (NSSG).
- The turbine plant water sampling system (TPSS) for secondary side sampling.
- Local grab sample provisions.
- Waste water retention basin effluent sampling system (WWRBESS).

These subsystems include equipment to collect representative samples of the various process fluids in a safe and convenient manner. The NSSL and NSSG are in the control building sample room. The TPSS is mostly in the turbine building. The WWRBESS is located in the yard area at the discharge lines from the waste water retention basin. These systems include sample lines, valves, coolers, and automatic analysis equipment. A description of the equipment comprising these systems and their features relating to safety is presented in this section.

Some sampling frequency and analyses requirements for these systems are listed in the Technical Specifications. Certain process sampling components are discussed in other sections. A safety-related containment hydrogen analyzer provided to monitor the containment atmosphere following a postulated loss-of-coolant accident (LOCA) is described in subsection 6.2.5. A discussion of process radiation monitoring is provided in section 11.5. A discussion of

gas analysis associated with the gaseous radwaste hydrogen recombiner is provided in section 11.3.

9.3.2.1 Design Bases

9.3.2.1.1 Safety Design Basis

The process sampling system serves no safety function and has no safety design basis, except for a containment isolation provision. The containment isolation valves in the system are selected, tested, and located in accordance with 10 CFR 50, Appendix A, General Design Criteria 54, 55, and 56, and 10 CFR 50, Appendix J, Type C Testing.

Each unit has its own NSSL, NSSG, TPSS, WWRBESS and local grab sample provisions.

9.3.2.1.2 Power Generation Design Basis

A. The NSSL and NSSG are designed to collect representative samples from the reactor coolant system (RCS) and auxiliary system process streams, as listed in tables 9.3.2-1, 9.3.2-2, and 9.3.2-6, excluding containment atmospheric gas, for analysis by the plant operating staff. Chemical and radiochemical analyses are performed by the plant operating staff to determine the following:

    1. Boron concentration.
    2. Fission and corrosion product activity levels.
    3. Dissolved gas concentration.
    4. Chloride and fluoride concentration.
    5. pH and conductivity levels.
    6. Fission gas content.
    7. Gas compositions in various vessels.

    The results are used to perform the following functions:

    1. Monitor core reactivity.
    2. Monitor fuel rod integrity.
    3. Evaluate ion exchanger and filter performance.
    4. Specify chemical additions to the various systems.
    5. Maintain acceptable hydrogen levels in the RCS.
    6. Detect radioactive material leakage.
    7. Post-accident confirmatory assessment.

B. The TPSS is designed to continuously monitor water samples from the turbine cycle and the circulating water system, as listed in table 9.3.2-3. Water quality analyses are performed on these samples to determine the following:

    1. pH and conductivity levels.

2. Dissolved oxygen.
3. Residual hydrazine.
4. Sodium.

The above measurements are used to control water chemistry and to permit appropriate corrective action by the laboratory staff. In addition, grab sample capabilities are provided at each of these monitoring points to monitor other chemical species.

C. Local grab sampling stations, as listed in table 9.3.2-4, are provided as needed for various process points.

D. The NSSL can be used to obtain post-accident samples of reactor coolant or containment sump liquid. Containment atmospheric gas samples can be obtained from a local grab sample point in the fuel handling building.

E. The WWRBESS is provided to continuously take effluent samples and flow data (total flow) from waste water retention basins. The collected flow data and composite samples are used to determine the total doses of released radioactive material from WWRB to unrestricted areas. With this sampling system, the WWRB effluents are monitored to assure that the concentrations of released radioactive material are within the limits specified in the Offsite Dose Calculation Manual.

F. The NSSL, NSSG, TPSS, and WWRBESS are designed and built to the codes listed in table 3.2.2-1.

9.3.2.2 System Description

9.3.2.2.1 Nuclear Sampling System - Liquids

The NSSL collects samples from the RCS and the auxiliary systems and transports them to a common location in a sample room in the control building. The NSSL consists of sample conditioning equipment and a sampling panel. To minimize the source volume exposed at the sampling panel, some sampling components that retain potentially radioactive fluids, such as sample coolers, isolation valves, and associated piping, are located in shielded compartments away from the sample panel. The rack is located behind a concrete wall which provides radiation shielding. The sampling panel also contains grab sampling facilities. The NSSL is shown in drawings 1X4DB140 and 2X4DB140. The sample coolers, which reduce the temperature of the samples to below 115°F (to permit the safe handling of samples), are cooled by the auxiliary component cooling water system (ACCW). The sample line instrumentation is designed for inlet stream conditions.

After temperature and pressure reduction, the NSSL samples are routed to the sample panel within an exhaust-ventilated, hooded enclosure to confine any leakage or spillage of radioactive fluids. Temperature and pressure indicators are provided to verify the sample conditions. Within the vented sampling hood are grab sample points for each stream and the sample pressure vessels. Any liquid leakage is collected in the sink and drained to the waste holdup tank for processing through the liquid radwaste system.

Most NSSL sample points are manually operated on an intermittent basis to provide samples for laboratory analysis. The exception to this manual method is the CVCS letdown sample lines

that may be collected manually or use in-line instrumentation for conductivity and hydrogen samples from the RCS stream. Sample lines are purged before each sample is drawn to ensure that representative samples are obtained. The purged liquid is returned to the low-pressure end of its own system.

The high-pressure RCS samples are collected at full process pressure and reduced temperature in one of two methods. A removable sample pressure vessel may be used. These sample vessels are designed for 3000 psig at 600°F and are equipped with quick-disconnect couplings to facilitate removal to the radiochemical laboratory for analysis.

A second method uses a multiport valve assembly connected to the nuclear sampling system panel via the same quick-disconnect couplings. Reactor coolant sample at full system pressure is captured in a sample loop. By operating the valve, the sample can be transferred to a container for laboratory analysis.

The RCS hot leg sample lines include a delay coil (tubing of sufficient length) to permit the decay of N-16 before the sample leaves the containment. The RCS, chemical and volume control system (CVCS), and accumulator samples require sufficient purge to ensure representative samples. System pressure provides the motive force for the purging flows. Purge time is determined for each sample by the flowrate and the individual sample line volume. Primary coolant purge flows are discharged to the CVCS mixed bed demineralizer or the volume control tank or sample sink drain. Other purge flows are returned to the recycle holdup tank, as shown in drawings 1X4DB140 and 2X4DB140. The sample sink drain, which may be contaminated with particulates or cleaning solutions, is routed to the auxiliary building chemical drain tank.

9.3.2.2.2 Nuclear Sampling System - Gaseous

The NSSG collects gaseous samples from auxiliary systems. The sample points are indicated in table 9.3.2-2, and a schematic drawing is provided in drawing 1X4DB141. The NSSG is located in the same control building complex as the NSSL. The gaseous sample vessels are positioned inside a filtered vent hood. Residual liquids collected in the sample sink are routed to the waste holdup tank. The lines are purged before sampling to ensure that samples are representative. The purged gas returns to the waste gas compressors as shown in drawing 1X4DB141.

9.3.2.2.3 Turbine Plant Sampling System

The purpose of the TPSS is to provide the data necessary to implement procedures for controlling the water quality of the secondary plant systems listed in table 9.3.2-3. The TPSS, most of which is located in the turbine building (the steam generator blowdown local conductivity sample panel is in the auxiliary building), is shown in drawings 1X4DB171-1, 1X4DB171-2, 1X4DB171-3, 1X4DB171-4, 1X4DB171-5, 1X4DB171-6, 1X4DB171-7, 1X4DB171-8, and 1X4DB171-9.

The steam generator blowdown lines are continuously monitored for radioactivity by one process radiation monitor on the common blowdown header. Blowdown is automatically terminated when radioactivity in the blowdown stream approaches the radiation monitor setpoint. Continuous monitoring of the water quality of the steam generator blowdown is provided by the TPSS. All steam generator blowdown lines and steam generator blowdown sample lines are automatically isolated from the containment on any signal which automatically starts the auxiliary feedwater pumps. However, the steam generator sample isolation valves

may be opened 30 seconds after closure due to an auxiliary feedwater auto-start signal to allow operators to obtain a sample.

The TPSS samples are given in table 9.3.2-3. Roughing coolers are provided for the samples whose temperatures exceed 125°F. All samples are conditioned to approximately 77°F by a chilled water, constant temperature bath and to approximately 40 psig by pressure regulators.

Sample points may be used to continuously monitor representative samples. The sample line and sample sink drains in the TPSS are collected in the secondary liquid waste system where they go to the turbine building floor sump. Each sample line has a grab sampling capability for laboratory analysis.

Feedwater to the steam generator is sampled through the feedwater dissolved oxygen sample panel. The sample panel cools and reduces the sample steam pressure to facilitate measurement by the oxygen sensor. The sample temperature is conditioned by the turbine plant closed cooling water system (subsection 9.2.10). An analyzer in the dissolved oxygen analyzer panel measures the dissolved oxygen and outputs the value locally and to a recorder located in the chemistry secondary lab. The sample and analyzer panels are located in the turbine building near the feedwater line to limit feedwater sample transit time from the main feedwater line to the oxygen sensor.

9.3.2.2.4 Manual Grab Sample Stations

Manual grab sample stations are provided for the liquid and gaseous sample points which require sampling at a frequency of less than once a week or on a nonscheduled basis. All gas sampling stations are of the inline type which returns purge gases to the process lines. Quick-disconnect type couplings are used for sample bottle connections to provide a convenient and expeditious way of sampling for the nuclear sampling system.

Grab sample points for secondary system liquids and gases are identified in table 9.3.2-4. No sample point is provided on the chemical mixing tank of the CVCS since chemical additives are preanalyzed before they are added to the mixing tank. The grab sample points are indicated on the appropriate system diagrams.

Additional local sampling points and sampling vessels are provided to collect samples of fluids and gases from the radwaste systems for laboratory analysis by the operating staff. The characteristics of these sampling points are listed in table 9.3.2-5. The individual sampling points are also shown on the appropriate system diagrams.

9.3.2.2.5 Post-Accident Confirmatory Sampling

VEGP was originally constructed and licensed with a post-accident sampling system (PASS) that met the requirements of NUREG-0737, Task II.B.3 and Regulatory Guide 1.97. However, with the approval of Amendments 123 and 101 to the VEGP operating licenses, the NRC eliminated the requirements for a PASS at VEGP. In their safety evaluation report supporting the amendments, the NRC staff determined that the PASS is not required to support emergency response decision making during the initial phases of an accident because the information provided by the PASS is either unnecessary or is effectively provided by other indications of process parameters or measurement of radiation levels. The NRC staff does, however, believe that there could be significant benefits to having information about the radionuclides existing post-accident in order to address public concerns and plan for long-term recovery operations. To this end, VEGP has the capability to obtain and analyze highly radioactive samples of the

reactor coolant, containment sump, and containment atmosphere. VEGP can utilize the NSSL to obtain grab samples from the reactor coolant and containment sump. Grab samples of the containment atmosphere can be obtained using a special sample point in the fuel handling building. The sample point is listed in table 9.3.2-6.

The post-accident confirmatory sampling is shown in drawing 1X4DB110. Sample points are listed in table 9.3.2-6.

The post-accident confirmatory sampling does not perform any direct safety function; however, when post-accident confirmatory sampling is not required, containment isolation integrity is maintained by inner and outer containment isolation valves. The capability to obtain grab samples during normal operation and post-accident operation (including operation after seismic events) is maintained, since essential portions of the post-accident confirmatory sampling are designed to Seismic Category I requirements. A list of qualified post-accident confirmatory sampling valves is provided in table 9.3.2-7. Filtered venting of any releases from the post-accident confirmatory sampling is provided by the fuel handling building ventilation system.

9.3.2.2.6 Waste Water Retention Basin Effluent Sampling System

The WWRBESS is designed with automatic sampling capabilities for taking composite effluent samples and flow data from waste water retention basins. The sampling scheme allows for continuous measurement of total effluent flow and a sample in proportion to either time or flow is collected and analyzed for calculating low level cumulative offsite doses. The sampling system is located at the discharge line from the waste water retention basin of each unit. The sampling system primarily consists of a composite waste water sampler, which can be programmed to collect effluent samples periodically, and a flow transmitter with flow totalizing devices, which is used to record effluent flow history. In the event of a failure of the automatic sampling equipment, WWRB effluent releases can be performed at batches. Continuous releases may continue provided grab sampling is performed such that samples are obtained in proportion to effluent time or flow. Either automatic sampling or grab sampling will ensure the WWRB effluent is sampled and analyzed in accordance with the sampling and analysis program specified in plant Technical Specifications.

9.3.2.3 Safety Evaluation

Except for the associated containment penetrations, the process sampling system does not have a safety function.

Subsections 6.2.4 and 6.2.6 provide the safety evaluation for the containment isolation system. All process sampling system lines penetrating the containment can be isolated at the containment boundary by valves that close either upon receipt of a containment isolation signal or by manual actuation. (See subsection 6.2.4 for a detailed discussion of containment isolation.)

9.3.2.4 Tests and Inspections

Proper operation of the process sampling system subsystems is initially demonstrated during preoperational testing.

The proper operation and availability of the NSSL and NSSG are proven in service by their use during normal plant operation. Samples from the NSSL and NSSG are drawn manually for

laboratory analysis. The results of this analysis are checked by calibrating the laboratory instruments against known compositions or check sources.

The TPSS draws continuous samples from the turbine cycle and the circulating water system for automatic or manual water quality analysis. The operation of the TPSS is verified by observing that continuous sample flow is maintained through the analyzers. The calibration of the analyzers is checked periodically by comparing it with laboratory analysis of a grab sample from the same process flow. The output of the continuous analyzers is recorded, and abnormal values are alarmed.

9.3.2.5 Instrumentation Applications

The process sampling systems use local pressure, temperature, and flow indicators to facilitate manual operation and to verify sample conditions before samples are drawn.

A radiation detector continuously monitors the steam generator blowdown system for primary-to-secondary tube leaks. In the event the steam generator blowdown system exhibits high radioactivity approaching the limits given in section 11.5, the blowdown flow path is automatically closed.

The TPSS is equipped with continuous analyzers to monitor specific water quality conditions. Certain measurements are used to automatically control pH and corrosion by chemical addition. Indicators and manual controls are provided on the sampling panel to maintain the proper sample conditions of the water entering the analyzers. Grab sample points are also provided for laboratory analysis verification of analyzer calibration.

9.3.3 EQUIPMENT AND FLOOR DRAINAGE SYSTEMS

The equipment and floor drainage systems collect effluent from equipment and floors, separate the effluents according to their activities, and transfer them to the proper area for processing or disposal. The systems consist of collection piping, equipment drains, floor drains, vents, traps, cleanouts, oil separators, sampling connections, and collection sumps.

9.3.3.1 Design Bases

9.3.3.1.1 Safety Design Bases

A. The drainage systems are designed so that they do not compromise the negative pressure boundary. The areas that are maintained under a negative pressure are discussed in section 9.4.

B. The drain systems from engineered safety features (ESF) equipment rooms are designed to prevent flooding of ESF equipment via backflow through drainage piping.

C. The control building drain system, the fuel handling building and electrical chase tunnel drain system, the auxiliary building flood retaining room drain system, the auxiliary building and miscellaneous drain system (except for the nuclear service cooling water (NSCW) chemical control building drain piping, the reactor makeup water storage tank area drain piping, transfer building drain piping, alternate

radwaste building drain piping, condensate storage tank valve room drain piping, and condensate storage tank trench drain piping up to the auxiliary feedwater pumphouse), and the containment and auxiliary building drain system (except for the drain piping inside the containment building) are designed to Seismic Category 1 requirements.

The isolation valves that isolate ESF equipment rooms and negative pressure areas are procured as Nuclear Safety Class 3 but installed as Nuclear Safety Class 4. Credit is taken for these valves being closed in the offsite analysis in table 15.6.5-6 and protection is provided by these valves from postulated post-LOCA recirculation piping leakage as discussed in paragraph 6.5.1.1.B.

D. The design allows for detection of leakage from ESF systems.

9.3.3.1.2 Power Generation Design Bases

A. The design and arrangement of the nonradioactive drainage systems allow diversion of potentially radioactive contaminated materials to the liquid waste processing system.

B. The liquid radwaste collection system collects potentially radioactive liquid wastes, at atmospheric pressure, from equipment and floor drainage of the containment, control building, auxiliary building, fuel handling building, radwaste processing facility, and alternate radwaste building. All such drainage is conveyed by gravity to sumps or tanks within the respective buildings and pumped from there to the waste receiver tanks. Chemical wastes collected from laboratory equipment decontamination areas and radiochemistry laboratory sinks drain to the chemical drain tank. Potentially radioactive wastes from the laundry, from the automatic utensil washer in the radiochemistry laboratory, and from personnel decontamination shower facilities are collected in the laundry and hot shower tank.

C. The turbine building drain system collects the normally nonradioactive floor drains, equipment drains, sampling wastes, and other miscellaneous drains. The fluid from such drains is usually sent to the oil separator prior to discharge to the environment. If the fluid becomes radioactive, it is treated before disposal as discussed in paragraph 9.3.3.2.3.9.C. Some drain lines, containing oily waste, are routed to individual collection vessels for separate offsite disposal.

D. Systems which are not potentially radioactive are provided for the collection and disposal of storm drainage, oily waste, chemical waste, and clear water waste.

E. Sump pumps are designed to discharge at a flowrate adequate for preventing sump overflow during normally anticipated drainage periods. Generally, sump capacities provide a live storage capacity consistent with an operating period of not less than 5 min with one pump operating.

F. Floor drains are collected in a closed floor drain tank provided with a vent connection to the exhaust system.

G. Nonsafety-related outside area drains are Seismic Category 2, unless otherwise noted (drawing 1X4DB146-3).

9.3.3.1.3 Codes and Standards

Codes and standards applicable to the equipment and floor drainage systems are listed in table 3.2.2-1.

9.3.3.2 <u>System Description</u>

The equipment and floor drainage systems are shown in drawings 1X4DB142-1, 1X4DB142-2, 1X4DB143, 1X4DB144-1, 1X4DB144-2, 1X4DB145-1, 1X4DB145-2, 1X4DB145-3, 1X4DB145-4, 1X4DB145-5, 1X4DB145-6, 1X4DB145-7, 1X4DB146-1, 1X4DB146-2, 1X4DB146-3, AX4DB105-4, 1X4DB147-1, 1X4DB147-2, 1X4DB180-1, 1X4DB180-2, 1X4DB180-3, 1X4DB180-4, and 1X4DB183). Component data are provided in table 9.3.3-1.

9.3.3.2.1 General Description

The equipment and floor drainage systems consist of collection piping, valves, equipment drains, floor drains, vents, seals, cleanouts, oil and sediment interceptors, acid neutralization tanks, collection sumps, sump pumps, and collection tanks with associated discharge pumps, piping, and valves.

9.3.3.2.2 Component Description

9.3.3.2.2.1 <u>Collection Piping</u>. In all potentially radioactive areas, the collection system piping for the liquid system is stainless steel. Potentially radioactive laboratory and decontamination waste, regeneration waste, and detergent waste collection system piping is stainless steel. Offsets in the piping are provided where necessary for radiation shielding.

9.3.3.2.2.2 <u>Collection Sumps (Potentially Radioactive Drains)</u>. These sumps are provided with a well-fitted, nongastight, removable plate access cover for convenient maintenance access. Each sump is fitted with a vent connection to exhaust potential sump gases into the room. A capability is provided for connection of the vent pipe to a ducted exhaust system, should it become necessary sometime in the future due to high radiation level from the sump gases. Oil interceptors are provided downstream of the turbine building sump.

9.3.3.2.2.3 <u>Auxiliary Building Drains</u>. The auxiliary building drains are run so that leakage external to the ESF equipment rooms does not flow into the rooms. Each ESF equipment room on the lowest floor level is provided with a floor drain box, which is drained by a separate gravity flow drainage line to a common sump. The drainage piping from each ESF room drain box is equipped with a locked closed, manually operated valve, which is located outside the equipment room. Components and floor drains not associated with the ESF systems drain into a sump, which is fitted with duplex sump pumps, or into a tank through a common gravity drain header.

9.3.3.2.2.4 <u>Equipment Drains</u>. Equipment which may be pressurized during drainage, and which drains via direct or indirect drain connection to the floor drain system, is designed so that the equipment discharge flow will not exceed the gravity flow capacity of the drainage header at atmospheric pressure. Equipment drain lines in ESF equipment rooms have normally closed manual valves similar to the room floor drain. (Note that valves 1-1205-U4-272 and 1-

1205-U4-273 on the train A and train B RHR pump drain lines will remain in the locked open position for all modes of operation.)

9.3.3.2.2.5 Floor Drains. All floor drains are installed with rims which are flush with the low-point elevation of the finished floor. Floor drains in areas of potential radioactivity are welded directly to the collection piping.

9.3.3.2.2.6 Traps. Inlets to sanitary drainage systems are provided with a water seal in the form of a vented P-trap to minimize entry into the building of vermin, foul odors, and toxic, corrosive, or flammable vapors. Air pressure vent lines to the outside atmosphere are provided downstream of the P-traps to prevent excessive backpressures which could cause blowout or siphonage of the water seal. Traps are not installed at inlets in areas of potential radioactivity to preclude either a potential for an accumulation of radioactivity in the trap or difficult maintenance of seal water level.

9.3.3.2.2.7 Cleanouts. In all collection system piping from areas of potential radioactivity, floor drain boxes serve as cleanouts. Additional cleanouts are welded directly to the piping and located accessibly.

9.3.3.2.2.8 Collection Sumps. Portions of some systems, which are too low in elevation to drain by gravity to the designated collection point, drain to a collection sump from which the waste is pumped to an elevation sufficient to enter the gravity drainage portion of that system from above.

9.3.3.2.2.9 Turbine Building Drains. The wastes generated in the turbine building, including drains, leakages, and sampling wastes, are generally collected in the sumps in the turbine building. Some drain lines, containing oily waste, are routed to individual collection vessels for separate offsite disposal.

The sump discharge, combining with other miscellaneous drains from other buildings, is normally sampled by a radiation monitor before entering into an oil separator prior to discharge. If the radioactivity level of this combined waste stream exceeds the setpoint of the radiation monitor, the waste stream is then sent to the turbine building drain tank for holdup before pumping to the auxiliary building for oil and radioactive material removal.

9.3.3.2.3 System Operation

The various subsystems drain directly to the appropriate collection point by gravity. Sump pumps have both automatic and manual operating capabilities. Sump pumps are started in automatic when a predetermined high level in the sump is reached. The subsystems and their operation are described in subsequent paragraphs according to their classification as nonradioactive or potentially radioactive.

Some sumps are provided with duplex pumps while others are provided with simplex pumps. A portable pump is used to pump waste water from the radwaste processing facility and the alternate radwaste building sumps to the auxiliary building. Portable pumps are also used to pump accumulated rainwater from the containment building tendon gallery sumps to the storm drainage system.

The duplex sump pumps are controlled by a main level control and a backup level control per sump. When the sump level rises to a preset level, the pump is started by the displacement action of the level switch. In all but the turbine building sumps, if the level continues to rise, a second level switch starts the second pump and provides a high high level alarm. Sumps that are equipped with only one sump pump are also provided with two level control switches, one controls the operation of the sump pump, the other provides a high-high level alarm. The radwaste processing facility has a high level alarm in lieu of a high-high level alarm. The tendon gallery sump pumps are equipped with a single level switch to control pump operation; a high-high level alarm is not provided.

Failure of one pump to start will not prevent the second pump from starting. If the level continues to rise, a separate high-high level switch is incorporated in the design to activate an annunciator in the control room advising the operators that a flooding condition is imminent. After the pumps lower the level to a point just above the pump suction, a third displacer on the control level switch stops both pumps.

9.3.3.2.3.1 Potentially Radioactive Drainage. Fluids conveyed by potentially radioactive drainage systems flow by gravity to sumps in the respective buildings and are then pumped to the waste holdup tanks drawings 1X4DB143, 1X4DB144-1, and 1X4DB144-2).

9.3.3.2.3.2 Storm Drainage. The storm drainage system collects water resulting from precipitation on all building roofs and areaways and paved and unpaved surfaces outside the buildings and conveys it to a natural body of water.

9.3.3.2.3.3 Oily Waste. The oily waste system collects liquid waste which enters floor drains located in areas which are normally not sources of potentially radioactive waste, and where possibility for oil spillage exists, and conveys it to an oil interceptor. The clarified effluent from the interceptor is conveyed to a waste water retention basin before being discharged (drawings 1X4DB180-1, 1X4DB180-2, 1X4DB180-3, and 1X4DB180-4).

9.3.3.2.3.4 Acid Waste. The acid wastes, which are liquid wastes containing chemicals and corrosive substances discharged by fixtures or equipment, enter floor drains located in areas which are not sources of potentially radioactive waste and are conveyed to an acid neutralizing sump. The effluent from the acid neutralizing sump is conveyed to the floor drainage system (drawings 1X4DB142-1, 1X4DB142-2, 1X4DB145-1, 1X4DB145-2, 1X4DB145-3, 1X4DB145-4, 1X4DB145-5, 1X4DB145-6, 1X4DB145-7, 1X4DB146-1, 1X4DB146-2, 1X4DB146-3, and AX4DB105-4).

9.3.3.2.3.5 Liner Plate Leakage Detection.

A. Fuel Transfer Canal

   A 3/4-in. valved line connected behind the fuel transfer canal liner plate discharges to a leak detection pit located in the fuel handling building. The leak detection pit drains to the fuel handling building drain sump.

B. Spent Fuel Pool

   Two 3/4-in. valved lines connected behind the spent fuel pool liner plate also discharge to the leak detection pit in the fuel handling building. A dripping 3/4-in. line indicates the existence of a leak.

C. Fuel Cask Loading Pit

A 3/4-in. line connected behind the fuel cask loading pit liner plate drains directly to the fuel handling building drain sump. Dripping from the drain line indicates a leak.

9.3.3.2.3.6 Refueling Cavity. A drain line from the bottom of the refueling cavity to the waste processing system reactor coolant drain tank pump is used to remove water in the refueling cavity after each refueling (drawings 1X4DB124, 1X4DB125, 1X4DB126, 1X4DB127, and 1X4DB130.

9.3.3.2.3.7 Reactor Cavity. Water collected in the reactor cavity is discharged to the waste processing system via the reactor cavity sump pumps. Leakage which may occur from the refueling cavity collects in the reactor cavity during the refueling operation.

9.3.3.2.3.8 Collection Sumps. Portions of some systems, which are at too low an elevation to drain by gravity to the designated collection point, drain to a collection sump from which the waste is pumped to an elevation sufficient to enter the gravity drainage portion of that system from above. A minimum size sump of 2.0 ft by 4.5 ft by 4.0 ft deep is used (with the exception of the containment building tendon gallery sumps, which are 2.0 ft by 2.0 ft by 1.5 ft deep). The 4.0-by-6.5-ft surface area is the minimum required sump area for installation of two pumps, two stilling wells, and discharge piping on the sump cover plate. The depth is compatible with standard sump pump column lengths. Where greater sump depth is required, sump depth is rounded up to the nearest foot. The various sump parameters are tabulated in table 9.3.3-2.

9.3.3.2.3.9 Normally Nonradioactive Drain Collection Points.

A. Auxiliary Building Sump and Penetration Room Sump

These sumps are located in the auxiliary building and collect all nonradioactive equipment and floor drainage from the area. The sump pumps normally discharge to the floor drain tank. Penetration room sump pumps may be routed to the waste holdup tank, if necessary. Both sump pumps may be aligned to the train B vertical pipe chase if additional storage is needed (drawings 1X4DB145-1, 1X4DB145-2, 1X4DB145-3, 1X4DB145-4, 1X4DB145-5, 1X4DB145-6, 1X4DB145-7, 1X4DB146-1, 1X4DB146-2, 1X4DB146-3, and AX4DB105-4).

B. Diesel Generator Building Sumps

An independent train-related sump is located inside the diesel generator building for each diesel generator. It collects normal equipment and floor drainage from this area. Each sump has a single pump that pumps discharge to the turbine building oil separator.

C. North and South Turbine Plant Area Sumps

These sumps collect all normal equipment and floor drainage from the turbine plant area. These sumps normally discharge to an oily waste separator; however, if it should become contaminated, the discharge is automatically diverted to the turbine building drain tank. From the tank, the waste water is pumped to an oil separator, an activated charcoal filter, and the demineralizers for oil and radioactive material removal prior to discharge to the waste water

retention basins (drawings 1X4DB180-1, 1X4DB180-2, 1X4DB180-3, and 1X4DB180-4).

D. Maintenance Building Sump

This sump collects drainage from the maintenance building including machine shop drains. This sump has two sump pumps which discharge to the turbine building oil separator.

E. North Firewater Pumphouse Oily Waste Separator Sump

The oily waste separator sump collects drainage from the north firewater pumphouse floor drains. The oily waste separator sump has two pumps that pump discharge to the waste water retention basin (drawings AX4DB152-2 and AX4DB152-3).

F. Storm Drainage

The storm drainage system collects water resulting from precipitation on all building roofs and areaways, paved and unpaved surfaces, and irrigation runoffs outside the buildings and conveys it eventually to the Savannah River (paragraph 2.4.3.2).

G. Clean Water Sump

Located in the auxiliary building, the clean water sump principally collects drains from the tube side of component cooling water (CCW) and auxiliary component cooling water (ACCW) heat exchangers, auxiliary building normal A/C unit condensates. Duplex pumps discharge to the turbine building drain system, the floor drain tank, and RD-101.

H. Sumps in Electrical Tunnels

Two sumps are provided in the electrical tunnels between the control building and the diesel generator building. Each sump has a single pump that discharges to the storm drains.

I. Main Steam Feedwater Tunnel Sump

This sump has two pumps that discharge into the storm drains.

J. Control Building Sumps

Both sumps collect normally nonradioactive drainage in the control building. The control building sumps have crosstie capability and can discharge to either the Unit 1 or Unit 2 turbine building oil separators Both control building sumps can be routed to their respective unit's waste monitor tanks if necessary. The discharge to the turbine building oil separator via the turbine building drain system is monitored for radiation. A high radiation alarm will shut off the flow (drawings 1X4DB142-1, 1X4DB180-1, 1X4DB180-2, 1X4DB180-3, and 1X4DB180-4).

K. NSCW Pumphouse Sumps

One sump is provided for each train of the NSCW system. Each sump has a single pump that discharges to the NSCW tower basin (drawing 1X4DB146-2).

L. Auxiliary Feedwater System Sump

Two joint sumps are provided. One collects drainage from the auxiliary feedwater pumphouse, and the other collects drainage from the condensate storage facility. Each sump has a single pump that normally discharges through a

common header to the turbine building drain system but may be routed to the storm drain catch basin.

M. Transformer Area Sumps

Normal rainfall onto the switchyard runs off to the yard drain ditch surrounding the area. Each transformer is independently diked, and the diked areas drain to a sump. The sumps are sized to contain one main transformer oil volume in addition to 30 min of fire protection deluge, including outside fire protection hose streams.

In the event of an oil spill, the contents of the sump will be pumped out and disposed by a suitable means such as tank trucks. Normal rainfall collected in the sump containing no oil is typically automatically pumped to the waste water retention basin during normal operation.

N. Lube Oil and Fuel Oil Storage Area Sump

A diked area is provided for the clean lube oil tank, the dirty lube oil tank, and the fuel oil storage tank. The truck station is curbed and surfaced; discharge from this area is drained to the dike for the oil storage area. The dike design provides capacity for single complete drainage from the largest tank plus the rainwater associated with a 100-year rainfall (11 in. in 24 h). The diked areas drain to a sump with a single pump. Discharge from this area is routed to the turbine building drain system oily waste separator.

O. Water Treatment Building Sump

This sump collects drainage from the water treatment building drains. The sump has two sump pumps which discharge to the waste water retention basin.

P. Electric Steam Boiler Building Sump

This is another normally nonradioactive drain collection point.

Q. Alternate Radwaste Building Floor Sump

This sump is located in the alternate radwaste building and collects floor drainage from the alternate radwaste building. A portable pump is utilized to pump out the sump contents. Piping is provided so that the sump discharge may be directed to the auxiliary building floor drain tank, or if contaminated, to the auxiliary building waste holdup tank.

R. Containment Building Tendon Gallery Sumps

Two sumps are provided in the containment building tendon gallery to collect accumulated rainwater. Each sump is provided with a portable pump which discharges to the storm drain system.

S. Radwaste Processing Facility Sump

This sump is located in the radwaste processing facility. The sump collects floor drainage from the radwaste processing facility and uses a portable pump to pump out the sump contents. Piping is provided so that the sump discharge may be directed to the auxiliary building floor drain tank or, if contaminated, to the auxiliary building waste holdup tank. The demineralizer and the high integrity container (HIC) storage vaults gravity drain into the sump.

9.3.3.2.3.10 Potentially Radioactive Drain Collection Points.

A. CCW Drain Tank

This 15,000-gal tank is located in the auxiliary building. It collects the normal and potentially radioactive drainage from the equipment and floor drains associated with the CCW and ACCW systems. A single pump discharges to the CCW and ACCW surge tanks. If the CCW becomes radioactively contaminated, it will be treated prior to offsite disposal. A flange connection is provided for this purpose.

B. Containment Sumps and Reactor Cavity Sump

These sumps are located inside the containment and collect normal and potentially radioactive equipment and floor drainage from inside the containment. The pumps normally discharge to the floor drain tank. The discharge line is equipped with pneumatically operated containment isolation valves inside and outside containment. Both valves fail closed. Containment isolation valves, control switches, and status lights to indicate valve position are installed in the main control room. Pump control is from control switches also located in the main control room.

C. Radioactive Drain Sump

This sump is located in the auxiliary building and collects normal and potentially radioactive equipment and floor drainage. The pumps normally discharge to the waste holdup tank. Pump control switches are located in the main control room.

D. Storage Tank Area Sump

The reactor makeup water storage tank, the refueling water storage tank, and the condensate storage tank are each surrounded by a separate trench. The contents of the reactor makeup water storage tank trench and refueling water storage tank trench are normally discharged to the storm drain system; but if the contents become contaminated, the discharge is routed to the spent fuel pool purification system. The contents of the condensate storage tank trench are discharged to the auxiliary feedwater sump.

E. Fuel Handling Building Sump

This sump collects normal and potentially radioactive drainage from equipment and floor drains in the fuel handling building. The sump pumps discharge to the waste monitor tank (drawing 1X4DB183).

9.3.3.3 <u>Safety Evaluation</u>

A. The drainage systems are designed so that they do not compromise the integrity of the negative pressure boundary. Drainage lines from negative pressure boundary areas that terminate outside the negative pressure boundary are provided with a locked closed valve, plugged drain, or water seal to maintain the integrity of the negative pressure boundary during modes 1 through 4. Refer to section 9.4 for a discussion of the areas that are maintained under a negative pressure.

B. ESF equipment rooms which are subject to potential flooding by backflow through the drainage piping are protected by means of a check valve or a locked closed, manually operated valve in the drainline serving that ESF equipment

room during modes 1 through 4. The valve is physically located outside of the area it serves.

Drain isolation valves for the ESF equipment rooms and negative pressure boundary areas except for CVCS charging pump and RHR equipment rooms may be left open during modes 5 and 6.

1. For RHR equipment rooms, the drain isolation valves of one train may remain open during modes 5 and 6 if that train is out of service and the drain valves of the other train remain locked closed to ensure a potential flood in one train room would not affect the other train. (Note that valves 1-1205-U4-272 and 1-1205-U4-273 on the train A and train B RHR pump drain lines will remain in the locked open position for all modes of operation.)
2. For CVCS centrifugal charging pump rooms, the equipment drain isolation valves may be opened, if required, up to two turns and locked in position in any mode. For CVCS centrifugal charging pump rooms during modes 5 and 6, the equipment drain isolation valves of one train may remain open if that train is out of service and the equipment drain isolation valves of the other train remain locked in the partially open or closed position. For these rooms during modes 5 and 6, the floor drain isolation valves of one train may remain open if that train is out of service and the floor drain isolation valves of the other train remain locked closed. This will ensure a potential flood in one train room would not affect the other train.
3. For CVCS normal charging pump rooms, the equipment drain isolation valves may be opened, if required, up to three turns and locked in position in any mode. For the CVCS normal charging pump room during modes 5 and 6, the equipment drain isolation valve(s) may remain open if the normal charging pump is out of service and the equipment drain isolation valves of the inservice CVCS centrifugal charging pump train(s) remain locked in the partially open or closed position. For these rooms during modes 5 and 6, the floor drain isolation valves may remain open if the normal charging pump is out of service and the floor drain isolation valves of the inservice CVCS centrifugal charging pump train(s) remain locked closed. This will ensure a potential flood in the normal charging pump room would not affect the inservice CVCS centrifugal charging pump train(s).

C. Drain piping is designed to Seismic Categories as noted in paragraphs 9.3.3.1.1.C and 9.3.3.1.2.G. The safety class of the drain piping and valves is shown in drawings 1X4DB142-1, 1X4DB142-2, 1X4DB143, 1X4DB144-1, 1X4DB144-2, 1X4DB145-1, 1X4DB145-2, 1X4DB145-3, 1X4DB145-4, 1X4DB145-5, 1X4DB145-6, 1X4DB145-7, 1X4DB146-1, 1X4DB146-2, 1X4DB146-3, AX4DB105-4, 1X4DB147-1, 1X4DB147-2, 1X4DB180-1, 1X4DB180-2, 1X4DB180-3, 1X4DB180-4, and 1X4DB183.

D. Rooms housing ESF equipment where flooding potential exists are analyzed for flood retaining capability, and watertight doors are provided when needed to prevent the spread of flooding damage and the spread of post-LOCA recirculation fluid. These rooms have a wall-mounted level switch, as required, to warn of a flooded condition and a leak-detecting floor drain box with indication

in the main control room for purposes of leak detection. A common alarm in the control room provides audible indication of a leak.

The leakage detection system conforms to the requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 279. The failure modes and effects analysis is presented in table 9.3.3-3.

9.3.3.4 Tests and Inspections

A. Testing During Construction

Equipment and floor drain lines in the auxiliary, control, fuel handling, and alternate radwaste buildings, and radwaste processing facility are hydrostatically tested with the static leak test method by filling the lines with water under atmospheric pressure. Pump suction and discharge piping are hydrostatically tested at 1-1/2 times the design pressure. Where these tests are not practical, the exposed welds that are not hydrostatically tested are nondestructively examined.

B. Operational Testing Capability

The operability of equipment and floor drainage systems dependent on gravity flow can be checked by normal usage. Portions of these systems dependent upon pumps to raise liquid waste to gravity drains may be checked through instrumentation and alarm registry in the control room.

9.3.3.5 Instrumentation Applications

As described in the safety evaluation, a high-level indication light is provided in the control room with a common high-level alarm for each ESF equipment room. Level indication, in addition to the level-operated switch used for pump control, is provided for sumps in the containment to provide backup indication of the presence of large leaks and to provide information as to the source.

9.3.4 CHEMICAL AND VOLUME CONTROL SYSTEM (INCLUDING BORON RECYCLE SYSTEM)

9.3.4.1 Chemical and Volume Control System

The chemical and volume control system (CVCS) (drawings 1X4DB114, 1X4DB115, 1X4DB116-1, 1X4DB116-2, 2X4DB116-2, 1X4DB117, and 1X4DB118) provides the following services to the reactor coolant system (RCS):

- Maintains programmed water level in the pressurizer (i.e., maintains required water inventory in the RCS).
- Maintains seal water injection flow to the reactor coolant pumps.
- Controls reactor coolant water chemistry conditions, activity level, and soluble chemical neutron absorber concentration and makeup.

- Provides injection flow to the RCS following actuation of the safety injection system.
- Provides means for filling and draining the RCS.

Portions of the CVCS are used for the safety-grade cold shutdown function. For a discussion of safety-grade cold shutdown, see paragraph 5.4.7.2.3.

9.3.4.1.1 Design Bases

System design parameters are given in table 9.3.4-1; qualitative descriptions are given below.

9.3.4.1.1.1 Reactivity Control. The CVCS regulates the concentration of chemical neutron absorber (boron) in the reactor coolant to control reactivity changes resulting from the change in reactor coolant temperature between cold shutdown and hot full-power operation, burnup of fuel and burnable poisons, buildup of fission products in the fuel, and xenon transients.

A. Reactor Makeup Control

   1. The CVCS is capable of borating the RCS through either of two flow paths and from either of two boric acid sources.
   2. The amount of boric acid stored in the CVCS always exceeds that amount required to borate the RCS to cold shutdown concentration assuming that the control assembly with the highest reactivity worth is stuck in its fully withdrawn position. This amount of boric acid also exceeds the amount required to bring the reactor to hot shutdown and to compensate for subsequent xenon decay.

B. Boron Thermal Regeneration

   The CVCS is designed to control the changes in reactor coolant boron concentration to compensate for the xenon transients during load follow operations without adding makeup for either boration or dilution. This is accomplished by the boron thermal regeneration system, which is designed to allow load follow operations as required by the design load cycle.

9.3.4.1.1.2 Regulation of Reactor Coolant Inventory. The CVCS maintains the coolant inventory in the RCS within the allowable pressurizer level range for all normal modes of operation, including startup from cold shutdown, full-power operation, and plant cooldown. This system also has sufficient makeup capacity to maintain the minimum required inventory in the event of minor RCS leaks. (See Technical Specifications for a discussion of maximum allowable RCS leakage.)

9.3.4.1.1.3 Reactor Coolant Purification. The CVCS is capable of removing fission and activation products, in ionic form or as particulates, from the reactor coolant to provide access to those process lines carrying reactor coolant during operation and to reduce activity releases due to leaks.

9.3.4.1.1.4 Corrosion Control. The CVCS provides a means for adding to the RCS chemicals which control the pH of the coolant during initial startup and subsequent operation, scavenge oxygen from the coolant during startup, and counteract the production of oxygen in

the reactor coolant due to radiolysis of water in the core region. Oxygen control is also provided by maintaining dissolved hydrogen in the reactor coolant to scavenge oxygen.

The CVCS is capable of maintaining the oxygen content and pH of the reactor coolant within the limits specified in table 5.2.3-3.

9.3.4.1.1.5 Seal Water Injection. The CVCS continuously supplies filtered water to each reactor coolant pump seal, as required by the reactor coolant pump design and specified in table 9.3.4-1.

9.3.4.1.1.6 Hydrostatic Testing of the Reactor Coolant System. The CVCS provides a path for supplying water at the maximum test pressure specified to verify the integrity of the RCS. The hydrostatic test is performed prior to initial plant operation.

9.3.4.1.1.7 Emergency Core Cooling. The centrifugal charging pumps in the CVCS also serve as the high-head safety injection pumps in the emergency core cooling system (ECCS). For a discussion of this function, see section 6.3. Other than the centrifugal charging pumps and associated piping and valves, the CVCS is not required to function during a loss-of-coolant accident (LOCA). During a LOCA, the CVCS is isolated except for the centrifugal charging pumps and the piping in the safety injection and seal injection paths.

9.3.4.1.2 System Description

The CVCS is shown in drawings 1X4DB114, 1X4DB115, 1X4DB116-1, 1X4DB116-2, 2X4DB116-2, 1X4DB117, and 1X4DB118 (piping and instrumentation diagram); system design parameters are listed in table 9.3.4-1. The codes and standards to which the individual components of the CVCS are designed are listed in table 3.2.2-1. The CVCS consists of several subsystems:

- The charging, letdown, and seal water system.
- The reactor coolant purification and chemistry control system.
- The reactor makeup control system.
- The boron thermal regeneration system.

Operation of the CVCS during accident mitigation is discussed in section 6.3.

9.3.4.1.2.1 Charging, Letdown, and Seal Water System. The charging and letdown functions of the CVCS are employed to maintain a programmed water level in the RCS pressurizer, thus maintaining proper reactor coolant inventory during all phases of plant operation. This is achieved by a continuous feed-and-bleed process, during which the feed rate is automatically controlled based on pressurizer water level. The bleed rate can be chosen to suit various plant operational requirements by selecting the proper combination of letdown orifices in the letdown flow path. Letdown is isolated on low pressurizer level as described in paragraph 7.7.1.6.

Reactor coolant is discharged to the CVCS from a reactor coolant loop cold leg; it then flows through the shell of the regenerative heat exchanger, where its temperature is reduced by heat transfer to the charging flow passing through the tubes. The coolant then experiences a large

pressure reduction as it passes through the letdown orifice(s) and flows through the tube side of the letdown heat exchanger, where its temperature is further reduced. Downstream of the letdown heat exchanger a second pressure reduction occurs. This second pressure reduction is performed by the low-pressure letdown valve, which maintains upstream pressure and thus prevents flashing downstream of the letdown orifices.

The coolant then flows through one of the mixed bed demineralizers. The flow may then pass through the cation bed demineralizer, which is used intermittently when additional purification of the reactor coolant is required.

From a point upstream of the boron thermal regeneration system or from a point upstream of the reactor coolant filters, a small sample flow may be diverted from the letdown stream to the boron concentration measurement system. (See section 7.7.) The readout on the boron concentration is given in the main control room.

During reactor coolant boration and dilution operations, especially during load follow, the letdown flow leaving the demineralizers may be directed to the boron thermal regeneration system. The coolant then flows through the reactor coolant filter and into the volume control tank through a spray nozzle in the top of the tank. Hydrogen (from the gaseous waste processing system) is continuously supplied to the volume control tank, where it mixes with fission gases which are stripped from the reactor coolant into the tank gas space. The contaminated hydrogen is vented back to the gaseous waste processing system. The partial pressure of the hydrogen gas mixture in the volume control tank determines the concentration of hydrogen dissolved in the reactor coolant for control of the oxygen produced by radiolysis of water in the core.

Three pumps (one normal charging pump and two centrifugal charging pumps) are provided to take suction from the volume control tank and return the purified reactor coolant to the RCS. Normal charging flow is handled by the centrifugal or normal charging pump. This charging flow splits into two paths. The bulk of the charging flow is pumped back to the RCS cold leg through the tube side of the regenerative heat exchanger. The letdown flow in the shell side of the regenerative heat exchanger raises the charging flow to a temperature approaching the reactor coolant temperature. Two charging paths are provided from a point downstream of the regenerative heat exchanger. Also, a flow path is provided from the regenerative heat exchanger outlet to the pressurizer spray line. An air-operated valve in the spray line is employed to provide auxiliary spray to the vapor space of the pressurizer during plant cooldown. This provides a means of cooling the pressurizer near the end of plant cooldown, when the reactor coolant pumps, which normally provide the driving head for the pressurizer spray, are not operating.

A portion of the charging flow is directed to the reactor coolant pumps (nominally 8 gal/min per pump) through a seal water injection filter. The flow is directed to a point above the pump shaft bearing. Here the flow splits and a portion (nominally 5 gal/min per pump) enters the RCS through the labyrinth seals and thermal barrier. The remainder of the flow is directed upward along the pump shaft to the No. 1 seal leakoff. The No. 1 seal leakoff flow discharges to a common manifold, exits from the containment, and then passes through the seal water return filter and the seal water heat exchanger to the suction side of the charging pumps or by an alternate path to the volume control tank. A very small portion of the seal flow leaks through to the No. 2 seal. A No. 3 seal provides a final barrier to leakage of reactor coolant to the containment atmosphere. The No. 2 leakoff flow is discharged to the reactor coolant drain tank in the liquid waste processing system. The No. 3 seal leakoff flow is discharged to the containment sump. (This leakoff flow consists of a portion of the reactor makeup water which is injected into the No. 3 seal.)

The excess letdown path is provided as an alternate letdown path from the RCS in the event that the normal letdown path is inoperable. Reactor coolant can be discharged from a cold leg to flow through the tube side of the excess letdown heat exchanger, where it is cooled by auxiliary component cooling water (ACCW). Downstream of the heat exchanger a remote-manual control valve controls the letdown flow. The flow normally joins the No. 1 seal discharge manifold and passes through the seal water return filter and heat exchanger to the suction side of the charging pumps. The excess letdown flow can also be directed to the reactor coolant drain tank or into the volume control tank via a spray nozzle. When the normal letdown line is not available, the purification path is also not in operation. Therefore, this alternate condition would allow continued power operation for a limited period of time, depending on RCS chemistry and activity. The excess letdown flow path is also used to provide additional letdown capability during the final stages of plant heatup. This path removes some of the excess reactor coolant due to coolant expansion as a result of the RCS temperature increase.

A safety-grade letdown path is provided by the reactor vessel head vent system which is described in subsection 5.4.15. Reactor coolant letdown by this path is directed either to the pressurizer relief tank or to the excess letdown heat exchanger. (See paragraph 5.4.7.2.3 and drawing 1X4DB112.)

Surges in RCS inventory due to load changes are accommodated for the most part in the pressurizer. The volume control tank provides surge capacity for reactor coolant expansion not accommodated by the pressurizer. If the water level in the volume control tank exceeds the normal operating range, a proportional controller modulates a three-way valve downstream of the reactor coolant filter to divert a portion of the letdown to the boron recycle system. If the high-level limit in the volume control tank is reached, an alarm is actuated in the control room, and the letdown flow is completely diverted to the boron recycle system.

Low level in the volume control tank initiates makeup from the reactor makeup control system (RMCS). If the RMCS does not supply sufficient makeup to keep the volume control tank level from falling to a lower level, a low alarm is actuated. Manual action may correct the situation, or, if the level continues to decrease, an emergency low-level signal from both level channels causes the suction of the charging pumps to be transferred from the volume control tank to the refueling water storage tank.

9.3.4.1.2.2 Reactor Coolant Purification and Chemistry Control System. Reactor coolant water chemistry specifications are given in table 5.2.3-3.

A. pH Control

The pH control chemical employed is lithium hydroxide. This chemical is chosen for its compatibility with the materials and water chemistry of borated water/ stainless steel/zirconium/Inconel systems. In addition, lithium-7 is produced in the core region due to irradiation of the dissolved boron in the coolant.

The concentration of lithium-7 in the RCS is coordinated with the boron concentration for pH control. (See table 5.2.3-3.) If the concentration exceeds this range, as it may during the early stages of a core cycle, the CVCS demineralizers are employed to remove excess lithium. Since the amount of lithium to be removed is small and its buildup can be readily calculated, the flow through the demineralizers is not required to be full letdown flow. If the concentration of lithium-7 is below the specified limits, lithium hydroxide can be introduced into the RCS via the charging flow. The solution is prepared in the laboratory and poured into the chemical mixing tank. Reactor makeup water is then used to flush the solution to the suction manifold of the charging pumps.

B. Oxygen Control

During plant startup from the cold condition, hydrazine is employed to scavenge oxygen. The hydrazine solution is introduced into the RCS in the manner described above for the pH control agent. Hydrazine is not normally employed except during refueling and startup from the cold shutdown state.

During normal plant operation, hydrogen dissolved in the reactor coolant is used to control and scavenge oxygen produced by radiolysis of water in the core region. A sufficient partial pressure of hydrogen is maintained in the volume control tank such that the specification is maintained. A pressure control valve maintains a minimum pressure of 15 to 20 psig in the vapor space of the volume control tank. This valve can be adjusted to provide the correct equilibrium hydrogen concentration. Hydrogen is supplied from the hydrogen manifold in the auxiliary gas system.

C. Reactor Coolant Purification

Mixed bed demineralizers are provided in the letdown line to provide cleanup of the letdown flow. The demineralizers remove ionic corrosion products, certain fission products, and zinc during periods of zinc addition, and act as filters. One demineralizer is in continuous service and can be supplemented intermittently by the cation bed demineralizer, if necessary, for additional purification. The cation resin removes principally cesium and lithium isotopes from the purification flow. The second mixed bed demineralizer serves as a standby unit for use if the operating demineralizer becomes exhausted during operation.

A further cleanup feature is provided for use during cold shutdown and residual heat removal. A remote-operated valve admits a bypass flow from the residual heat removal system (RHRS) into the letdown line upstream of the letdown heat exchanger. The flow passes through the heat exchanger, through a mixed bed demineralizer and the reactor coolant filter to the volume control tank. The fluid is then returned to the RCS via the normal charging route.

Filters are provided at various locations to ensure filtration of particulate and resin fines and to protect the seals on the reactor coolant pumps.

Fission gases are removed from the reactor coolant by continuous purging of the volume control tank to the gaseous waste processing system.

D. Zinc Addition

A soluble zinc compound may be added to the reactor coolant as a means to reduce radiation fields within the primary system. The zinc used may be either natural zinc or zinc depleted of ^{64}Zn.

9.3.4.1.2.3 Reactor Makeup Control System. The soluble neutron absorber (boric acid) concentration is controlled by the boron thermal regeneration system and by the RMCS. The RMCS is also used to maintain proper reactor coolant inventory. In addition, for emergency boration and makeup, the capability exists to provide refueling water or 4 weight percent boric acid directly to the suction of the charging pump. Also, the RMCS can be aligned to provide makeup to the RWST.

The RMCS provides a manually preselected makeup composition to the charging pump suction header or to the volume control tank. The makeup control functions are those of maintaining desired operating fluid inventory in the volume control tank and adjusting reactor coolant boron

concentration for reactivity control. Reactor makeup water and boric acid solution (4 weight percent) can be blended together at the reactor coolant boron concentration for use as makeup to maintain volume control tank inventory, or they can be used separately to change the reactor coolant boron concentration.

A boron concentration measurement system (section 7.7) is provided to monitor the boron content of the reactor coolant in the letdown line. The boron concentration is indicated in the main control room.

The boric acid is stored in one boric acid storage tank for each unit. There are two boric acid transfer pumps for each unit. The capability exists to direct the contents of the Unit 1 tank to the Unit 2 tank and vice versa. A pump can be periodically run to recirculate the tank contents with or without the boric acid filter and back to the tank. On a demand signal by the RMCS, one pump starts and delivers boric acid for makeup.

All portions of the CVCS which normally contain 4 weight percent boric acid solution are required to be located in compartments that are maintained at a temperature of ≥65°F. If a portion of the system which normally contains concentrated boric acid solution is not located in a heated area, it is provided with some other means, e.g., heat tracing or low temperature alarming capability, to ensure that the solution is maintained at a temperature ≥65°F.

The reactor makeup water pumps, taking suction from the reactor makeup water storage tank (RMWST), are employed for various makeup and flushing operations throughout the systems. One of these pumps starts on demand from the reactor makeup controller and provides flow to the suction header of the charging pumps or the volume control tank through the letdown line and spray nozzle.

During reactor operation, changes are made in the reactor coolant boron concentration for the following conditions:

A. Reactor startup: boron concentration must be decreased from shutdown concentration to achieve criticality.

B. Load follow: boron concentration must be either increased or decreased to compensate for the xenon transient following a change in load.

C. Fuel burnup: boron concentration must be decreased to compensate for fuel burnup and for buildup of fission products in the fuel.

D. Cold shutdown: boron concentration must be increased to the cold shutdown concentrations.

The boron thermal regeneration system is normally used to control boron concentration to compensate for xenon transients during load follow operations. Boron thermal regeneration can also be used in conjunction with dilution operations of the RMCS to reduce the amount of effluent to be processed by the boron recycle system.

The RMCS can be set up for the following modes of operation:

A. Automatic Makeup

The automatic makeup mode of operation of the RMCS provides blended boric acid solution preset to match the boron concentration in the RCS. Automatic makeup compensates for minor leakage of reactor coolant without causing significant changes in the reactor coolant boron concentration.

Under normal plant operating conditions, the mode selector switch is set in the "automatic makeup" position. This switch position establishes a preset control signal to the total makeup flow controller and establishes positions for the

makeup stop valves for automatic makeup. The boric acid flow controller is set to blend to the same concentration of borated water as contained in the RCS. A preset low-level signal from the volume control tank level controller causes the automatic makeup control action to:

1. Start a reactor makeup water pump.
2. Start a boric acid transfer pump.
3. Open the makeup gate valve to the charging pump suction.
4. Position the boric acid flow control valve and the reactor makeup waterflow control valve.

The flow controllers then blend the makeup stream according to the preset concentration. Makeup addition to the charging pump suction header causes the water level in the volume control tank to rise. At a preset high-level point, the makeup is stopped. This operation may be terminated manually at any time.

If the automatic makeup fails or is not aligned for operation and the tank level continues to decrease, a low-level alarm is actuated. Manual action may correct the situation, or, if the level continues to decrease, a low-low signal opens the stop valves in the refueling water supply line to the charging pumps and closes the stop valves in the volume control tank outlet line.

B. Dilution

The dilute mode of operation permits the addition of a preselected quantity of reactor makeup water at a preselected flowrate to the RCS. The operator sets the mode selector switch to "dilute," the total makeup flow controller setpoint to the desired flowrate, and the total makeup batch integrator to the desired quantity and initiates system start. This opens the reactor makeup waterflow control valve, opens the makeup stop valve to the volume control tank inlet, and starts a reactor makeup water pump. Excessive rise of the volume control tank water level is prevented by automatic actuation (by the tank level controller) of a three-way diversion valve which routes the reactor coolant letdown flow to the boron recycle system. When the preset quantity of water has been added, the batch integrator causes makeup to stop. The operation may be terminated manually at any time.

The dilute mode of operation can also be used to add a preselected quantity of reactor makeup water at a preselected flowrate to the RWST. This process is similar to that described above for diluting the RCS, except normally closed manual valves in the flowpath to the RWST are opened while the automatic makeup valves, which direct flow to either the top of the VCT or to the suction of the charging pumps, are closed. This alignment ensures reactor makeup water will be directed to the RWST and not the RCS.

Dilution can also be accomplished by operating the boron thermal regeneration system in the boron storage mode.

C. Alternate Dilution

The alternate dilute mode of operation is similar to the dilute mode except that a portion of the dilution water flows directly to the charging pump suction and a portion flows into the volume control tank via the spray nozzle and then flows to the charging pump suction. This decreases the delay in diluting the RCS caused by directing dilution water to the volume control tank.

If desired, the dilution flow path into the volume control tank may be isolated to direct the flow directly to the charging pump suction.

D. Boration

The borate mode of operation permits the addition of a preselected quantity of concentrated boric acid solution at a preselected flowrate to the RCS. The operator sets the mode selection switch to "borate," the concentrated boric acid flow controller setpoint to the desired flowrate, and the concentrated boric acid batch integrator to the desired quantity and initiates system start. This opens the makeup stop valve to the charging pumps suction, positions the boric acid flow control valve, and starts the selected boric acid transfer pump, which delivers a 4 weight percent boric acid solution to the charging pumps suction header. The total quantity added in most cases is so small that it has only a minor effect on the volume control tank level. When the preset quantity of concentrated boric acid solution is added, the batch integrator causes makeup to stop. Also, the operation may be terminated manually at any time.

The borate mode of operation permits the addition of a preselected quantity of concentrated boric acid solution at a preselected flowrate to the RWST. This process is similar to that described above for borating the RCS, except normally closed manual valves in the flowpath to the RWST are opened while the automatic makeup valve to the suction of the charging pump is closed. This alignment ensures the concentrated boric acid solution will be directed to the RWST and not the RCS.

Boration can also be accomplished by operating the boron thermal regeneration system in the boron release mode.

E. Manual

The manual mode of operation permits the addition of a preselected quantity and blend of boric acid solution to the RCS to the refueling water storage tank, to the recycle holdup tanks in the boron recycle system, to the spent fuel pool, or to some other location via a temporary connection. In the manual mode of operation, automatic makeup to the RCS is precluded. The discharge flow path must be prepared by opening manual valves in the desired path.

The operator sets the mode selector switch to "manual," the boric acid and total makeup flow controllers to the desired flowrates, and the boric acid and total makeup batch integrators to the desired quantities and actuates the makeup start switch.

The start switch actuates the boric acid flow control valve and the reactor makeup waterflow control valve and starts the preselected reactor makeup water pump and boric acid transfer pump.

When the preset quantities of boric acid and reactor makeup water have been added, the batch integrators cause makeup to stop. This operation may be stopped manually by actuating the makeup stop switch.

If either batch integrator is satisfied before the other has recorded its required total, the pump and valve associated with the integrator which has been satisfied will terminate flow. The flow controlled by the other integrator will continue until that integrator is satisfied. After a boration, blended or reactor makeup water will be injected to prevent the piping system from remaining filled with 4 weight percent boric acid solution.

The quantities of boric acid and reactor makeup water injected are totalized by the batch counters, and the flowrates are indicated by flow indicators. Deviation alarms sound for both boric acid and reactor makeup water if flowrates deviate from setpoints.

F. Safety-Grade Boration

If the normal boration paths are rendered inoperable, the operator is able to borate the RCS by using the A-train safety-grade boration path from the boric acid transfer pumps to the charging pump suction.

The refueling water storage tank also contains sufficient boric acid to achieve cold shutdown. Two parallel paths, each with a single motor-operated valve, are provided.

9.3.4.1.2.4 Boron Thermal Regeneration System. Downstream of the mixed bed demineralizers, the letdown flow can be diverted to the boron thermal regeneration system, where part or all of the letdown flow can be treated when boron concentration changes are desired for load follow. After processing, the flow is returned to a point upstream of the reactor coolant filter.

The boron concentration measurement system (section 7.7) can be used to monitor the boron content in the letdown stream before it is diverted to the boron thermal regeneration system for processing, or it can monitor the adjusted boron content of the letdown stream after it has been treated by the thermal regeneration process.

Storage and release of boron during load follow operation is determined by the temperature of fluid entering the thermal regeneration demineralizers. A chiller unit and a group of heat exchangers are employed to provide the desired fluid temperatures at the demineralizer inlets for either storage or release operation of the system.

The flow path through the boron thermal regeneration system is different for the boron storage and the boron release operations. During boron storage, the letdown stream enters the moderating heat exchanger; from there it passes through the letdown chiller heat exchanger. These two heat exchangers cool the letdown stream before it enters the demineralizers. The letdown reheat heat exchanger is valved out on the tube side and performs no function during boron storage operations. The temperature of the letdown stream at the point of entry to the demineralizers is controlled automatically by the temperature control valve which controls the shell-side flow to the letdown chiller heat exchanger. After passing through the demineralizers, the letdown enters the moderating heat exchanger shell side, where it is heated by the incoming letdown stream before going to the volume control tank.

Therefore, for boron storage a decrease in the boric acid concentration in the reactor coolant is accomplished by sending the letdown flow at relatively low temperatures to the thermal regeneration demineralizers. The resin, which was depleted of boron at high temperature during a prior boron release operation, is now capable of storing boron from the low-temperature letdown stream. Reactor coolant with a decreased concentration of boric acid leaves the demineralizers and is directed to the RCS via the charging system.

During the boron release operation, the letdown stream enters the moderating heat exchanger tube side, bypasses the letdown chiller heat exchanger, and passes through the shell side of the letdown reheat heat exchanger. The moderating and letdown reheat heat exchangers heat the letdown stream before it enters the resin beds. The temperature of the letdown at the point of entry to the demineralizers is controlled automatically by the temperature control valve which controls the flowrate on the tube side of the letdown reheat heat exchanger. After passing

through the demineralizers, the letdown stream enters the shell side of the moderating heat exchanger, passes through the tube side of the letdown chiller heat exchanger, and then goes to the volume control tank. The temperature of the letdown stream entering the volume control tank is controlled automatically by adjusting the shell-side flowrate on the letdown chiller heat exchanger. Thus, for boron release an increase in the boric acid concentration in the reactor coolant is accomplished by sending the letdown flow at relatively high temperatures to the thermal regeneration demineralizers. The water flowing through the demineralizers now results in the release of boron which was stored by the resin at low temperature during a previous boron storage operation. The boron-enriched reactor coolant is returned to the RCS via the charging system.

Although the boron thermal regeneration system is primarily designed to compensate for xenon transients occurring during load follow, it can also be used to handle boron changes during other modes of plant operation. For example, during startup dilution, the resin beds are first saturated, then washed off to the boron recycle system, then again saturated and washed off. This operation continues until the desired dilution in the RCS is obtained. This method of startup serves to reduce the effluents diverted to the boron recycle system.

As an additional function, a thermal regeneration demineralizer can be used as a deborating demineralizer, which can be used to dilute the RCS down to very low boron concentrations toward the end of a core cycle. To make such a bed effective, the effluent concentration from the bed must be kept very low, close to 0 ppm boron. This low effluent concentration can be achieved by using fresh resin. Use of fresh resin can be coupled with the normal replacement cycle of the resin, one resin bed being replaced during each core cycle.

A thermal regeneration demineralizer may also be used as a filtering demineralizer. A filtering media is added to the vessel to perform this function.

9.3.4.1.2.5 Component Description. A summary of principal CVCS component design parameters is given in table 9.3.4-2, and safety classifications and design codes are given in section 3.2.

All CVCS piping that handles radioactive liquid is austenitic stainless steel. Piping joints and connections are welded, except where flanged connections are required to facilitate equipment removal for maintenance and testing.

9.3.4.1.2.5.1 Charging Pumps. Three charging pumps are supplied to inject coolant into the RCS. All three of the pumps are of the single-speed, horizontal, centrifugal type; however, one of the pumps, the normal charging pump, is non-1E powered. All parts in contact with the reactor coolant are fabricated of austenitic stainless steel. To prevent leakage to the atmosphere, the pump seals are provided with leakoffs to collect the leakage. A minimum flow recirculation line protects the charging pumps from a closed discharge valve condition.

Charging flowrate is determined from a pressurizer level signal. A modulating valve on the discharge side of the pumps accomplishes the charging flow control. The 1E-powered charging pumps also serve as high-head safety injection pumps in the ECCS. A description of the 1E-powered charging pump function upon receipt of a safety injection signal is given in paragraph 6.3.2.2.

9.3.4.1.2.5.2 Boric Acid Transfer Pumps. Two canned motor pumps are supplied per unit. One pump is normally aligned to supply boric acid to the suction header of the charging pumps while the second serves as a standby. Manual or automatic initiation of the reactor coolant makeup system will start one pump to provide normal makeup of boric acid solution to the suction header of the charging pumps. Miniflow from this pump flows back to the associated

boric acid storage tank and helps maintain thermal equilibrium. The standby pump can be used intermittently to circulate boric acid solution through the tank to maintain thermal equilibrium. Emergency boration, supplying 4 weight percent boric acid solution directly to the suction of the charging pumps, can be accomplished by manually starting either or both pumps. The transfer pumps also function to transfer boric acid solution from the boric acid batching tank to the boric acid storage tanks.

The pumps are located in a heated area to prevent crystallization of the boric acid solution. Pump parts in contact with the solution are of austenitic stainless steel.

9.3.4.1.2.5.3 Chiller Pumps. Two centrifugal pumps circulate the water through the chilled water loop in the boron thermal regeneration system. One pump is normally operated, with the second serving as a standby.

9.3.4.1.2.5.4 Regenerative Heat Exchanger. The regenerative heat exchanger is designed to recover heat from the letdown flow by reheating the charging flow, which reduces thermal effects on the charging penetrations into the reactor coolant loop piping.

The letdown stream flows through the shell of the regenerative heat exchanger; the charging stream flows through the tubes. The unit is constructed of welded austenitic stainless steel.

The temperatures of both outlet streams from the heat exchanger are monitored with indication given in the control room. A high-temperature alarm is actuated on the main control board if the temperature of the letdown stream exceeds desired limits.

9.3.4.1.2.5.5 Letdown Heat Exchanger. The letdown heat exchanger cools the letdown stream to the operating temperature of the mixed bed demineralizers. Reactor coolant flows through the tube side of the exchanger; ACCW flows through the shell side. Heat exchanger surfaces in contact with the reactor coolant are austenitic stainless steel, and the shell is carbon steel.

The low-pressure letdown valve, located downstream of the heat exchanger, maintains the pressure of the letdown flow upstream of the heat exchanger in a range sufficiently high to prevent two-phase flow. Pressure indication and high-pressure alarm are provided on the main control board. The letdown temperature control indicates and controls the temperature of the letdown flow exiting from the letdown heat exchanger. A temperature sensor, which is part of the CVCS, provides input to the controller in the ACCW system. The exit temperature of the letdown stream is thus controlled by regulating the ACCW flow through the letdown heat exchanger. Temperature indication is provided on the main control board. If the outlet temperature from the heat exchanger is excessive, a high-temperature alarm is actuated, and a temperature-controlled valve diverts the letdown directly to the volume control tank.

The outlet temperature from the shell side of the heat exchanger is allowed to vary over an acceptable range compatible with the equipment design parameters and required performance of the heat exchanger in reducing letdown stream temperature.

9.3.4.1.2.5.6 Excess Letdown Heat Exchanger. The excess letdown heat exchanger cools reactor coolant letdown flow. The flowrate is equivalent to the portion of the nominal seal injection flow which flows into the RCS through the reactor coolant pump labyrinth seals.

The excess letdown heat exchanger can be employed either when normal letdown is temporarily out of service to maintain the reactor in operation, or it can be used to supplement maximum letdown during the final stages of heatup. The letdown flows through the tube side of the unit, and ACCW is circulated through the shell. Heat exchanger surfaces in contact with

reactor coolant are austenitic stainless steel; the shell is carbon steel. Heat exchanger tube joints are welded.

A temperature detector measures the temperature of the excess letdown flow downstream of the excess letdown heat exchanger. Temperature indication and high-temperature alarm are provided on the main control board.

A pressure sensor indicates the pressure of the excess letdown flow downstream of the excess letdown heat exchanger and excess letdown control valve. Pressure indication is provided on the main control board.

9.3.4.1.2.5.7 Seal Water Heat Exchanger. The seal water heat exchanger is designed to cool fluid from three sources: reactor coolant pump No. 1 seal leakage, reactor coolant discharged from the excess letdown heat exchanger, and miniflow from a centrifugal charging pump. Reactor coolant flows through the tube side of the heat exchanger; ACCW is circulated through the shell. The design flowrate through the tube side is equal to the sum of the nominal excess letdown flow, maximum design reactor coolant pump seal leakage, and miniflow from one centrifugal charging pump. The unit is designed to cool the above flow to the temperature normally maintained in the volume control tank. All surfaces in contact with reactor coolant are austenitic stainless steel; the shell is carbon steel.

9.3.4.1.2.5.8 Moderating Heat Exchanger. The moderating heat exchanger operates as a regenerative heat exchanger between incoming and outgoing streams to and from the thermal regeneration demineralizers.

The incoming letdown flow enters the tube side of the moderating heat exchanger. The shell-side fluid, which comes directly from the thermal regeneration demineralizers, enters at low temperature during boron storage and at high temperature during boron release.

9.3.4.1.2.5.9 Letdown Chiller Heat Exchanger. During the boron storage operation, the process stream enters the tube side of the letdown chiller heat exchanger after leaving the tube side of the moderating heat exchanger. The letdown chiller heat exchanger cools the process stream to allow the thermal regeneration demineralizers to remove boron from the coolant. The desired cooling capacity is adjusted by controlling the chilled water flowrate passed through the shell side of the heat exchanger.

The letdown chiller heat exchanger is also used during the boron release operation to cool the liquid leaving the thermal regeneration demineralizers to ensure that its temperature does not exceed that of normal letdown to the volume control tank.

9.3.4.1.2.5.10 Letdown Reheat Heat Exchanger. The letdown reheat heat exchanger is used only during boron release operations to heat the process stream. Water used for heating is diverted from the letdown line upstream of the letdown heat exchanger, passed through the tube side of the letdown reheat heat exchanger, and then returned to the letdown stream upstream of the letdown heat exchanger.

9.3.4.1.2.5.11 Volume Control Tank. The volume control tank provides surge capacity for part of the reactor coolant expansion volume not accommodated by the pressurizer. When the level in the tank reaches the high-level setpoint, the remainder of the expansion volume is accommodated by diverting the letdown stream to the boron recycle system. The tank also provides a means for introducing hydrogen into the coolant to maintain the required equilibrium concentration of 25 to 50 cm^3 hydrogen (at standard temperature and pressure)/kg water and is used for degassing the reactor coolant. It also serves as a head tank for the charging pumps.

A spray nozzle located inside the tank on the letdown line provides liquid-to-gas contact between the incoming fluid and the hydrogen atmosphere in the tank.

Hydrogen (from the hydrogen manifold in the gaseous waste processing system) is continuously supplied to the volume control tank; a remotely operated vent valve, discharging to the gaseous waste processing system, permits continuous removal of gaseous fission products which are stripped from the reactor coolant and collected in this tank. Relief protection, gas space sampling, and nitrogen purge connections are also provided. The tank can also accept the seal water return flow from the reactor coolant pumps, although this flow normally goes directly to the suction of the charging pumps.

Volume control tank pressure is monitored with indication given in the control room. Alarm is actuated in the control room for high- and low-pressure conditions. The volume control tank pressure control valve is automatically closed by the low-pressure signal.

Two level channels govern the water inventory in the volume control tank. Level indication with a low alarm is provided on the main control board for one controller, and local level indication with a high alarm on the main control board is provided for the other controller.

If the volume control tank level rises above the normal operating range, one level channel provides an analog signal to the proportional controller which modulates the three-way valve downstream of the reactor coolant filter to maintain the volume control tank level within the normal operating band. The three-way valve can split letdown flow so that a portion goes to the boron recycle system and a portion to the volume control tank. The controller operates in this fashion during a dilution operation when reactor makeup water is being fed to the volume control tank from the RMCS.

If the modulating function of the channel fails and the volume control tank level continues to rise, the high-level alarm will alert the operator to the malfunction; the full letdown flow will be automatically diverted by the backup level channel.

During normal power operation, a low level in the volume control tank initiates automatic makeup, which injects a preselected blend of boric acid solution and reactor makeup water into the charging pump suction header. When the volume control tank level is restored to normal, automatic makeup stops.

If the automatic makeup fails or is not aligned for operation and the tank level continues to decrease, a low-level alarm is actuated in the main control room. Manual action may correct the situation, or, if the level continues to decrease, a low-low signal from both level channels opens the stop valves in the refueling water supply line and closes the stop valves in the volume control tank outlet line.

9.3.4.1.2.5.12 Boric Acid Storage Tanks. The boric acid storage tank capacity is sized to store sufficient boric acid solution for one refueling shutdown plus enough for one cold shutdown from full-power operation immediately following refueling with the most reactive control rod not inserted.

The concentration of boric acid solution in storage is maintained between 4 and 4.4 percent by weight. Periodic manual sampling and corrective action, if necessary, ensure that these limits are maintained. Therefore, measured amounts of boric acid solution can be delivered to the reactor coolant to control the boron concentration. The boric acid storage tank has a diaphragm that precludes oxygen from mixing with the tank's contents.

A temperature sensor provides temperature measurement of the tank's contents. Temperature indication as well as high- and low-temperature alarms are provided on the main control board.

Two level detectors indicate the level in the boric acid storage tank. Level indication with high, low, low-low, and empty level alarms is provided on the main control board. The high alarm indicates that the tank may soon overflow. The low alarm warns the operator to start makeup to the tank. The low-low alarm is set to indicate the minimum level of boric acid in the tank to ensure that sufficient boric acid is available for a cold shutdown with one stuck rod. The empty level alarm is set to give warning of loss of pump suction.

9.3.4.1.2.5.13 Boric Acid Batching Tank. The boric acid batching tank, which is shared between the two units, is used for mixing a makeup supply of boric acid solution for transfer to the boric acid tank.

A local sampling point is provided for verifying the solution concentration before transferring it out of the tank. The tank is provided with an agitator to improve mixing during batching operations.

9.3.4.1.2.5.14 Chemical Mixing Tank. The chemical mixing tank is used primarily in the preparation of caustic solutions for pH control, hydrazine solution for oxygen scavenging, and chemicals for corrosion product oxidation during a refueling shutdown.

9.3.4.1.2.5.15 Chiller Surge Tank. The chiller surge tank handles the thermal expansion and contraction of the water in the chiller loop. The surge volume in the tank also acts as a thermal buffer for the chiller. In addition, this tank can provide a holdup should there be a leak in the chiller heat exchanger. The fluid level in the tank is monitored with level indication and high- and low-level alarms provided on the main control board.

9.3.4.1.2.5.16 Mixed Bed Demineralizers. Two flushable mixed bed demineralizers assist in maintaining reactor coolant purity. The resin bed removes fission and corrosion products. The resin bed is designed to reduce the concentration of ionic isotopes in the purification stream, except for cesium, yttrium, and molybdenum, by a minimum factor of 10.

Each demineralizer has more than sufficient capacity for one core cycle with 1 percent of the rated core thermal power being generated by defective fuel rods. One demineralizer is normally in service with the other in standby.

A temperature sensor monitors the temperature of the letdown flow downstream of the letdown heat exchanger. If the letdown temperature exceeds the maximum allowable resin operating temperature (approximately 140°F), a three-way valve is automatically actuated so that the flow bypasses the demineralizers. Temperature indication and high alarm are provided on the main control board. The air-operated three-way valve failure mode directs flow to the volume control tank.

9.3.4.1.2.5.17 Cation Bed Demineralizers. A flushable demineralizer with cation resin in the hydrogen form is located downstream of the mixed bed demineralizers and is used intermittently to control the concentration of lithium-7 which builds up in the coolant from the $B^{10} \rightarrow (n,\alpha) \rightarrow Li^7$ reaction. The demineralizer also has sufficient capacity to maintain the cesium-137 concentration in the coolant below 1.0 μCi/cm^3 with 1-percent defective fuel. The resin bed is designed to reduce the concentration of ionic isotopes, particularly cesium, yttrium, and molybdenum, by a minimum factor of 10.

The demineralizer has more than sufficient capacity for one core cycle with 1 percent of the rated core thermal power being generated by defective fuel rods.

9.3.4.1.2.5.18 Thermal Regeneration Demineralizers. The function of the thermal regeneration demineralizers is to store the total amount of boron that must be removed from the

RCS to accomplish the required dilution during a load cycle to compensate for xenon buildup resulting from a decreased power level. Furthermore, the demineralizers must be able to release the previously stored boron to accomplish the required boration of the reactor coolant during the load cycle to compensate for a decrease in xenon concentration resulting from an increased power level.

The thermally reversible ion storage capacity of the resin applies only to borate ions. The capacity of the resin to store other ions is not thermally reversible. Thus, during boration, when borate ions are released by the resin, there is no corresponding release of the ionic fission and corrosion products stored on the resin.

The thermal regeneration demineralizer resin capacity is directly proportional to the solution boron concentration and inversely proportional to the temperature. Further, the differences in capacity as a function of both concentration and temperature are reversible. For the 50°F to 140°F temperature cycle, this reversible capacity varies from the beginning of a core cycle to the end of core life by a factor of about 2.

The demineralizers can accept flow in either direction. The flow direction during boron storage is therefore always opposite to that during release. When the beds are switched from storage to release and vice versa, this provides much faster response than would be the case if the demineralizers could accept flow in only one direction.

Temperature instrumentation is provided upstream of the thermal regeneration demineralizers to control the temperature of the process flow. During boron storage operations, it controls the flow through the shell side of the letdown chiller heat exchanger to maintain the process flow at 50°F as it enters the demineralizers. During boron release operations, it controls the flow through the tube side of the letdown reheat heat exchanger to maintain the process flow at 140°F as it enters the demineralizers. Temperature indication and a high-temperature alarm are provided on the main control board.

An additional temperature instrument is provided to protect the demineralizer resins from a high-temperature condition. On reaching the high-temperature setpoint, an alarm is sounded on the main control board, and the letdown flow is diverted to the volume control tank from a point upstream of the mixed bed demineralizers.

Failure of the temperature controls resulting in hot waterflow to the demineralizers would result in a release of boron stored on the resin with a resulting increase in reactor coolant boron concentration and increased margin for shutdown. If the temperature of the resin rises significantly above 140°F, the number of ion storage sites on the resin will gradually decrease, thus reducing the capability of the resin to remove boron from the process stream. Degradation of ion removal capability will occur for temperatures of approximately 160°F and above. The extent of the degradation and the rate at which it will occur depend upon the temperature experienced by the resin and the length of time that the resin experiences this elevated temperature.

Failure of the temperature control system resulting in cold waterflow to the demineralizers would result in storage of boron on the resin and reduction of the reactor coolant boron concentration. The amount of reduction in reactor coolant boron concentration is limited by the capacity of the resin to remove boron from the water. As the boron concentration is reduced, the control rods would be driven into the core to maintain power level. If the rods were to reach the shutdown limit setpoint, an alarm would be actuated informing the operator that emergency boration of the RCS is necessary to maintain the capability of shutting the reactor down with control rods alone.

9.3.4.1.2.5.19 Reactor Coolant Filter. The reactor coolant cartridge filter is located in the letdown line between the demineralizers and the volume control tank diversion valve of the volume control tank. The filter collects resin fines and particulates from the letdown stream. The nominal flow capacity of the filter is greater than the maximum purification flowrate. A local pressure differential indicator is provided to show the pressure drop across the reactor coolant filter.

9.3.4.1.2.5.20 Seal Water Injection Filters. Two seal water injection cartridge filters are located in parallel in a common line to the reactor coolant pump seals; they collect particulate matter that could be harmful to the seal faces. Each filter is sized to accept flow in excess of the normal seal waterflow requirements.

A differential pressure indicator monitors the pressure drop across each seal water injection filter and gives local indication with high differential pressure alarm on the main control board.

9.3.4.1.2.5.21 Seal Water Return Filter. This backflushable filter collects particulates from the reactor coolant pump seal water return and from the excess letdown flow. The filter is designed to pass the sum of the excess letdown flow and the maximum design leakage from all reactor coolant pumps.

A local differential pressure indicator is provided to show the differential pressure across the filter.

9.3.4.1.2.5.22 Boric Acid Filter. The boric acid filter collects particulates from the boric acid solution being pumped from the boric acid storage tank by the boric acid transfer pumps. The filter is designed to pass the design flow of two boric acid transfer pumps operating simultaneously.

A local differential pressure indicator is provided for the boric acid filter.

9.3.4.1.2.5.23 Letdown Orifices. Three letdown orifices are provided in parallel to reduce the letdown pressure from reactor conditions and to control the flow of reactor coolant leaving the RCS. The orifices are placed into or out of service by remote operation of their respective isolation valves. Two of the orifices are designed for normal operation flow; the third is capable of being used in parallel with one of the normally operating orifices for either flow control when the RCS pressure is less than normal or greater letdown flow during maximum purification or heatup. Each orifice consists of an assembly which provides for permanent pressure loss without recovery and is made of austenitic stainless steel or other adequate corrosion-resistant material.

A flow monitor provides indication in the control room of the letdown flowrate and a high alarm to indicate unusually high flow.

A low-pressure letdown controller located downstream of the letdown heat exchanger controls the pressure upstream of the letdown heat exchanger to prevent flashing of the letdown liquid. Pressure indication and high-pressure alarm are provided on the main control board.

9.3.4.1.2.5.24 Chiller. The chiller is located in a chilled water loop, which contains a surge tank, chiller pumps, and the letdown chiller heat exchanger, piping, valves, and controls. The chiller is shared between the two units.

The purpose of the chiller is twofold:

A. To cool down the process stream during storage of boron on the resin.

B. To maintain an outlet temperature from the boron thermal regeneration system at or below 115°F during release of boron.

9.3.4.1.2.5.25 Valves. Where pressure and process temperature conditions permit, diaphragm-type valves are used to essentially eliminate leakage to the atmosphere. All packed valves which are larger than 2 in. and which are designated for radioactive services are provided with a stuffing box and lantern leakoff connections. All control (modulating) and three-way valves are either provided with stuffing box and leakoff connections or are totally enclosed. Leakage to the atmosphere is essentially zero for these valves. Basic material of construction is stainless steel for all valves which handle radioactive liquid or boric acid solutions.

Relief valves are provided for lines and components that might be pressurized above design pressure by improper operation or component malfunction.

A. Charging Line Downstream of Regenerative Heat Exchanger

If the charging side of the regenerative heat exchanger is isolated while the hot letdown flow continues at its maximum rate, the volumetric expansion of coolant on the charging side of the heat exchanger is relieved to the RCS through a spring-loaded check valve.

B. Letdown Line Downstream of Letdown Orifices

The pressure relief valve downstream of the letdown orifices protects the low-pressure piping and the letdown heat exchanger from overpressure when the low-pressure piping is isolated. The capacity of the relief valve is equal to the maximum flowrate through all letdown orifices. The valve set pressure is equal to the design pressure of the letdown heat exchanger tube side.

C. Letdown Line Downstream of Low-Pressure Letdown Valve

The pressure relief valve downstream of the low-pressure letdown valve protects the low-pressure piping and equipment from overpressure when this section of the system is isolated. The overpressure may result from leakage through the low-pressure letdown valve. The capacity of the relief valve exceeds the maximum flowrate through all letdown orifices. The valve set pressure is equal to the design pressure of the demineralizers.

D. Volume Control Tank

The relief valve on the volume control tank permits the tank to be designed for a lower pressure than the upstream equipment. This valve has a capacity greater than the summation of the following items:

1. Maximum letdown.
2. Normal seal water return.
3. Excess letdown.
4. Nominal flow from one reactor makeup water pump.

The valve set pressure equals the design pressure of the volume control tank.

E. Charging Pump Suction

A relief valve on the charging pump suction header relieves pressure that may build up if the suction line isolation valves are closed or if the system is overpressurized. The valve set pressure is equal to the design pressure of the associated piping and equipment.

F. Seal Water Return Line (Inside Containment)

This relief valve is designed to relieve overpressurization in the seal water return piping inside the containment if the motor-operated isolation valve is closed. The valve is designed to relieve the total leakoff flow from the No. 1 seals of the reactor coolant pumps plus the design excess letdown flow. The valve is set to relieve at the design pressure of the piping.

G. Seal Water Return Line (Charging Pumps Bypass Flow)

This relief valve protects the seal water heat exchanger and its associated piping from overpressurization. If either of the isolation valves for the heat exchanger is closed and if the bypass line is closed, the piping would be overpressurized by the miniflow from the centrifugal charging pumps. The valve is sized to handle the miniflow from the centrifugal charging pumps. The valve is set to relieve at the design pressure of the associated piping and equipment.

H. Letdown Reheat Heat Exchanger

The relief valve is located on the piping leading to the shell side of the heat exchanger. If the shell side were isolated while flow was maintained in the tube side, overpressurization could occur. The valve is set to relieve at the design pressure of the heat exchanger shell side.

I. Letdown Chiller Heat Exchanger

The relief valve is located on the piping leading from the shell side of the heat exchanger. If the shell side were isolated while flow was maintained in the tube side, overpressurization could occur. The valve is set to relieve at the design pressure of the heat exchanger shell side.

J. Steam Line to Batching Tank

The relief valve on the steam line to the batching tank protects the low-pressure piping and batching tank heating jacket from overpressure when the condensate return line is isolated. The capacity of the relief valve equals the maximum expected steam inlet flow. The set pressure equals the design pressure of the heating jacket.

9.3.4.1.2.5.26 Piping. All CVCS piping that handles radioactive liquid is austenitic stainless steel. All piping joints and connections are welded, except where flanged connections are required to facilitate equipment removal for maintenance and hydrostatic testing.

9.3.4.1.2.5.27 Zinc Addition System. This system will add zinc as an aqueous solution of zinc acetate during the fuel cycle. The concentration of the zinc acetate and the duration of the zinc addition will be determined on a cycle-specific basis. The system will consist of a batch/mixing tank, dilution water supply, one electrically powered positive displacement metering pump, and associated pipe, plastic and stainless steel tubing, tubing supports, and electrical power supply and instrumentation along with isolation, check, relief and backpressure valves.

9.3.4.1.2.6 System Operation.

9.3.4.1.2.6.1 Reactor Startup. Reactor startup is defined as the operations which bring the reactor from cold shutdown to normal operating temperature and pressure.

It is assumed that:

A. Normal residual heat removal is in progress.

B. The RCS boron concentration is at the cold shutdown concentration.

C. The RMCS is set to provide makeup at the cold shutdown concentration. (The RMCS unborated water source isolation valves must remain secured in the closed position until the loops are filled per Technical Specification 3.4.7 or mode 4 entry. Makeup will normally be from the RWST until blended flow is available.)

D. The RCS is either water solid or drained to minimum level for refueling or maintenance. If the RCS is water solid, system pressure is maintained by operating a charging pump and is controlled by the low-pressure letdown valve in the letdown line. (Letdown is achieved via the RHRS.)

E. The charging and letdown lines of the CVCS are filled with coolant at the cold shutdown boron concentration. The letdown orifice isolation valves are closed.

If the RCS requires filling, the two allowable procedures are a fill and vent method and vacuum refill method. The fill and vent method is as follows:

A. One charging pump is started, which provides blended flow at the cold shutdown boron concentration. The standby RHR train may be used to aid in the filling process. Acceptable sources of borated water are the RMCS, VCT, RWST, and the RHUT.

B. The vents on the head of the reactor vessel and pressurizer are opened.

C. The RCS is filled and the vents closed.

The system pressure is raised by using the charging pump and is controlled by the low-pressure letdown valve. When the system pressure is adequate for operation of the reactor coolant pumps, seal waterflow to the pumps is established and the pumps are operated and vented sequentially until all gases are cleared from the system. Final venting takes place at the pressurizer.

The capability to perform a vacuum refill of the RCS is provided. This alternative method for filling uses a nonsafety-related vacuum pump to evacuate the air and other noncondensibles from the RCS. Vacuum in the RCS is accomplished by connecting vacuum hoses from a temporary nonsafety-related vacuum pump skid to the reactor head and the pressurizer. Demineralized water is used for the vacuum pump seal water. The evacuated air and noncondensibles are discharged to a normal purge exhaust or a mini-purge exhaust receptacle, while any liquid is discharged through a drain hose to a radioactive drain. The vacuum pump requires 480 V-ac power, which will be supplied from temporary outage power or a welding receptacle. The initial conditions require the plant to be in mode 5 with RCS temperature less than 130 °F and the RCS water level at midloop. The RCS is drained to midloop to ensure good communication between all voided parts of the RCS. One train of RHR, seal injection, charging, and letdown will be in service. The alternate train of RHR will be in standby. To provide additional assurance of makeup capability to mitigate a potential loss of RHR at reduced inventory conditions, the alternate train of charging will be available, as well as two offsite ac power sources and both emergency diesel generators.

When all of the connections are made to the vacuum refill skid, and any instruments that might be damaged by the vacuum are isolated, the process can begin. The vacuum pump is started and a vacuum of between 21.8 in. Hg and 25 in. Hg is established. Adequate subcooling margin is maintained. After the vacuum is established, filling will begin. Filling will be accomplished using the charging system or the idle train of RHR or a combination of these. When the reactor vessel is filled, the connection to the reactor head is closed. Filling will

continue until the pressurizer is 70-percent full, at which time the pressurizer connections will be closed. The hoses and the power cable are disconnected and, along with the reactor coolant vacuum skid, are then removed from containment.

After the filling process is complete, the pressurizer is heated while still under vacuum using the pressurizer heaters, and a pressurizer bubble is formed. The RCS is pressurized using the pressurizer heaters, to the pressure at which RCPs are started. At this point the vacuum refill process converges with the normal fill and vent process, and a normal transition is made into mode 4.

No matter which method of filling and venting the RCS is used, the reactor coolant boron concentration is then reduced either by operating the RMCS in the dilute mode or by operating the boron thermal regeneration system in the boron storage mode and, when the resin beds are saturated, washing off the beds to the boron recycle system. The reactor coolant boron concentration is corrected to the point where the control rods may be withdrawn and criticality achieved. Nuclear heatup may then proceed with corresponding manual adjustment of the reactor coolant boron concentration to balance the temperature coefficient effects and maintain the control rods within their operating range. During heatup, the appropriate combination of letdown orifices is used to provide necessary letdown flow.

Prior to or during the heating process, the CVCS is employed to obtain the correct chemical properties in the RCS. The RMCS is operated on a continuing basis to ensure correct control rod position. Chemicals are added through the chemical mixing tank as required to control reactor coolant chemistry such as pH and dissolved oxygen content. Hydrogen overpressure is established in the volume control tank to ensure the appropriate hydrogen concentration in the reactor coolant.

9.3.4.1.2.6.2 Power Generation and Hot Standby Operation.

A. Base Load

At a constant power level, the rates of charging and letdown are dictated by the requirements for seal water to the reactor coolant pumps and the normal purification of the RCS. One charging pump is employed, and charging flow is controlled automatically from pressurizer level. The only adjustments in boron concentration necessary are those to compensate for core burnup. These adjustments are made at infrequent intervals to maintain the control groups within their allowable limits. Rapid variations in power demand are accommodated automatically by control rod movement. If variations in power level occur and the new power level is sustained for long periods, some adjustment in boron concentration may be necessary to maintain the control groups within their maneuvering band.

During normal operation, normal letdown flow is maintained, and one mixed bed demineralizer is in service. Reactor coolant samples are taken periodically to check boron concentration, water quality, pH, and activity level. The charging flow to the RCS is controlled automatically by the pressurizer level control signal through the discharge header flow control valve.

B. Load Follow

A power reduction will initially cause a xenon buildup followed by xenon decay to a new, lower equilibrium value. The reverse occurs if the power level increases: initially, the xenon level decreases and then it increases to a new and higher equilibrium value associated with the amount of the power level change.

The boron thermal regeneration system is normally used to vary the reactor coolant boron concentration to compensate for xenon transients occurring when reactor power level is changed. The CVCS chiller is shared between the operating units; therefore, the boron thermal regeneration system has the capacity to serve only one unit at a time. The RMCS may also be used to vary the boron concentration in the reactor coolant.

The most important intelligence available to the plant operator, enabling him to determine whether dilution or boration of the RCS is necessary, is the position of the control rods. For example, if the control rods are below their desired position, the operator must borate the reactor coolant to bring the rods outward. If, on the other hand, the control rods are above their desired position, the operator must dilute the reactor coolant to bring the rods inward.

During periods of plant loading, the reactor coolant expands as its temperature rises. The pressurizer absorbs this expansion as the level controller raises the level setpoint to the increased level associated with the new power level. The excess coolant due to RCS expansion is let down and stored in the volume control tank. During this period, the flow through the letdown orifice remains constant, and the charging flow is reduced by the pressurizer level control signal, resulting in an increased temperature at the regenerative heat exchanger outlet. The temperature controller downstream from the letdown heat exchanger increases the component cooling waterflow to maintain the desired letdown temperature.

During periods of plant unloading, the charging flow is increased to make up for the coolant contraction not accommodated by the programmed reduction in pressurizer level.

C. Hot Shutdown

If required for periods of maintenance or following spurious reactor trips, the reactor can be held subcritical but with the capability to return to full power within the period of time it takes to withdraw control rods. During this hot shutdown period, temperature is maintained at no-load T_{avg} by initially dumping steam to remove core residual heat or, at later stages, by running reactor coolant pumps to maintain system temperature.

Following shutdown, xenon buildup occurs and increases the degree of shutdown; i.e., initially, with initial xenon concentrations and all control rods inserted, the core is maintained at a minimum of 1-percent $\Delta k/k$ subcritical. The effect of xenon buildup is to increase this value to a maximum of about 3-percent $\Delta k/k$ at about 9 h following shutdown from equilibrium full-power conditions. If hot shutdown is maintained past this point, xenon decay results in a decrease in degree of shutdown. Since the value of the initial xenon concentration is about 3-percent $\Delta k/k$ (assuming that an equilibrium concentration has been reached during operation), boration of the reactor coolant is necessary to counteract the xenon decay and maintain shutdown.

If a rapid recovery is required, dilution of the system may be performed to counteract this xenon buildup. However, after the xenon concentration reaches a peak, boration must be performed to maintain the reactor subcritical as the xenon decays out.

D. Cold Shutdown

Cold shutdown is the operation which takes the reactor from hot shutdown conditions to cold shutdown conditions: reactor is subcritical by at least 1-percent $\Delta k/k$ and $T_{avg} \leq 200°F$.

Before initiating a routine cold shutdown, the RCS hydrogen concentration is lowered by reducing the volume control tank overpressure, by replacing the volume control tank hydrogen atmosphere with nitrogen, and by continuous purging to the gaseous waste processing system.

Optionally, the RCS hydrogen concentration may be lowered by chemical degassing while in cold shutdown. Chemical degassing consists of the addition of hydrogen peroxide into the chemical addition tank to consume the RCS dissolved hydrogen. Chemical degassing may be performed in conjunction with, or in lieu of, the mechanical degassing method described in the previous paragraph.

Before cooldown and depressurization of the reactor plant are initiated, the reactor coolant boron concentration is increased to the cold shutdown value. After the boration is completed and reactor coolant samples verify that the concentration is correct, the operator resets the RMCS for leakage makeup and system contraction at the shutdown reactor coolant boron concentration.

Contraction of the coolant during cooldown of the RCS results in actuation of the pressurizer level control to maintain normal pressurizer water level. The charging flow is increased relative to letdown flow and results in a decreasing volume control tank level. The volume control tank level controller automatically initiates makeup to maintain the inventory.

After the RHRS is placed in service and the reactor coolant pumps are shut down, further cooling of the pressurizer liquid is accomplished by charging through the auxiliary spray line. Coincident with plant cooldown, a portion of the reactor coolant flow is diverted from the RHRS to the CVCS for cleanup. Demineralization of ionic radioactive impurities and stripping of fission gases reduce the reactor coolant activity level sufficiently to permit personnel access for refueling or maintenance operations.

9.3.4.1.3 Safety Evaluation

The classification of structures, components, and systems is presented is section 3.2. A further discussion on seismic design categories is given in section 3.7. Conformance with Nuclear Regulatory Commission general design criteria for the plant systems, components, and structures important to safety is discussed in section 3.1. Section 1.9 provides a discussion on applicable regulatory guides.

9.3.4.1.3.1 Reactivity Control. Anytime the plant is at power, the quantity of boric acid retained and ready for injection always exceeds that quantity required for normal cold shutdown, assuming that the control assembly of greatest worth is in its fully withdrawn position. This quantity always exceeds the quantity of boric acid required to bring the reactor to hot shutdown and to compensate for subsequent xenon decay. An adequate quantity of boric acid is also available in the refueling water storage tank to achieve cold shutdown.

When the reactor is subcritical, i.e., during cold or hot shutdown, refueling, and approach to criticality, the neutron source multiplication is continuously monitored and indicated. Any

appreciable increase in the neutron source multiplication, including that caused by the maximum physical boron dilution rate, is slow enough to give ample time to start a corrective action to prevent the core from becoming critical. (The boron dilution accident is discussed in subsection 15.4.6.) The rate of boration, with a single boric acid transfer pump operating, is sufficient to take the reactor from full-power operation to 1-percent shutdown in the hot condition, with no rods inserted, in a few hours. In a few additional hours enough boric acid can be injected to compensate for xenon decay, although xenon decay below the equilibrium operating level will not begin until approximately 25 h after shutdown. Additional boric acid is employed if it is desired to bring the reactor to cold shutdown conditions.

Two separate and independent flow paths are available for reactor coolant boration, i.e., the charging line and the reactor coolant pump seal injection line. A single failure does not result in the inability to borate the RCS.

If the normal charging line is not available, charging to the RCS is continued via reactor coolant pump seal injection at the rate of approximately 5 gal/min per pump. At the charging rate of 20 gal/min (5 gal/min per reactor coolant pump), the time required to add enough boric acid to solution to counteract xenon decay is greater than the time with normal charging available, but still within a few hours. Xenon decay below the full-power equilibrium operating level will not begin until approximately 25 h after the reactor is shut down.

As backup to the normal boric acid supply, the operator can align the refueling water storage tank outlet to the suction of the charging pumps. Other systems can be applied in mode 6 to comply with Technical Requirements Manual requirements. RHR can be available for boration in mode 6 under certain conditions as described in paragraph 5.4.7.2.3.6. The safety injection system can be available for boration in mode 6 when the reactor vessel head is removed. Additional details are provided in the Technical Requirements Manual.

Since inoperability of a single component does not impair ability to meet boron injection requirements, the Technical Specifications and Technical Requirements Manual, as applicable, allow components to be temporarily out of service for repairs. However, with an inoperable component, the ability to tolerate additional component failure is limited. Therefore, the Technical Specifications and Technical Requirements Manual, as applicable, require action to effect repairs of an inoperable component, restrict permissible repair time, and require demonstration of the operability of the redundant component.

9.3.4.1.3.2 Reactor Coolant Purification. The CVCS is capable of reducing the concentration of ionic isotopes in the purification stream as required in the design basis. This is accomplished by passing the letdown flow through one of the mixed bed demineralizers which removes ionic isotopes, except those of cesium, molybdenum, and yttrium, with a minimum decontamination factor of 10. Through occasional use of the cation bed demineralizer, the concentration of cesium can be maintained below 1.0 μcm^3, assuming 1 percent of the rated core thermal power is being produced by fuel with defective cladding. The cation bed demineralizer is capable of passing the maximum purification letdown flow, though only a portion of this capacity is normally utilized. Each mixed bed demineralizer is capable of processing the maximum purification letdown flowrate. If the normally operating mixed bed demineralizer's resin has become exhausted, the second demineralizer can be placed in service. Each demineralizer is designed, however, to operate for one core cycle with 1-percent defective fuel.

A further cleanup feature is provided for use during residual heat removal operations. A remotely operated valve admits a bypass flow from the RHRS into the letdown line at a point upstream of the letdown heat exchanger. The flow passes through the heat exchanger and

then passes through one of the mixed bed demineralizers and the reactor coolant filter to the volume control tank. The fluid is then returned to the RCS via the normal charging route.

The maximum temperature that will be allowed for the mixed bed and cation bed demineralizers is approximately 140°F. If the temperature of the letdown stream approaches this level, the flow will be automatically diverted so as to bypass the demineralizers. If the letdown is not diverted, the only consequence will be a decrease in ion removal capability. Ion removal capability starts to decrease when the temperature of the resin goes above approximately 160°F for anion resin or above approximately 250°F for cation resin. The resins do not lose their exchange capability immediately. Ion exchange still takes place (at a faster rate) when temperature is increased. However, with increasing temperature, the resin loses some of its ion exchange sites along with the ions that are held at the lost sites. The ions lost from the sites may be reexchanged farther down the bed. The number of sites lost is a function of the temperature reached in the bed and of the time the bed remains at the high temperature. Capability for ion exchange will not be lost until a significant portion of the exchange sites is lost from the resin.

No safety problem is associated with overheating the demineralizer resins. The only effect on reactor operating conditions would be a possible increase in the reactor coolant activity level. If the activity level in the reactor coolant were to exceed the limit given in the Technical Specifications, reactor operation would be restricted.

The ability of the CVCS to maintain reactor coolant chemistry requirements within the Technical Requirements Manual limits is in conformance with General Design Criterion 14 as it relates to ensuring reactor coolant pressure boundary material integrity.

9.3.4.1.3.3 Seal Water Injection. Flow to the reactor coolant pump seals is ensured, since there are three charging pumps, any one of which is capable of supplying the normal charging line flow plus the nominal seal waterflow.

9.3.4.1.3.4 Hydrostatic Testing of the Reactor Coolant System. The CVCS provides a path for providing water used to pressurize the RCS to its maximum specified hydrostatic test pressure.

9.3.4.1.3.5 Leakage Provisions. The CVCS components, valves, and piping which see radioactive service are designed to limit leakage to the atmosphere. The following preventive means limit radioactive leakage to the environment:

A. Where pressure and temperature conditions permit, diaphragm-type valves are used to essentially eliminate leakage to the atmosphere.

B. All packed valves which are larger than 2 in. and which are designated for radioactive service are provided with a stuffing box and lantern leakoff connections.

C. All control (modulating) and three-way valves are either provided with stuffing box and leakoff connections or are totally enclosed.

D. All piping joints and connections are welded except where flanged connections are provided to facilitate maintenance and hydrostatic testing.

E. The CVCS components (i.e., piping, valves, pumps, heat exchangers, etc.) are located in rooms that are provided with leak detecting floor drains, as discussed in subsection 9.3.3.

The volume control tank provides an inferential measurement of leakage from the CVCS as well as the RCS. The amount of leakage can be inferred from the amount of makeup added by the RMCS.

During normal operation, the hydrogen and fission gases in the volume control tank are continuously purged to the waste processing system to limit the release of radioactive gases through leakage by maintaining the radioactive gas level in the reactor coolant several times lower than the equilibrium level. Also provided are two mixed bed demineralizers that maintain reactor coolant purity, thus reducing the radioactivity level of the RCS water.

Automatic isolation valves are provided for all CVCS lines that penetrate reactor containment, with the exception of the reactor coolant pump seal water injection lines. The use of automatic containment isolation valves in the letdown and seal water return lines precludes the transport of reactor coolant outside containment during or following a serious transient or accident.

The above provisions address the requirements of NUREG-0737, item III.D.1.1, for the CVCS.

9.3.4.1.3.6 Ability to Meet the Safeguards Function. A failure analysis of the portion of the CVCS that is safety related (used as part of the ECCS) is included as part of the ECCS failure analysis presented in tables 6.3.2-5 and 6.3.2-6.

Those portions of the CVCS utilized in the safety-grade cold shutdown operation are included as part of the RHRS failure analysis presented in table 5.4.7-4.

The use of the CVCS in conjunction with the emergency core cooling system in providing reactor coolant makeup and boration is in conformance with General Design Criteria 5, 29, 33, and 35.

9.3.4.1.3.7 Heat Tracing. Heat tracing requirements for boric acid solutions depend mainly on the solution concentration. The concentration of boric acid in the CVCS ranges from 10 ppm to 4 weight-percent boric acid. Electrical heat tracing low temperature alarming capability is provided as required on CVCS components which contain 4 weight-percent boric acid to ensure the temperature is maintained at a temperature of 65°F or higher. Refer to paragraph 9.3.4.1.2 for more information.

9.3.4.1.3.8 Abnormal Operation. The CVCS is capable of making up for a small RCS leakoff up to approximately 130 gal/min using one centrifugal charging pump and still maintaining seal injection flow to the reactor coolant pumps. This also allows for a minimum RCS cooldown contraction. This is accomplished with the letdown isolated.

9.3.4.1.4 Tests and Inspections

As part of plant operation, periodic tests, surveillance inspections, and instrument calibrations are made to monitor equipment condition and performance. Most components are in use regularly; therefore, assurance of the availability and performance of the systems and equipment is provided by control room and/or local indication.

Inservice inspection of piping, pumps, and valves is performed in accordance with the requirements of ASME Section XI as discussed in section 6.6 and subsection 3.9.6, respectively.

Technical Specifications and requirements in the Technical Requirements Manual have been established concerning calibration, checking, and sampling of the CVCS.

Refer to section 14.2 for information for the initial test program.

9.3.4.1.5 Instrumentation Application

Process control instrumentation is provided to acquire data concerning key parameters about the CVCS. The location of the instrumentation is shown on drawings 1X4DB114, 1X4DB115, 1X4DB116-1, 1X4DB116-2, 2X4DB116-2, 1X4DB117, and 1X4DB118).

The instrumentation furnishes input signals for monitoring and/or alarming purposes. Indications and/or alarms are provided for the following parameters:

- Temperature.
- Pressure.
- Flow.
- Water level.

The instrumentation also supplies input signals for control purposes. Some specific control functions are listed below:

A. Letdown flow is diverted to the volume control tank upon high-temperature indication upstream of the mixed bed demineralizers.

B. Pressure upstream of the letdown heat exchanger is controlled to prevent flashing of the letdown liquid.

C. Charging flowrate is controlled during charging pump operation.

D. Water level is controlled in the volume control tank.

E. Temperature of the boric acid solution in the batching tank is maintained.

F. Reactor makeup is controlled.

G. Temperature of letdown flow to the boron thermal regeneration system is controlled.

H. Temperature of the chilled waterflow to the letdown chiller heat exchanger is controlled.

I. Temperature of letdown flow return from the boron thermal regeneration demineralizers is controlled.

9.3.4.2 Boron Recycle System

The boron recycle system (BRS), which is shared between the two units, processes reactor coolant effluent that can be readily reused as makeup. The system decontaminates the effluent by means of demineralization.

9.3.4.2.1 Design Bases

9.3.4.2.1.1 Collection Requirements. The BRS collects and processes RCS effluent, most of which is the deaerated, tritiated, borated, and radioactive water from the letdown and process drains.

The BRS is designed to collect, via the letdown line in the CVCS, the excess reactor coolant that results from the following plant operations during one core cycle:

A. Dilution for core burnup from approximately 1200 ppm boron at the beginning of an annual core cycle to approximately 10 ppm near the end of the core cycle.

B. Hot shutdowns and startups. Four hot shutdowns are assumed to take place during an annual core cycle.

C. Cold shutdowns and startups. Three cold shutdowns are assumed to take place during an annual core cycle.

D. Refueling shutdown and startup.

The BRS also collects water from the following sources:

A. Reactor coolant drain tank (liquid waste processing system), which collects leakoff type drains from equipment inside the containment.

B. Volume control tank and charging pump suction pressure reliefs (CVCS) and safety injection, residual heat removal pressure reliefs.

C. Boric acid blending tee (CVCS), which provides storage of boric acid if a boric acid tank must be emptied for maintenance. The boric acid solution is stored in a recycle holdup tank after first being diluted with reactor makeup water by the blending tee to ensure against precipitation of the boric acid in the unheated recycle holdup tank.

D. Accumulators (safety injection system), which collect effluent resulting from leak testing of accumulator check valves.

E. Liquid waste processing system.

F. Spent fuel pool pumps (spent fuel pool cooling and cleanup system), which provide a means of storing the fuel transfer canal water in case maintenance is required on the transfer equipment.

G. Valve leakoffs and equipment drains.

H. Safety injection system, which accepts flush water when boron injection tank valves are being tested or flushed.

9.3.4.2.1.2 Capacity Requirement. The BRS is designed to process the total volume of water collected during a core cycle as well as short-term surges. The design surge is that produced by a cold shutdown and subsequent startup during the latter part of a core cycle or by a refueling shutdown and startup.

9.3.4.2.2 System Description

The BRS is shown in drawings AX4DB123-1 and AX4DB123-2. The codes and standards to which the individual components of the BRS are designed are listed in section 3.2. When water

is directed to the recycle holdup tank, the recycle evaporator feed demineralizers and filters will normally be bypassed. The recycle evaporator feed pumps can be used to transfer liquid from one recycle holdup tank to the other if desired.

Piping connections have been provided to permit the use of both a portable demineralizer system and a portable filtration system, which are located in the radwaste processing facility.

9.3.4.2.2.1 Component Descriptions. A summary of principal component data is given in table 9.3.4-3; the code requirements are given in section 3.2.

9.3.4.2.2.1.1 Recycle Evaporator Feed Pumps. Two centrifugal, canned motor pumps were installed to recirculate water from the recycle holdup tanks through the recycle evaporator feed demineralizers for cleanup and to feed the radwaste processing facility demineralizer system. An auxiliary discharge connection is provided to return water to the fuel transfer canal from the recycle holdup tanks, if those tanks were used for storage of transfer canal water during refueling equipment maintenance. Another auxiliary discharge connection is provided to supply water to the suction of the charging pumps (CVCS) for refilling the RCS after loop or system drain.

9.3.4.2.2.1.2 Recycle Holdup Tanks. Two recycle holdup tanks provide storage of radioactive fluid which is discharged from the RCS during startup, shutdown, load changes, and boron dilution. The sizing criteria are based on the design surge produced by a cold shutdown and subsequent startup during the latter part of core cycle or by refueling shutdown and startup.

Each tank has a diaphragm which prevents air from dissolving in the water and prevents the hydrogen and fission gases in the water from mixing with the air. The volume in the tank above the diaphragm is continuously ventilated with building supply air, and any gas which accumulates below the diaphragm is intermittently vented to the gaseous waste processing system.

In addition to the collection of effluents, the recycle holdup tanks perform the following functions:

A. Serve as a head tank for the recycle evaporator feed pumps.

B. Provide holdup for an RCS drain to the centerline of the reactor vessel nozzles, including the pressurizer and steam generators.

C. Provide storage for refueling transfer canal water during refueling equipment maintenance.

D. Collect discharges from the various relief valves.

9.3.4.2.2.1.3 Recycle Evaporator Feed Demineralizers. Two flushable, mixed bed demineralizers remove fission products from the fluid directed to the recycle holdup tanks. The demineralizers also provide a means of cleaning the recycle holdup tank contents via recirculation.

9.3.4.2.2.1.4 Recycle Evaporator Condensate Demineralizer. A flushable, anion demineralizer is provided as a polishing demineralizer for cleanup of the RMWST contents. Although the bed may become saturated with boron at the normally low concentration (at 10 ppm), it will still remove boron if the concentration increases.

9.3.4.2.2.1.5 Recycle Evaporator Feed Filters. These backflushable filters collect resin fines and particulates from the fluid entering the recycle holdup tanks.

9.3.4.2.2.1.6 Recycle Evaporator Condensate Filter. This filter collects resin fines and particulates from the boric acid evaporator condensate stream.

9.3.4.2.2.1.7 Recycle Holdup Tank Vent Ejector. The ejector is designed to pull gases from under the diaphragm in a recycle holdup tank and deliver them to the gaseous waste processing system. Nitrogen, provided by the standby waste gas compressor, provides the motive force.

9.3.4.2.2.2 System Operation. The BRS is manually operated with the exception of a few automatic protection functions, which:

A. Protect the recycle evaporator feed demineralizers from a high inlet temperature and a high differential pressure.

B. Prevent a high vacuum from being drawn on the recycle holdup tank diaphragm.

C. Protect the recycle evaporator feed pumps from low net positive suction head.

The BRS has sufficient instrumentation readouts and alarms to provide the operator information to ensure proper system operation.

9.3.4.2.2.2.1 Recycle Holdup Tank Venting. Because hydrogen is dissolved in the reactor coolant at an overpressure of approximately one atmosphere, a portion of the hydrogen along with fission gases may come out of solution in the recycle holdup tank under the diaphragm. The hydrogen and fission gases are vented to the gaseous waste processing system as required. The gas volume under the recycle holdup tank diaphragm should be confirmed nonflammable or vented before and after an RCS loop drain or a drain from the fuel storage area (or fuel transfer canal).

The general process for venting either recycle holdup tank is described below.

A. All inlets to the recycle holdup tank are closed.

B. The recycle holdup tank is emptied of water by processing through the radwaste processing facility systems.

C. The standby waste gas compressor is lined up to the recycle holdup tank vent ejector. Normally, the standby compressor will feed the other waste gas compressor, which is lined up to a catalytic recombiner and a high-activity gas decay tank. However, in the event of a recycle holdup tank diaphragm leak or after an RCS loop drain or spent fuel pool drain, a shutdown gas decay tank is used instead of a high-activity gas decay tank. This prevents accumulation of air; i.e., nitrogen, in the high-activity gas decay tanks.

D. The standby gas compressor is started up and the vent from the holdup tank is opened. The vent flow is throttled to approximately between 1 sf^3/min and 3 sf^3/min. At this time, a sample of the vent gases can be taken to check the composition.

E. When the gases have been vented from the recycle holdup tank, the pressure in the vent line decreases, automatically tripping the recycle holdup tank vent isolation valve closed.

F. After the vent isolation valve closes, the manual vent valve is closed; the gas compressor is shut down; and the recycle holdup tank inlets and outlets are lined up for normal use.

9.3.4.2.2.2.2 Maintenance Drains. When large amounts of water must be drained from the RCS or the fuel storage area (or fuel transfer canal) to the BRS, a recycle holdup tank is drained of water and vented to the gaseous waste processing system. The water can then be stored in this tank until maintenance is completed and, after checking the chemistry, returned. After returning the water, the recycle holdup tank is again vented to the gaseous waste processing system, where it is directed to a shutdown gas decay tank to prevent accumulation of air; i.e., nitrogen in the high-activity gas decay tanks during the venting.

9.3.4.2.2.2.3 Reactor Makeup Water Cleanup. If the reactor makeup water requires purification, it can be recirculated through the recycle evaporator condensate demineralizer until its chemistry is within specifications. If further processing is necessary, water from the RMWST can be directed through the recycle evaporator condensate demineralizer and into the recycle holdup tanks.

9.3.4.2.3 Safety Evaluation

Malfunctions in the BRS do not affect the safety of station operations. The BRS is designed to tolerate equipment faults with critical functions being met by the use of two pieces of equipment so that the failure of one will, at most, reduce the capacity of the BRS but not completely shut it down. Because of the large surge capacity of the BRS, the occasional nonavailability of the system can be tolerated for brief periods of time. Also, backup is provided by a portable filtration system and portable demineralizer system located in the radwaste processing facility.

9.3.4.2.4 Tests and Inspections

The BRS is in intermittent use throughout normal reactor operation. Periodic visual inspection and preventive maintenance are conducted using accepted industry practice. Refer to chapter 14 for further information.

9.3.4.2.5 Instrumentation Application

The instrumentation available for the BRS is discussed below. Alarms are provided as noted. There is also a common alarm on the main control board which indicates any alarms on the BRS panel.

9.3.4.2.5.1 <u>Temperature</u>. Instrumentation is provided to measure the temperature of the inlet flow to the recycle evaporator feed demineralizers and to control a three-way bypass valve. If the inlet temperature becomes too high, the instrumentation aligns the valve to bypass the demineralizers. Local temperature indication and a high-temperature alarm on the BRS panel are provided by this instrumentation.

9.3.4.2.5.2 <u>Pressure</u>.

A. Instrumentation is provided to measure the pressure differential across the recycle evaporator feed demineralizers and to control the three-way valve discussed above (but independently of the temperature control). If the pressure drop through the demineralizers is too high, this instrumentation aligns the valve to divert flow directly to the recycle evaporator feed filters. Local pressure

differential indication and a high alarm on the BRS panel are provided by this instrumentation.

B. Instrumentation is provided to measure and give local indication of the discharge pressure of each recycle evaporator feed pump.

C. Instrumentation is provided to measure the pressure in the recycle holdup tank vent line and to control a shutoff valve in the vent line. This instrumentation is used during holdup tank venting operations. When the pressure in this line becomes too low, the valve will be automatically closed to protect the holdup tank diaphragm from an excessive differential pressure across it. Local pressure indication and low-pressure alarm on the BRS panel are provided.

9.3.4.2.5.3 Flow.

A. Instrumentation is provided which gives local indication of the recycle holdup tank vent purge flow.

B. Instrumentation is provided which gives local indication of recycle evaporator feed flow.

9.3.4.2.5.4 Level. Instrumentation is provided to give an indication of the water level of each recycle holdup tank. Both high-level and low-level alarms are provided by this instrumentation at the BRS panel. If, after reaching the low-level alarm setpoint, the recycle evaporator feed pumps are not stopped, the holdup tank level will continue to decrease until a second low-level point is reached and a level-actuated control circuit stops the pumps.

9.3.5 AUXILIARY GAS SYSTEMS

The auxiliary gas systems provide hydrogen, oxygen, and nitrogen gases to the plant systems as required.

9.3.5.1 Design Bases

9.3.5.1.1 Safety Design Basis

The VEGP is designed such that plant equipment does not rely upon the auxiliary gas systems (hydrogen, oxygen, nitrogen) to perform its safety function; thus, there is no safety design basis for the system.

9.3.5.1.2 Power Generation Design Bases

The auxiliary nitrogen gas system function is to supply nitrogen for pressurizing, blanketing, and purging of various plant components.

The auxiliary hydrogen gas system function is to supply hydrogen to the generator for cooling and to the chemical and volume control system for oxygen scavenging. In addition, two standard hydrogen bottles, arranged in two headers (one header operating, the other header

acting as backup) are provided to assure a continuous supply of gas to the reactor coolant drain tanks.

The auxiliary oxygen gas system function is to store and supply oxygen gas to the hydrogen catalytic recombiners of the gaseous waste processing system.

9.3.5.2 System Description

The auxiliary gas systems are shown in drawings AX4DB176-1, AX4DB176-2, and 1X4DB176-3. The codes and standards applicable to the system are indicated in table 3.2.2-1. Table 9.3.5-1 provides a listing of design parameters for the major system components.

9.3.5.2.1 General Description

The auxiliary nitrogen gas system consists of:

- A liquid nitrogen cryogenic storage vessel.
- A liquid nitrogen cryogenic pump.
- High-pressure vaporizer.
- Low-pressure vaporizers.
- A gaseous nitrogen storage tube bank assembly.
- A high-and-low pressure control station.
- A high-pressure temperature control switch.
- A low-pressure temperature control station.
- A gaseous nitrogen tube trailer discharging stanchion.
- All interconnecting piping and valves with associate vent and pressure relief devices.

The auxiliary hydrogen gas system consists of:

- A pressure control station.
- A temperature control station.
- A gaseous hydrogen tube trailer discharging stanchion.
- All interconnecting piping and valves with associated vents and pressure relief devices.
- Two standard hydrogen bottles.

The auxiliary oxygen gas system consists of:

- A gas storage tube bank assembly.
- A pressure control station.
- A gaseous oxygen tube trailer discharging stanchion.
- All interconnecting piping and valves with associated vents and pressure relief devices.

9.3.5.2.2 Component Description

9.3.5.2.2.1 Liquid Nitrogen Storage Tank. Liquid nitrogen is stored under its own vapor pressure as a saturated liquid in a nickel steel inner, carbon steel outer storage vessel. The net vessel capacity is 6000 gal. This is an equivalent gaseous capacity of 558,700 sf^3. The tank is American Society of Mechanical Engineers (ASME) coded for a maximum allowable working pressure of 250 psig and is provided as a unit with outlet piping connections attached. The annular space between the inner and outer vessels is filled with powdered insulation and maintained under vacuum.

9.3.5.2.2.2 Liquid Nitrogen Pump. Since the maximum working pressure of the nitrogen storage tank is 250 psig, a cryogenic liquid nitrogen pump is utilized to provide a supply of 2400 psig nitrogen. It is a single cylinder positive displacement pump with the entire "cold" pumping assembly enclosed in a two-piece vacuum jacketed sump, which permits the pump to remain cold in the standby condition with a minimum of heat leak. The net positive suction head (NPSH) for full flow is only 2 psi.

9.3.5.2.2.3 High-Pressure Vaporizer. Liquid nitrogen is vaporized by a high-pressure, taperfin, natural convection vaporizer, which vaporizes and superheats cryogenic nitrogen using heat from the ambient air. The vaporizer is stainless steel lined, aluminum jacketed, with a maximum working pressure of 2500 psig.

9.3.5.2.2.4 Low-Pressure Vaporizers. Four aluminum-finned tubing units installed in two parallel banks with a total nitrogen vaporization capacity of 6000 sf^3/h per bank provide continuous nitrogen vaporization under ambient conditions of 90 percent relative humidity, 70°F, calm, and no sunlight. In the event of frost buildup on the active bank, flow is redirected to the other bank to allow defrosting.

9.3.5.2.2.5 Gaseous Nitrogen Storage Tubes. Three ASME coded gaseous nitrogen storage tubes, each with a capacity of 5809 sf^3, are provided, with a maximum allowable working pressure of 2450 psig.

9.3.5.2.2.6 Nitrogen Pressure Control Stations. Two pressure control stations are provided, affording pressures delivered to house lines at 100 psig and 700 psig for nitrogen service.

9.3.5.2.2.7 Nitrogen Temperature Control Stations. One temperature control valve is provided for the low-pressure nitrogen system.

9.3.5.2.2.8 Nitrogen Tube Trailer Discharging Stanchion. One gaseous nitrogen tube trailer discharge stanchion is provided for high-pressure system fill.

9.3.5.2.2.9 Liquid Hydrogen Storage Tank. This equipment has been removed.

9.3.5.2.2.10 Hydrogen Ambient Air Vaporizers. This equipment has been removed.

9.3.5.2.2.11 Hydrogen Pressure Control Station. One pressure control station is provided regulating hydrogen gas pressure to 100 psig at 125 sf^3/min.

9.3.5.2.2.12 Hydrogen Temperature Control Station. This equipment has been abandoned in place.

9.3.5.2.2.13 Tube Trailer Discharge Stanchion. One gaseous hydrogen tube trailer discharge stanchion is provided. A tube trailer is connected to the stanchion and provides the hydrogen requirements for the plant.

9.3.5.2.2.14 Gas Storage Bank Assembly. Four ASME coded gaseous oxygen storage tubes, each with a capacity of 8740 sf^3, are provided, with maximum allowable working pressure 2450 psig.

9.3.5.2.2.15 Pressure Control Station. A pressure control station with dual regulators is provided, affording pressures of 60 psig from the active storage tank and 55 psig for reserve oxygen capacity.

9.3.5.2.2.16 Tube Trailer Discharge Stanchion. One gaseous oxygen tube trailer discharge stanchion is provided for system fill.

9.3.5.2.3 System Operation

Liquid nitrogen is stored under its own vapor pressure as a saturated liquid. An economizer circuit minimizes product loss due to vessel boiloff under low-flow conditions. A pressure build circuit maintains pressure at a suitable level above house line pressures. For the low-pressure system, liquid is withdrawn, vaporized, and regulated to 100 psig for delivery to house lines. For high-pressure nitrogen, liquid is withdrawn by the pump, which pressurizes the liquid to 2400 psig. This liquid is vaporized and discharged into the high-pressure storage module. The gas is then regulated to 700 psig and routed to house lines.

A tube trailer with gaseous hydrogen is used to supply the hydrogen requirements for the plant. The gas is pressure regulated to house lines at 100 psig.

Gaseous oxygen is drawn from the storage tube assembly and pressure reduced by two parallel regulators, one for each of two storage banks. The active storage tube bank regulator supplies gas at 60 psig; the reserve tube storage bank regulator, activated by automatic switchover when the active bank is depleted, supplies gas at 55 psig.

9.3.5.3 Safety Evaluation

The auxiliary gas systems are required for normal plant operation and startup of the plant. The auxiliary gas systems are not required for safe shutdown of the plant; therefore, the auxiliary gas systems are not designed to meet Seismic Category 1 requirements as the single failure criterion.

The auxiliary gas systems are located outside of main buildings. The storage tanks are analyzed as a potential missile source.

Location of the storage tanks is such as not to cause diesel engine air starvation in case of tank rupture. See subsection 9.5.8 for a further discussion of the diesel generator combustion air intake.

9.3.5.4 Tests and Inspections

9.3.5.4.1 Storage Vessel Testing

A. Each storage vessel is hydrostatically tested in accordance with ASME Boiler and Pressure Vessel Code UPV, Item UG-99, Standard Hydrostatic Test.

B. After heat treatment, material test samples with each furnace quantity of storage bank tubes are tested for tensile and yield characteristics.

C. Each vessel is examined using the magnetic particle method. This test consists of developing a magnetic field over the surface of the vessel and sprinkling iron particles over the surface. Irregularities in the pattern of the iron particles indicate defects at the surface and slight defects at the subsurface.

9.3.5.4.2 Pressure Testing of Manifolds

Before a manifold is installed on a vessel, the manifold is tested at 3000 psig minimum. After assembly the manifold is pressure tested at 90 percent of the relief devices, and all joints are soap checked for leaks.

9.3.5.5 Instrumentation Requirements

A low-level indication alarm is provided in the control room for liquid nitrogen storage tank level. A low-pressure indication alarm is located in the control room to indicate a low supply of gaseous oxygen.

The liquid nitrogen pump includes the following instruments for pump shutdown:

- Tank level switch.
- Low-temperature switch, high-pressure vaporizer discharge.
- Cavitation sensor.
- Motor overloads.

- High-pressure switch.

In addition, temperature and pressure indicators are located at various points within the system.

In addition to the above-mentioned instruments, the hydrogen and oxygen systems utilize pressure indicators at various points within their respective systems.

9.3.6 STANDBY LIQUID CONTROL SYSTEM (BOILING WATER REACTOR)

This subsection is not applicable to VEGP.

9.3.7 CHLORINE SUPPLY SYSTEM

9.3.7.1 <u>Design Bases</u>

9.3.7.1.1 Safety Design Bases

The chlorine supply system has no safety design basis.

9.3.7.1.2 Power Generation Design Bases

The system is designed to provide a biocide required for treatment of the river makeup water at the river intake structure to control biological growth.

The system provides biocide required for shock treatment of the circulating water at the circulating water pump intakes.

The biocide supply system provides biocide required for shock treatment of the nuclear service cooling water (NSCW) at the cooling tower outlet.

The biocide supply system provides treatment of potable water in accordance with requirements of the Georgia Department of Natural Resources Environmental Protection Division.

9.3.7.2 <u>System Description</u>

9.3.7.2.1 General Description

Biocide control facilities are provided for VEGP to allow for treatment of the systems described above as necessary to control biological fouling.

9.3.7.2.2 Component Description

Biocide application will be accomplished by use of a biocide (other than gaseous chlorine) or hypochlorite solution. New biofouling control agents will be evaluated for effectiveness prior to use.

The biocide application system for the potable water system consists of a hypochlorite injection pump which supplies liquid hypochlorite directly to the potable water system.

The chlorine sample lines from the NSCW cooling tower supply headers supply flow to the NSCW corrosion coupon racks which allow continuous monitoring of corrosion rates in the NSCW system. The return line from the corrosion coupon rack is connected to the abandoned chlorine supply line, and flow from the corrosion racks is returned to the NSCW cooling tower basins.

9.3.7.2.3 System Operation

Intermittent biocide application of the river water makeup system may be used to control biological activity. Continuous biocide application may be required during the Corbicula clam spawning season. The design capacity for the biocide application facility allows a dosage of 10 ppm. The liquid hypochlorite system may be operated at free residual chlorine levels up to 0.5 ppm for routine chlorination and 1.3 ppm for Corbicula control during the spawning season.

Biocide treatment of the circulating water is applied before the circulating water pump suction. The circulating water system hypochlorite liquid chlorinator is designed to be able to provide adequate biocide concentrations at the injection point. Biocide treatment of the circulating water is expected to last 1 h/day per unit, but the treatment frequency may vary on a daily basis during warmer summer months or may be once per week during winter months.

The biocide treatment for the NSCW is used as necessary to control biological growth. The NSCW liquid hypochlorite chlorinator is designed to provide a dosage of 3 ppm for the circulating water of the NSCW tower. The maximum free available residual chlorine during biocide application periods will be controlled to enhance biocidal action. For operation of the potable water system, see paragraph 9.2.4.2.2.3.

If treatment chemicals other than chlorine are used, treatment concentrations will be in accordance with test data which defines proper treatment levels for control of biofouling agents.

9.3.7.3 Safety Evaluation

The system inhibits algae growth by providing treatment of the river makeup water system, the turbine plant cooling water system, and the NSCW system.

If sodium hypochlorite is used as the biofouling control agent and potable water biological control agent, the solution will be stored in containers compatible with this solution.

If treatment chemicals other than sodium hypochlorite are used, safety precautions in accordance with manufacturer's recommendations will be utilized.

9.3.7.4 Inspection and Testing Requirements

The biocide application systems will be tested in accordance with written procedures prior to release for routine use.

9.3.7.5 Instrumentation Requirements

The biocide treatment dosage is controlled manually with remote raise/lower and on/off switch stations. The concentrations of biocontrol agents in treated systems are measured by laboratory analysis.

TABLE 9.3.1-1 (SHEET 1 OF 2)

COMPONENT DESCRIPTION COMPRESSED AIR SYSTEM

Air Compressors

Type	Reciprocating
Capacity, each (sf^3/min)	885
Motor (hp)	200
Design pressure (psig)	132
Type	Rotary
Capacity, each (sf^3/min)	750
Motor (hp)	200
Design pressure (psig)	125

Air Receivers

Capacity, each (ft^3)	150
Design pressure (psig)	150
Stored energy, each (ft-lb)	7
Design code	ASME Section VIII

Prefilters and Afterfilters

Type	Coalescing (prefilter) Particulate (afterfilter
Design pressure (psig)	150
Design code	ASME Section VIII

Aftercooler Moisture Separators

Type	Mechanical
Design pressure (psig)	132
Design code	ASME Section VIII

TABLE 9.3.1-1 (SHEET 2 OF 2)

Service Air Dryers

Type	Regenerative
Capacity, each (sf^3/min)	1200
Design pressure (psig)	150
Dewpoint design code	ASME Section VIII

Instrument Air Dryer

Type	Regenerative
Capacity, each (sf^3/min)	740
Design pressure (psig)	150
Design code	ASME Section VIII

TABLE 9.3.1-2 (SHEET 1 OF 3)

SAFETY-RELATED PNEUMATICALLY OPERATED VALVES

System	Quantity	Location	Design Function	Safe Position	Failure Mode on Loss of Air Supply	Comments
Containment fluid penetration isolation (table 6.2.4-1)	59	Various	Terminate process flow and/or isolate containment	Closed	Closed	
Safety injection system (SIS) (Note 1)	1 HV8882	SIS injection line from boron injection tank	Isolates SIS injection from SIS test header	Closed	Closed	
	8 HV8877A HV8877B HV8877C HV8877D HV8879A HV8879B HV8879C HV8879D	Accumulator test line	Isolates accumulators from SIS test header	Closed	Closed	
	4 HV8878A HV8878B HV8878C HV8878D	Accumulator fill line	Isolates accumulators from fill line	Closed	Closed	
	4 HV8889A HV8889B HV8889C HV8889D	SIS test lines	Isolates SIS lines from SIS test header	Closed	Closed	
Main feedwater system	8 FV510 FV520 FV530 FV540 LV5242 LV5243 LV5244 LV5245	Feedwater line to steam generators	Feedwater line and steam generator isolation	Closed	Closed	

TABLE 9.3.1-2 (SHEET 2 OF 3)

System	Quantity	Location	Design Function	Safe Position	Failure Mode on Loss of Air Supply	Comments
Nuclear service cooling water system	2 CV9446 CV9447	Nuclear service cooling water blowdown line	Secures blowdown on receipt of safety injection signal	Closed	Closed	
Residual heat removal (RHR) system	2 HV606 HV607	RHR heat exchanger outlet	Controls reactor coolant flow through RHR heat exchanger	Open	Open	
	2 FV618 FV619	RHR heat exchanger bypass	Ensures all RHR flow through RHR heat exchanger	Closed	Closed	
Chemical and volume control system (CVCS)	1 HV8145	Pressurizer auxiliary spray line	Provide pressurizer spray when RCPs tripped	Closed	Closed	
	1 HV15214	Letdown line in containment upstream of the penetration isolation valve	Stop letdown in event of line rupture in auxiliary building	Closed	Closed	
Safety injection (SI) system	2 HV10957 HV10958	RWST sludge mixing system inlet	Isolate sludge mixing system on RWST low level alarm	Closed	Closed	
Steam generator blowdown process (SGBP) system	8 HV15212A HV15212B HV15212C HV15212D HV15216A HV15216B HV15216C HV15216D	Blowdown lines upstream of the containment penetration	Stop blowdown in event of line rupture in auxiliary building	Closed	Closed	
Electric steam boiler system	2 AHV19722 AHV19723			Closed	Closed	Electric steam boilers and components located in the electric steam boiler building have been removed. All other equipment has been abandoned in place.

TABLE 9.3.1-2 (SHEET 3 OF 3)

System	Quantity	Location	Design Function	Safe Position	Failure Mode on Loss of Air Supply	Comments
Boron recycle system	2 HV12596 HV12597	Recycle holdup tank ventilation inlet	Serve as negative pressure boundary for piping penetration ventilation for containment isolation	Closed	Closed	

Note: Valves serve as pressure boundary devices.

TABLE 9.3.2-1

NUCLEAR SAMPLING SYSTEM - LIQUID SAMPLE POINTS

Sample Point No	Sample Point Name	Pressure (psig)	Temperature[a] (°F)
1	Reactor coolant system hot leg (loop 1 or 3)	2200	115
2	Pressurizer vapor space	100	115
3	Pressurizer liquid space	100	115
4	CVCS downstream of letdown heat exchanger	125	115
5	RHR downstream of heat exchanger (train A or B)	550	115
6	CVCS downstream of thermal regenerative heat exchanger	250	115
7	CVCS downstream of mixed bed demineralizer	50	115
8	Recycle holdup tank (outlet[b] of recycle evaporator feed pumps)	100	115

a. Maximum-under normal conditions.
b. Unit 1 only

TABLE 9.3.2-2

NUCLEAR SAMPLING SYSTEM - GASEOUS SAMPLE POINTS

Sample Point No	Sample Point Name	Pressure[a] (psig)	Temperature[a] (°F)
1	Recycle holdup tanks	Atmospheric	Ambient
2	Waste gas decay tanks	100	140
3	Reactor coolant drain tank	10	100
4	Volume control tank	15	115

a. Vendor normal conditions.

TABLE 9.3.2-3 (SHEET 1 OF 4)

TURBINE PLANT SAMPLING SYSTEM

Line No.	Sample Point Name	Analysis[b]
Turbine Building		
001	Condenser A hotwell east[a]	CC
003	Condenser A hotwell west[a]	CC
005	Condenser B hotwell east[a]	CC
007	Condenser B hotwell west[a]	CC
046	Condenser condensate makeup[a]	CC
009	Condenser C hotwell east[a]	CC
011	Condenser C hotwell west[a]	CC
027	Condenser P discharge	Na
		O_2
		SC
		pH
		CC
502	Filter/demineralizer vessel 1[a]	CC
		Na
503	Filter/demineralizer vessel 2[a]	CC
		Na
504	Filter/demineralizer vessel 3[a]	CC
		Na

TABLE 9.3.2-3 (SHEET 2 OF 4)

Line No.	Sample Point Name	Analysis[b]
505	Filter/demineralizer vessel 4[a]	CC
		Na
506	Filter/demineralizer vessel 5[a]	CC
		Na
057	Demineralizer total effluent[c]	Na
		SC
		CC
507	Demineralizer backwash recirculator	SC
		CC
501	Feedwater chemical feed control	N_2H_4
		SC
058	Feedwater to steam generator	Na
		O_2
		SC
		pH
		N_2H_4
		CC
084	Steam generator blowdown system discharge	SC
		CC
		Na
019	SG001 blowdown	Na
		SC

TABLE 9.3.2-3 (SHEET 3 OF 4)

Line No.	Sample Point Name	Analysis[b]
		pH
		CC
020	SG002 blowdown	Na
		SC
		pH
		CC
021	SG003 blowdown	Na
		SC
		pH
		CC
022	SG004 blowdown	Na
		SC
		pH
		CC
066	Main steam from SG001	Na
		CC
067	Main steam from SG002	Na
		CC
068	Main steam from SG003	Na
		CC
069	Main steam from SG004	Na CC
059	Reheat steam to CIV3	Na[a]

TABLE 9.3.2-3 (SHEET 4 OF 4)

Line No.	Sample Point Name	Analysis[b]
		CC
060	Reheat steam to CIV4	Na[a]
		CC
061	Reheat steam to CIV2	Na[a]
		CC
062	Reheat steam to CIV5	Na[a]
		CC
063	Reheat steam to CIV1	Na[a]
		CC
064	Reheat steam to CIV6	Na[a]
		CC
041	Feedwater heater drain pump A discharge	CC
		Na[a]
042	Feedwater heater drain pump B discharge	CC
		Na[a]

a. These points are provided with grab sampling capability but are not always continuously monitored.

b. Symbols used:
SC - specific conductivity
CC - cation conductivity
TRB - turbidity

c. Continuous monitoring during startup only.

TABLE 9.3.2-4 (SHEET 1 OF 6)

PROCESS GRAB SAMPLE POINTS[a]

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
Turbine Building			
1	Feedwater heater 3A condenser outlet	40	110
2	Feedwater heater 3B condenser outlet	40	110
3	Feedwater heater 3C condenser outlet	40	110
4	Moisture separator drain tank A	40	77
5	Moisture separator drain tank B	40	77
6	Moisture separator drain tank C	40	77
7	Moisture separator drain tank D	40	77
8	Feedwater heater 6A drain	40	110
9	Feedwater heater 6B drain	40	110
10	Feedwater heater 5A	40	77
11	Feedwater heater 5B	40	77
12	Feedwater heater 1A drain	40	110
13	Feedwater heater 1B drain	40	110
14	Feedwater heater 1C drain	40	110
16	Steam jet air ejector inter- and after-condenser drain	10	110
17	Turbine plant closed cooling water	40	77
18	Condensate pump A discharge	40	77
19	Condensate pump B discharge	40	77
20	Condensate pump C discharge	40	77
21	Condenser circulating water	45	127

TABLE 9.3.2-4 (SHEET 2 OF 6)

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
Maintenance Building			
22	Deleted		
Yard Area			
23	River water makeup	10	Ambient
24	Circulating water blowdown	10	Ambient
25	Waste water effluent (from sump)	Atmospheric	Ambient
Auxiliary Building			
26	Boric acid blender discharge	25	75
28	Boric acid storage tank discharge	Atmospheric	75
29	Boric acid batching tank	Atmospheric	180
30	Boric injection surge tank	Atmospheric	180
31	Boric injection tank inlet	2735	165
32	Boric injection tank outlet	2735	165
33	Accumulator tank 1	700	120
34	Accumulator tank 2	700	120
35	Accumulator tank 3	700	120
36	Accumulator tank 4	700	120
37	Test lines return to recirculating water storage tank	2660	206
38	Recirculating water storage tank bottom	Atmospheric	Ambient
39	Safety injection pumps discharge	1670	206
40	Residual heat removal train A discharge	600	350
41	Residual heat removal train B discharge	600	350

TABLE 9.3.2-4 (SHEET 3 OF 6)

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
42	Recycle holdup tank 001, above diaphragm	Atmospheric	Ambient
43	Recycle holdup tank 002, above diaphragm	Atmospheric	Ambient
44	Recycle evaporator package, concentrates sample vessel[d]	65	120
45	Recycle evaporator package, distillate sample vessel[d]	65	120
46	Spray additive tank[e]		
47	Spray additive to eductors[e]	15	Ambient
48	CCW pump 005 discharge, train A	100	105
49	CCW pump 006 discharge, train B	100	105
50	ACCW heat exchanger D01 discharge	21	105
51	ACCW pumps discharge	130	105
52	Pipe chase	Atmospheric	Ambient
53	Pipe chase above R-D036	Atmospheric	Ambient
54	Pipe chase above R-D102	Atmospheric	Ambient
55	Recycle evaporator feed pump room (R-035)	Atmospheric	Ambient
56	Spent resin storage tank room	Atmospheric	Ambient
57	Pipe chase UC-D03	Atmospheric	Ambient
58	Valve gallery R-D102	Atmospheric	Ambient
59	Valve gallery R-D117	Atmospheric	Ambient
60	Valve gallery R-D54	Atmospheric	Ambient
61	Clean water sump pumps discharge	25	105

TABLE 9.3.2-4 (SHEET 4 OF 6)

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
62	RHR heat exchanger room, train B	Atmospheric	Ambient
63	RHR heat exchanger room, train A	Atmospheric	Ambient
64	Centrifugal charge pumps room, train B	Atmospheric	Ambient
65	Centrifugal charge pumps room, train A	Atmospheric	Ambient
66	Normal charging pump room	Atmospheric	Ambient
67	Pipe chase area, train A	Atmospheric	Ambient
68	Pipe chase area, train B	Atmospheric	Ambient
69	Boric acid storage pump room 1	Atmospheric	Ambient
70	Boric acid storage pump room 2	Atmospheric	Ambient
71	Boric acid storage pump room	Atmospheric	Ambient
72	Future tank room	Atmospheric	Ambient
73	Floor drain tank room	Atmospheric	Ambient
74	RHR pump room, train A	Atmospheric	Ambient
75	RHR pump room, train B	Atmospheric	Ambient
76	Waste holdup tank room	Atmospheric	Ambient
77	Boron recycle holdup tank room	Atmospheric	Ambient
78	Containment spray pump room, train A	Atmospheric	Ambient
79	Containment spray pump room, train B	Atmospheric	Ambient
80	Safety injection pump room, train B	Atmospheric	Ambient
81	Safety injection pump room, train A	Atmospheric	Ambient
82	CCW heat exchanger room, train A	Atmospheric	Ambient
83	CCW heat exchanger room, train B	Atmospheric	Ambient
84	ACCW heat exchanger room, train A	Atmospheric	Ambient

TABLE 9.3.2-4 (SHEET 5 OF 6)

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
85	ACCW heat exchanger room, train B	Atmospheric	Ambient
86	CCW pump room, train A	Atmospheric	Ambient
87	CCW pump room, train B	Atmospheric	Ambient
88	Spent fuel pool heat exchanger room, train A	Atmospheric	Ambient
89	Spent fuel pool heat exchanger room, train B	Atmospheric	Ambient
90	Turbine building drain system oil separator outlet	100	Ambient
91	Turbine building drain system demineralizer feed filter outlet	110	Ambient
92	Turbine building drain system demineralizer 001 outlet	100	Ambient
93	Turbine building drain system demineralizer 002 outlet	100	Ambient
94	Turbine building drain discharge filter outlet	100	Ambient
95	Electric steam boiler 001BD (Abandoned in place)	-	-
96	Electric steam boiler 002BD (Abandoned in place)	-	-
Control Building			
97	Control building drains sump pumps discharge	25	100
Fuel Handling Building			
98	Spent fuel pit filter outlet	65	120
99	Demineralizer inlet	160	120

TABLE 9.3.2-4 (SHEET 6 OF 6)

Sample Point No.	Sample Point Name	Pressure[b] (psig)	Temperature[b] (°F)
100	Demineralizer outlet	150	120
Auxiliary Feedwater Pumphouse			
101	Degasifier transfer pumps PO2 and PO3 discharge	25	70
102	Degasifier feed pump PO1 discharge	25	70
103	AFW pump train A discharge	1500	70
104	AFW pump train B discharge	1500	70
105	AFW pump train C discharge	1500	70
Nuclear Service Cooling Water Chemical Control Building			
106	Degasifier transfer pump discharge	40	70
107	Degasifier feed pump discharge	40	70
108	Phase separator bottoms	30	75
109	Decontaminant transfer pump	85	75
110	NSCW Unit 1 train B	145	95
111	NSCW Unit 1 train A	145	95

a. Additional grab sample points are provided on all continuous sampling lines of the turbine plant sampling system (table 9.3.2-3).

b. Under normal conditions.

c. Symbols used:

CC - cation conductivity
SC - specific conductivity
SS - suspended solids

d. Waste and recycle evaporators are abandoned in place.

e. Spray additive tank is abandoned in place.

TABLE 9.3.2-5 (SHEET 1 OF 2)

RADWASTE GRAB SAMPLE POINTS

Sample Point No.	Sample Point Name	Pressure (psig)	Temperature (°F)
1	Waste evaporator feed pump discharge[(a)]	110	100
2	Waste evaporator concentrates holdup tank pump to radwaste solidification[(a)]	50	170
3	Concentrates (sample vessel)	60	120
4	Distillates (sample vessel)	85	120
5	Waste evaporator discharge to demineralizer and filter	85	120
6	Waste evaporator condensate deminerlizer discharge[(a)]	80	120
7	Waste evaporator condensate pump discharge[(a)]	110	100
8	Chemical drain tank pump discharge	110	100
9	Spent resin sluice pump discharge	110	140
10	Laundry and hot shower pump discharge	110	100
11	Floor drain tank pump discharge	110	100
12	Waste monitor tank 009 pump discharge	110	100
13	Waste monitor tank 010 pump discharge	110	100
14	Floor drain tank 008 inlet piping	110	140
15	Floor drain tank 008 outlet piping	15	100

TABLE 9.3.2-5 (SHEET 2 OF 2)

Sample Point No.	Sample Point Name	Pressure (psig)	Temperature (°F)
16	Waste processing system-gaseous shutdown tanks[b]	100	140
17	Sampling system-gaseous[b] (sample vessel)	100	140
18	Waste gas decay tank[b] (sample vessel)	100	140

a. Evaporators are abandoned in place.

b. Other existing connections such as instrument test connections may be used as alternate sample collection points when so directed in approved plant procedures.

TABLE 9.3.2-6

POST-ACCIDENT SAMPLING SAMPLE POINTS

Sample Point Name	Pressure (psig)	Temperature (°F)
Reactor coolant system hot leg		
Maximum (operating)	Reference NSSL	
Post-accident	Reference NSSL	
Containment sump liquid	Reference NSSL	
Containment atmospheric gas	0 to 52	0 to 400

TABLE 9.3.2-7

ENVIRONMENTALLY QUALIFIED POST ACCIDENT VALVES

Valve Tag No.	Function
HV-8211	Containment isolation valve on post-accident gas sample return to containment atmosphere
HV-8212	Containment isolation valve on post-accident gas sample return to containment atmosphere
HV-8811A	Containment isolation valve on RHR emergency sump discharge line
HV-8811B	Containment isolation valve on RHR emergency sump discharge line
HV-3548	Containment isolation valve on sample from RCS hot leg
HV-3500	Isolation valve on sample from RCS hot leg loop 1
HV-2790A	Containment isolation valve on containment atmosphere sample
HV-2790B	Containment isolation valve on containment atmosphere sample
HV-2791A	Containment isolation valve on containment atmosphere sample
HV-8221	Isolation valve on containment atmosphere sample

TABLE 9.3.3-1 (SHEET 1 OF 3)

EQUIPMENT AND FLOOR DRAINAGE SYSTEM COMPONENT DATA

Component	No. of Pumps	Flow (gal/min)	Pressure (ft)
Reactor cavity sump pumps	2	50	130
Containment sump pumps	4	50	90
Penetration room sump pumps	2	50	95
Auxiliary building sump pumps	2	50	85
Radioactive drain sump pumps	2	50	70
Clean water sump pumps	2	50	125
NSCW pumphouse sump pumps	2	50	45
Diesel generator electrical tunnel sump pumps	2	50	100
Main steam and feedwater tunnel sump pumps	2	80	70
Control building sump pumps	2	150	120
Diesel generator building oily waste sump pumps	2	50	100
North firewater pumphouse oily waste separator pumps	2	75	47
Turbine building sump pumps	4	300	100
Turbine building drain transfer pumps	2	50	390
Maintenance building sump pumps	2	130	85

TABLE 9.3.3-1 (SHEET 2 OF 3)

Component	No. of Pumps	Flow (gal/min)	Pressure (ft)
CCW drain tank pump	1	200	160
Fuel handling building sump pumps	2	50	100
Alternate radwaste building submersible sump pump	1	40	100
Radwaste processing facility	1	20	40
Water treatment building sump pumps	2	100	160
Lube oil storage area sump pump	1	60	30
Auto transformer area sump pump	1	50	105
Switchhouse station service transformer area sump pump	1	30	55
Low-voltage transformer area sump pump	1	50	32
Outdoor pipe trench sump pump	1	100	33
Station service cable trench sump pump	1	30	28
Auxiliary feedwater pumphouse sump pumps	2	80	220
Electric steam boiler building sump pump	1	70	100
Containment building tendon gallery sump pumps	2	5	90

TABLE 9.3.3-1 (SHEET 3 OF 3)

Component	Description
CCW drain tank	
Quantity	1
Capacity (gal)	15,000
Design pressure	Atmospheric
Design temperature (°F)	200
Turbine building drain tank	
Quantity	2
Capacity (gal)	18,000
Design pressure	Atmospheric
Design temperature (°F)	110

TABLE 9.3.3-2 (SHEET 1 OF 2)

SUMP PARAMETERS

	Project[a] Classification (Entering Lines)	Top Elevation of Sump (ft)	(in.)	Dimensions (ft) Long x Wide x Deep
Normally Nonradioactive:				
Auxiliary building	414	119	3	5.0 x 8.0 x 6.0
Clean water	414	119	3	4.0 x 6.5 x 6.0
Main steam and feedwater tunnel	N/A	198	0	5.0 x 8.0 x 6.0
Turbine building	424	195	0	6.5 x 8.0 x 15.0
Control building	414	160	0	4.0 x 6.5 x 14.75[b]
NSCW pumphouse	414	205	0	2.5 x 5.0 x 5.5
Diesel generator electric tunnel	N/A	175	0	2.5 x 5.0 x 5.5
Diesel generator building oily waste	414	220	0	2.5 x 5.0 x 4.0
Penetration room[d]	414[c]	119	3	4.0 x 6.5 x 4.0
Auxiliary feedwater	414	215	0	2.5 x 5.0 x 10.0
Alternate radwaste building floor drain	424	220	5	4.0 x 4.0 x 3.0
Maintenance building	424	219	6	5.5 x 5.5 x 6.0
North firewater pumphouse oily waste separator	626	208	0	32.0 x 6.0 x 6.0
Water treatment building	626	220	0	5.5 x 11.0 x 8.0
Radwaste processing facility floor drain	424	217	6	4 x 4 x 17.2
Lube oil storage area	424	219	0	34.0 x 12.0 x 3.0
Auto transformer area	626	215	9	36.0 x 18.0 x 11.0

TABLE 9.3.3-2 (SHEET 2 OF 2)

Sump	Project[a] Classification (Entering Lines)	Top Elevation of Sump (ft)	Top Elevation of Sump (in.)	Dimensions (ft) Long x Wide x Deep
Station service cable trench	626	198	0	6.0 x 4.0 x 6.0
Switchhouse station service transformer area	626	213	2	6.0 x 6.0 x 6.0
Low voltage transformer area	626	218	6	36.0 x 18.0 x 11.0
Outdoor pipe trench	626	205	9	4.0 x 9.0 x 6.0
Electric steam boiler building	414	220	0	7.5 x 5.5 x 5.5
Containment building tendon gallery	N/A	148	0	2.0 x 2.0 x 1.5
Potentially Radioactive:				
Containment[d]	424	171	9	4.0 x 6.5 x 4.0
Radioactive drain	414	119	3	5.0 x 8.0 x 6.0
Reactor cavity[d]	424	143	6	4.0 x 6.5 x 4.0
Fuel handling building	414	160	0	4.0 x 6.5 x 4.0

a. All structures are Seismic Category 1. All sump pumps are Seismic Category 2 unless otherwise noted. All pump discharge lines are Seismic Category 2 unless otherwise noted. Further discussion of project classification is in section 3.2.

b. Dimensions are approximate; sump is irregularly shaped.

c. Pump discharge lines are Seismic Category 1.

d. Sump pumps are Seismic Category 1.

TABLE 9.3.3-3 (SHEET 1 OF 8)

EQUIPMENT AND FLOOR DRAINAGE SYSTEMS FAILURE MODE AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
1	Centrifugal charging pump A room R-C115 leak detecting floor drain switch LSH-9830 (train A), normally open	Provides control room alarm of high water level in room R-C115 sump	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9826 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A charging pump, but redundant train B pump available automatically if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9826 does not alarm. Visual inspection confirms absence of water	None; both train A and B charging pumps available automatically if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
2	Centrifugal charging pump A roomR-C115 wall-mounted switch LSH-9826 (train A), normally open	Provides control room alarm of high water level in room R-C115 (see general remarks)	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with room flooded	Floor drain switch LSH-9830 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A charging pump, but redundant train B pump available automatically if required.	This room containing ESF equipment is watertight and isolated from drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	
				Spurious alarm not flooded	Floor drain switch LSH-9830 does not alarm. Visual inspection confirms absence of water.	None; but train A B charging pumps available automatically if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		

TABLE 9.3.3-3 (SHEET 2 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
3	Centrifugal charging pump B room C-118 leak detecting floor drain level switch LSH-9831 (train B), normally open	Provides control room alarm of high water level in room R-C118	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9827 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B charging pump, but redundant train A pump available.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	4
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9827 does no alarm. Visual inspection confirms absence of water.	None; both train A and B charging pumps available automatically if required.		
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant train A available if required.		
4	Centrifugal charging pump B room R-C118 wall-mounted switch LSH-9827 (train B), normally open	Provides control room alarm of high water level in room R-C118 (see general remarks)	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with room flooded	Floor drain switch LSH-9831 provides alarm and light as water level rises. Visual inspection confirms absence of water.	None; possible loss of train B charging pump, but redundant train A pump available.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	3
				Spurious alarm, room not flooded	Floor drain switch LSH-9831 does not alarm. Visual inspection confirms absence of water.	None; both train A and B charging pumps available automatically if required		
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant train A available if required.		
5	Residual heat removal heat exchanger A room R-C090 leak detecting floor drain level switch LSH-9874 (train A), normally open	Provides control room alarm of high water level in room R-C090 sump.	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Periodic inspection of room when residual heat removal system in operation.	None; possible loss of train A residual heat removal system, but redundant train B system available, if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	
				Spurious alarm, leak detecting floor drain not flooded	Visual inspection of room confirms absence of water.	None; both train A and B residual heat removal systems available if required.		

TABLE 9.3.3-3 (SHEET 3 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
6	Residual heat removal heat exchanger B room R-C091 leak detecting floor drain level switch LSH-9855 (train B), normally open	Provides control room alarm of high water level in room R-C091	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Periodic inspection of room when residual heat removal system in operation.	None; possible loss of train B residual heat removal system, but redundant train A system available.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding to any other room containing ESF equipment.	
				Spurious alarm, leak detecting floor drain not flooded	Visual inspection of room confirms absence of water	None; both train A and B residual heat removal systems available automatically if required.		
				Loss of train B power supply	Control room alarm shows train B disabled.	None, redundant train B available if required.		
7	Safety injection pump A room R-B015 leak detecting floor drain switch LSH-9816 (train A), normally open	Provides control room alarm of high water level in room R-B015 sump	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with leaks detecting floor drain flooded	Wall-mounted switch LSH-9812 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A safety injection pumps, but redundant train B available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	8
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9812 does not alarm. Visual inspection confirms absence of water.	None; both train A and B safety injection pumps available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
8	Safety injection pump A room R-B015 wall-mounted switch LSH-9812 (train A), normally open	Provides control room alarm of high water level in room R-B015 (see general remarks)	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with room flooded	Floor drain switch LSH-9816 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A safety injection pump, but redundant train B available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause	7
				Spurious	Floor drain switch LSH-9816	None; both train A		

TABLE 9.3.3-3 (SHEET 4 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
				alarm, room not flooded	does not alarm. Visual inspection confirms absence of water.	and B safety injection pumps available if required.	flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
9	Safety injection pump B room R-B019 leak detecting floor drain switch LSH-9817 (train B), normally open	Provides control room alarm of high water level in room R-B019 sump	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9813 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B safety injection pump, but redundant train A pump available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	10
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9813 does not alarm. Visual inspection confirms absence of water.	None; both train A and B safety injection pumps available if required.		
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant train A available if required.		
10	Safety injection pump B room R-B019 wall-mounted switch LSH-9813 (train B), normally open	Provides control room alarm of high water level in room R-B019 (see general remarks).	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with room flooded	Floor drain switch LSH-9817 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B safety injection pump, but redundant train A pump available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	
				Spurious alarm, room not flooded	Floor drain switch LSH-9817 does not alarm. Visual inspection confirms absence of water.	None; both train A and B safety injection pumps available if required.		
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant train A available if required.		
11	Train A pipe chase area R-D100 leak detecting floor drain switch LSH-9846 (train A), normally open	Provides control room alarm of high water level in room R-D100 sump	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with leak detecting floor drain	Wall-mounted switch LSH-9842 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A ESF equipment but redundant train B equipment available	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any	12

TABLE 9.3.3-3 (SHEET 5 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
				flooded		if required.	room connected to the drain header will not cause flooding in any other room containing ESF equipment.	
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9842 does not alarm. Visual inspection confirms absence of water.	None; both train A and B ESF equipment available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available.		
12	Train A pipe chase area R-D100 wall-mounted switch LSH-9842 (train A), normally open	Provides control room alarm of high water level in room R-D100 (see general remarks)	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with area flooded	Floor drain switch LSH-9846 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A ESF equipment, but redundant train B equipment available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	11
				Spurious alarm, area not flooded	Floor drain switch LSH-9846 does not alarm. Visual inspection confirms absence of water.	None; both train A and B ESF equipment available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
13	Residual heat removal pump A room R-D048 leak detecting floor drain switch LSH-9860 (train A), normally open	Provides control room alarm of high water level in room R-D048 sump	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9856 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A residual heat removal system, but redundant train B system available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	14
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9856 does not alarm. Visual inspection confirms absence of water.	None; both train A and B residual heat removal systems available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		

TABLE 9.3.3-3 (SHEET 6 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
14	Residual heat removal pump A room R-D048 wall-mounted switch LSH-9856 (train A), normally open	Provides control room alarm of high water level in room R-D048 (see general remarks)	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with room flooded	Floor drain switch LSH-9860 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A residual heat removal systems, but redundant train B system available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	1
				Spurious alarm, room not flooded	Floor drain switch LSH-9860 does not alarm. Visual inspection confirms absence of water.	None; both train A and B residual heat removal systems available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
15	Residual heat removal pump B room R-D049 leak detecting floor drain switch LSH-9861 (train B), normally open	Provides control room alarm of high water level in room R-D049 sump	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9857 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B residual heat removal system, but redundant train A system available.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	16
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9857 does not alarm. Visual inspection confirms absence of water.	None; both train A and B residual heat removal systems available if required		
				Loss of train B power	Control room alarm shows train B disabled.	None; redundant train A available if required.		
16	Residual heat removal pump B room R-D049 wall-mounted switch LSH-9857 (train B), normally open	Provides control room alarm of high water level in room R-D049 (see general remarks)	1 through 4 (for modes 5 and 6, see note b)	Fails to alarm with room flooded	Floor drain switch LSH-9861 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B residual heat removal systems, but redundant train A system available.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for The ESF equipment room	15
				Spurious alarm, room not flooded	Floor drain switch LSH-9861 does not alarm. Visual inspection confirms absence of water.	None; both train A and B residual heat removal systems available if		

TABLE 9.3.3-3 (SHEET 7 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
						required.	is 50 gal/min for 30 min or 1500 gal total.	
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant train A available if required.		
17	Containment spray pump A room R-D076 leak detecting floor drain switch LSH-9872 (train A), normally open	Provides control room alarm of high water level in room R-D076 sump	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with leak detecting floor drain flooded	Wall-mounted switch LSH-9868 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A containment spray pump, but redundant train B pump available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause any flooding in any other room containing ESF equipment.	18
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9868 does not alarm. Visual inspection confirms absence of water.	None; both train A and B containment sprays pumps available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled.	None; redundant train B available if required.		
18	Containment spray pump A room R-D076 wall-mounted switch LSH-9868 (train A), normally open	Provides control room alarm of high water level in room R-D076 (see general remarks)	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with room flooded	Floor drain switch LSH-9872 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train A containment spray pump, but redundant train B pump available if required	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	17
				Spurious alarm, room not flooded	Floor drain switch LSH-9872 does not alarm. Visual inspection confirms absence of water.	None; both train A and B containment spray pumps available if required.		
				Loss of train A power supply	Control room alarm shows train A disabled	None; redundant train B available if required		
19	Containment spray pump B room R-D077 leak detecting floor drain switch LSH-9873	Provides control room alarm of high water level in room R-D077 sump	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with leak detecting	Wall-mounted switch LSH-9869 provides alarm and light as water level rises. Visual inspection confirms presence	None; possible loss of train B containment spray pump, but	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed	20

TABLE 9.3.3-3 (SHEET 8 OF 8)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go To Item No.
	(train B), normally open			floor drain flooded	of water.	redundant train A pump available if required.	valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment.	
				Spurious alarm, leak detecting floor drain not flooded	Wall-mounted switch LSH-9869 does not alarm. Visual inspection confirms absence of water.	None; both train A and B containment spray pumps available if required.		
				Loss of train B power supply	Control room alarm shows train B disabled.	None; redundant rain A available if required.		
20	Containment spray pump B room R-D077 wall-mounted switch LSH-9869 (train B), normally open	Provides control room alarm of high water level in room R-D077 (see general remarks)	1 through 4 (for modes 5 and 6, see note a)	Fails to alarm with room flooded	Floor drain switch LSH-9873 provides alarm and light as water level rises. Visual inspection confirms presence of water.	None; possible loss of train B containment spray pump, but redundant train A pump available if required.	This room containing ESF equipment is watertight and isolated from the drain headers by locked closed valves. Thus flooding in any room connected to the drain header will not cause flooding in any other room containing ESF equipment. Also, the design basis flood for the ESF equipment room is 50 gal/min for 30 min or 1500 gal total.	19
				Spurious alarm, room not flooded	Floor drain switch LSH-9873 does not alarm. Visual inspection confirms absence of water.	None; both train A and B containment spray pumps available if required.		
				Loss of train B power	Control room alarm shows train B disabled.	None; redundant train A available if required.		

NOTES:

a. Drain isolation valves are not required to be locked closed during modes 5 and 6, since the associated equipment is not needed during these modes.

b. For the RHR system and CVCS charging pump rooms during modes 5 and 6, the drain isolation valves will be maintained closed except when that train is out of service. When needed, the out of service train equipment and floor drain isolation valves can remain open, but the drain isolation valves for the alternate train must remain in their normal operating position to prevent potential cross-train flooding.

TABLE 9.3.4-1

CHEMICAL AND VOLUME CONTROL SYSTEM DESIGN PARAMETERS

General	
Seal water supply flowrate, for four reactor coolant pumps, nominal (gal/min)	32
Seal water return flowrate, for four reactor coolant pumps, nominal (gal/min)	12
Letdown flow	
Normal (gal/min)	75
Maximum (gal/min)	130
Charging flow (excludes seal water)	
Normal (gal/min)	55
Maximum (gal/min)	110
Temperature of letdown reactor coolant entering system (°F)	<560
Temperature of charging flow directed to RCS (°F)	517
Temperature of effluent directed to BRS (°F)	115
Centrifugal charging pump miniflow, each (gal/min)	60
Amount of 4 weight percent boric acid solution required to meet cold shutdown requirements shortly after full-power operation (gal)	31,740
Maximum pressurization required for hydrostatic testing of RCS (psig)	3107

TABLE 9.3.4-2 (SHEET 1 OF 8)

CHEMICAL AND VOLUME CONTROL SYSTEM PRINCIPAL COMPONENT DATA SUMMARY

Normal Charging Pump

Number	1
Design pressure (psig)	3100
Design temperature (°F)	300
Design flow (gal/min)	130
Design head (ft)	5900
Material	Austenitic SS

Centrifugal Charging Pumps

Number	2
Design pressure (psig)	2800
Design temperature (°F)	300
Design flow (gal/min)	150
Design head (ft)	5800
Material	Austenitic SS

Boric Acid Transfer Pump

Number	2
Design pressure (psig)	150
Design temperature (°F)	250
Design flow (gal/min)	75
Design head (ft)	235
Material	Austenitic SS

Chiller Pumps

Number	2
Design pressure (psig)	150
Design temperature (°F)	200
Design flow (gal/min)	400
Design head (ft)	150
Material	Carbon steel

Regenerative Heat Exchanger

Number	1
Heat transfer rate at design conditions (Btu/h)	11.0×10^6

TABLE 9.3.4-2 (SHEET 2 OF 8)

Shell Side

Design pressure (psig)	2485
Design temperature (°F)	650
Fluid	Borated reactor coolant
Material	Austenitic SS

Tube Side

Design pressure (psig)	3100
Design temperature (°F)	650
Fluid	Borated reactor coolant
Material	Austenitic SS

Shell Side (Letdown)

Flow (lb/h)	37,300
Inlet temperature (°F)	560
Outlet temperature (°F)	290

Tube Side (Charging)

Flow (lb/h)	27,300
Inlet temperature (°F)	130
Outlet temperature (°F)	517

Letdown Heat Exchanger

Number	1
Heat transfer rate at design conditions (Btu/h)	16.1×10^6

Shell Side

Design pressure (psig)	150
Design temperature (°F)	250
Fluid	ACCW
Material	Carbon steel

Tube Side

Design pressure (psig)	600
Design temperature (°F)	400

TABLE 9.3.4-2 (SHEET 3 OF 8)

Fluid		Borated reactor coolant
Material		Austenitic SS

Shell Side	Design	Normal
Flow (lb/h)	498,000	170,000
Inlet temperature (°F)	105	105
Outlet temperature (°F)	137	143
Tube Side (Letdown)		
Flow (lb/h)	59,600	37,300
Inlet Temperature (°F)	380	290
Outlet temperature (°F)	115	115

Excess Letdown Heat Exchanger

Number		1
Heat transfer rate at design conditions (Btu/h)		5.2×10^6

	Shell Side	Tube Side
Design pressure (psig)	150	2485
Design temperature (°F)	250	650
Design flow (lb/h)	129,000	12,410
Inlet temperature (°F)	105	560
Outlet temperature (°F)	145	165
Fluid	ACCW	Borated reactor coolant
Material	Carbon steel	Austenitic SS

Seal Water Heat Exchanger

Number		1
Heat transfer rate at design conditions (Btu/h)		2.0×10^6

	Shell Side	Tube Side
Design pressure (psig)	150	150
Design temperature (°F)	250	250
Design flow (lb/h)	125,000	66,000
Inlet temperature (°F)	105	139
Outlet temperature (°F)	118	115
Fluid	ACCW	Borated reactor coolant
Material	Carbon steel	Austenitic SS

TABLE 9.3.4-2 (SHEET 4 OF 8)

Moderating Heat Exchanger

Number		1
Heat transfer rate at design conditions (Btu/h)		2.53×10^6
	Shell Side	Tube Side
Design pressure (psig)	300	300
Design temperature (°F)	200	200
Design flow (lb/h)	59,600	59,600
Design inlet temperature, boron storage mode (°F)	50	115
Design outlet temperature, boron storage mode (°F)	92.4	72.6
Inlet temperature, boron release mode (°F)	140	115
Outlet temperature, boron release mode (°F)	123.7	131.3
Material	Austenitic SS	Austenitic SS

Letdown Chiller Heat Exchanger

Number		1
Heat transfer rate at design conditions, boron storage mode (Btu/h)		1.434×10^6
	Shell Side	Tube Side
Design pressure (psig)	150	300
Design temperature (°F)	200	200
Design flow, boron storage mode (lb/h)	175,000	59,400
Design inlet temperature, boron storage mode (°F)	43	72.6
Design outlet temperature, boron storage mode (°F)	51.2	48.5
Flow, boron release mode (lb/h)	175,000	59,400
Inlet temperature, boron release mode (°F)	43	123.7
Outlet temperature, boron release mode (°F)	46.0	115
Material	Carbon steel	Austenitic SS

Letdown Reheat Heat Exchanger

Number		1
Heat transfer rate at design conditions (Btu/h)		1.49×10^6
	Shell Side	Tube Side
Design pressure (psig)	300	600

TABLE 9.3.4-2 (SHEET 5 OF 8)

Design temperature (°F)	200	400
Design flow (lb/h)	59,600	44,700
Inlet temperature (°F)	115	280
Outlet temperature (°F)	140	246.7
Material	Austenitic SS	Austenitic SS

Volume Control Tank

Number	1
Volume (ft^3)	400
Design pressure (psig)	75
Design temperature (°F)	250
Material	Austenitic SS

Boric Acid Storage Tanks

Number	1
Capacity, usable (gal)	46,000
Design pressure	Atmospheric
Design temperature (°F)	200
Material	Austenitic SS

Boric Acid Batching Tank

Number	1 (shared)
Capacity (gal)	800
Design pressure	Atmospheric
Design temperature (°F)	300
Material	Austenitic SS

Chemical Mixing Tank

Number	1
Capacity (gal)	5
Design pressure (psig)	150
Design temperature (°F)	200
Material	Austenitic SS

Chiller Surge Tank

Number	1
Volume (gal)	500
Design pressure	Atmospheric

TABLE 9.3.4-2 (SHEET 6 OF 8)

Design temperature (°F)	200
Material	Carbon steel

Mixed Bed Demineralizer

Number	2
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	120
Resin volume, each (ft^3)	30[(a)]
Material	Austenitic SS

Cation Bed Demineralizers

Number	1
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	75
Resin volume (ft^3)	20[(a)]
Material	Austenitic SS

Thermal Regeneration Demineralizers

Number	5
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	250
Resin volume (ft^3)	74[(a)]
Material	Austenitic SS

Reactor Coolant Filter

Number	1
Type	Cartridge
Design pressure (psig)	375
Design temperature (°F)	250
Design flow (gal/min)	150
Particle retention	0.1 to 6.0 - µm absolute
Material, vessel	Austenitic SS

TABLE 9.3.4-2 (SHEET 7 OF 8)

Seal Water Injection Filters

Number	2
Type	Cartridge
Design pressure (psig)	3100
Design temperature (°F)	250
Design flow (gal/min)	80
Particle retention	98% of 0.1 to 5-µm size
Material, vessel	Austenitic SS

Seal Water Return Filter

Number	1
Type	Backflushable
Design pressure (psig)	375
Design temperature (°F)	250
Design flow (gal/min)	150
Particle retention	98% of 25-µm size
Material, vessel	Austenitic SS

Boric Acid Filter

Number	1
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	150
Particle retention	98% of 25-µm size
Material, vessel	Austenitic SS

Letdown Orifice	45 gal/min	75 gal/min
Number	1	2
Design flow (lb/h)	22,230	37,050
Differential pressure at design flow (psig)	1700±100	1700±100
Design pressure (psig)	2485	2485
Design temperature (°F)	650	650
Material	Austenitic SS	Austenitic SS

TABLE 9.3.4-2 (SHEET 8 OF 8)

<u>Chiller Unit</u>

Number	1 shared
Capacity (Btu/h)	1.434×10^6
Design flow (gal/min)	350
Inlet temperature (°F)	51.2
Outlet temperature (°F)	43.0

<u>Electronic Zinc Injection Pump</u>

Number	1
Design pressure (psig)	150
Design temperature(°F)	120
Design flow (gal/day)	6
Design head (ft)	315
Material	PVC

<u>Zinc Addition Batch Tank</u>

Number	1
Capacity (gal)	30
Design pressure	Atmospheric
Design temperature(°F)	120
Material	Polyethlene

a. This is the design maximum loading. Smaller volumes may be used depending on operational needs and type of resin used. Media loaded into the demineralizer are evaluated through the VEGP Chemical Control Program.

TABLE 9.3.4-3 (SHEET 1 OF 2)

BORON RECYCLE SYSTEM
PRINCIPAL COMPONENT DATA SUMMARY

Recycle Evaporator Feed Pumps

Number	2 (shared)
Design pressure (psig)	150
Design temperature (°F)	250
Design flow (gal/min)	35/100
Design heat (ft)	250/200
Material	Austenitic SS

Recycle Holdup Tanks

Number	2 (shared)
Capacity, usable, each (gal)	112,000
Design pressure	Atmospheric
Design temperature (°F)	200
Material	Austenitic SS

Recycle Evaporator Feed Demineralizers

Number	2 (shared)
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	120
Resin volume (ft^3)	30
Material	Austenitic SS

Recycle Evaporator Condensate Demineralizer

Number	1 (shared)
Design pressure (psig)	300
Design temperature (°F)	250
Design flow (gal/min)	75
Resin volume (ft^3)	27
Material	Austenitic SS

Recycle Evaporator Feed Filter

Number	2 (shared)
Type	Backflushable
Material, vessel	Austenitic SS

TABLE 9.3.4-3 (SHEET 2 OF 2)

Recycle Evaporator Condensate Filter

Number	1 (shared)
Design pressure (psig)	200
Design temperature (°F)	250
Design flow (gal/min)	35
Particle retention	98% of 25-μm size
Material, vessel	Austenitic SS

Recycle Holdup Tank Vent Ejector

Number	1 (shared)
Design pressure (psig)	150
Design temperature (°F)	200
Suction flow (sf^3/min)	1 to 3
Motive flow (sf^3/min)	40
Material	Austenitic SS

TABLE 9.3.4-4

DIFFERENTIAL PRESSURES (DP)

Component	Indication[a]	DP Fouled (Maximum) (psid)
Boric acid filter	PDI-108 (DP)	20
Thermal regeneration demineralizers	PI-383, PI-384;	10
Seal water return filter	PDIT-41330 (DP)	20
Seal water injection filter	PDIS-140 (DP), PDIS-141 (DP)	20
Mixed bed demineralizer cation bed demineralizer (letdown)	None (b)	N/A
Reactor coolant filter	PDIT-41321 (DP)	20

a. All pressure indications are local at the component.
b. Performance of the demineralizers is monitored by tracking radiological decontamination factor and various chemical parameters.

TABLE 9.3.5-1

DESIGN PARAMETERS FOR MAJOR COMPONENTS OF THE AUXILIARY GAS SYSTEM

Component	Capacity
Liquid N_2 storage vessel	6000 gal = 558,700 sf^3
Liquid N_2 pump	200 sf^3/min equivalent at 2400 psig
Liquid N_2 vaporizers	
High pressure	20,000 sf^3/h
Low pressure	3000 sf^3/h
Gaseous N_2 storage bank assembly	
3 tubes	5809 sf^3 (each)
Gaseous O_2 storage bank assembly	
4 tubes	8740 sf^3 (each)

TABLE 9.3.7-1

CHLORINATION SYSTEM COMPONENT DATA

Subsystem IV - Potable Water Chlorination System

Metering Pumps	1; 2.9 gal/h
Containers	1; 250-gal tank

9.4 AIR-CONDITIONING, HEATING, COOLING, AND VENTILATION SYSTEMS

Heating, ventilation, and air-conditioning systems (HVAC) are provided as required for personnel comfort, personnel safety protection, and equipment functional protection.

The HVAC systems provided for each building or room are designed for the specific functional requirements of that individual building or room.

For those buildings and rooms required for functional use during all plant operating modes (normal, shutdown, and emergency), basically two separate HVAC systems are provided:

- Individual system for normal operation.
- Individual system for emergency (essential) operation.

For the essential systems, redundant safety-related Seismic Category 1 trains are provided.

The meteorological conditions used as a basis for the design of the HVAC systems are listed in table 9.4.1-1 and in section 2.3. The inside design conditions for the systems provided for each building, room, or area are tabulated in table 9.4.1-2.

9.4.1 CONTROL BUILDING VENTILATION SYSTEMS

The control building HVAC systems consist of the control building normal supply and exhaust systems, the control room HVAC system, and the engineered safety features (ESF) electrical equipment room HVAC system.

The control building supply and exhaust systems provide conditioned outside air for ventilation and cooling to each level of the control building and a means of normal exhaust. They also provide a means of purging smoke from Radiation Zone I areas of the control building following a fire.

The control room air-conditioning provides a suitable atmosphere for personnel and equipment within the control room during normal operation.

The essential HVAC system for the control room and the habitability systems for the control room area are discussed in section 6.4. The control room ventilation isolation provisions are discussed in section 7.3.

The safety features electrical equipment room HVAC system provides a suitable environment for the Class 1E electrical equipment and is discussed in subsection 9.4.5.

The control building normal supply and exhaust systems include the following: control room normal HVAC, control building normal HVAC, control building locker and toilet exhaust, control building laboratory hood vent, cable spreading rooms HVAC, equipment and electrical equipment rooms HVAC, central alarm station backup HVAC, and the onsite technical support center HVAC. The control building normal HVAC systems are described in the following paragraphs. P&ID and flow diagrams for these systems are given in drawings AX4DB206-1, AX4DB206-2, AX4DB206-3, AX4DB256-1, 1X4DB257-1, AX4DB266-2, 2X4DB266-1, AX4DB376, AX4DB269, and AX4DB270. The onsite technical support center HVAC system is described in paragraph 9.4.1.8.

9.4.1.1 Design Bases

9.4.1.1.1 Safety Design Bases

The normal HVAC systems (non-ESF systems) provided for the control building serve no safety function. However, the failure of nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components. The systems are not required to function after an SSE.

9.4.1.1.2 Power Generation Design Bases

A. Control Room Normal HVAC System

The control room normal HVAC system supplies conditioned air to the control room area during normal plant operating conditions to provide personnel comfort and to maintain a suitable operating environment for equipment.

The control room normal HVAC system is designed to maintain temperature at 75±5°F and 50-percent maximum relative humidity in the control room area.

The control room emergency HVAC system is shared by both Units 1 and 2. The two units' control rooms are partially separated by a partition. Areas in the vicinity of the shift technical advisor work station and the balance of plant (BOP) and nuclear steam supply system (NSSS) control panels provide access between the Unit 1 and Unit 2 areas of the control room as shown in drawing AX1D11A04 sheet 1. The air ducts serving the control room are a common system connected to the Units 1 and 2 safety-related air handling units. Four safety-related air handling units are available to serve the control room envelope.

B. Control Building Normal HVAC System

The control building normal HVAC system provides the necessary air to maintain temperatures between 40°F and 100°F in the control building (excluding control room). The battery rooms are maintained between 70°F and 80°F.

C. Control Building Locker and Toilet Exhaust System

The control building locker and toilet exhaust system is designed to purge the locker, shower, and toilet areas by exhausting to the atmosphere the makeup air supplied to these areas by the control building normal HVAC system.

D. Control Building Laboratory Hood Vent System

The control building laboratory hood vent system prevents chemical fumes and contaminated air from passing into laboratory areas. The control building laboratory and service areas are maintained at slightly negative pressures to prevent exfiltration of air to other low activity areas.

E. Cable Spreading Rooms HVAC Systems

The cable spreading rooms HVAC systems provide a suitable environment for lower and upper cable spreading rooms and surrounding areas during normal operating conditions.

F. Control Building Normal HVAC and Electrical Equipment Rooms System

The control building HVAC and electrical equipment rooms system for level 4 is designed to provide suitable conditions for HVAC and electrical equipment during normal plant operation.

The electrical equipment rooms on level 4 consist of a battery room and battery switchgear room. The battery room is ventilated to prevent accumulation of hydrogen gas. The ventilation system is designed to limit the hydrogen concentration to less than 2 percent by volume within the battery area in accordance with Regulatory Guide 1.128.

G. Central Alarm System Backup HVAC System

The environmental control for the central alarm system room is provided by two separate HVAC systems, the control building normal HVAC system and a dedicated backup air cooling system. The central alarm station backup HVAC system can be powered by the security diesel generator.

9.4.1.1.3 Codes and Standards

Conformance to Regulatory Guide 1.140 is described in subsection 1.9.140. The codes and standards for the systems are listed in table 3.2.2-1.

9.4.1.2 System Description

9.4.1.2.1 Control Room Normal HVAC System

The control room normal HVAC system is shown schematically in drawings AX4DB206-1, AX4DB206-2, and AX4DB206-3. Major components of the system include two 100-percent-capacity redundant air handling units, two 100-percent-capacity return and exhaust fans, ductwork with dampers and associated controls, electric duct heaters, and one exhaust fan serving the toilet, kitchen, conference room, and janitor rooms. The seismic and quality classifications of components, instrumentation, and ducting are given in table 3.2.2-1.

There are two outside air intakes located on the east and west walls of the control building. The outside air mixes with return air from the control room and then flows into an air-conditioning unit. Each air-conditioning unit contains a prefilter, high-efficiency filter, chilled water cooling coil supplied by the normal chilled water system, and a centrifugal fan which discharges the conditioned air into the supply air ductwork to connect the units with the control room air distribution system. The control room normal HVAC system maintains the control room at a positive pressure (nominally 1/8 in. WG) to prevent infiltration.

Ductwork and dampers are arranged so that either air handling unit may be operated with either return/exhaust fan.

The system provides 100-percent outside air for ventilation and extraction of smoke in case of a local fire, utilizing the normal exhaust and return exhaust fans.

Electric duct heaters maintain temperatures at 75±5°F during winter in the kitchen, conference room, records storage files, and control room.

Fire dampers are located between fire barriers, as necessary, to maintain the fire ratings of the barriers. Dampers are the 3-h-rated curtain type.

Where a means of system isolation is required, bubble-tight isolation dampers are utilized.

Opposed blade type flow control dampers are utilized, as necessary, to provide a means of system balancing. In general, these are manually operated. However, some dampers utilize power operators to allow compensation for changes occurring during system operation.

All motors and electric heaters that are not safety related are connected to the normal 480-V ac system.

9.4.1.2.2 Control Building Normal HVAC System

The control building normal HVAC systems for levels A, B, 1, and 2 consist of three air-conditioning systems as shown in drawings 1X4DB210, 1X4DB211, AX4DB215, AX4DB223, and AX4DB237. One system is for levels A and B wing areas, a second system is for level B, and a third system is common for Units 1 and 2 levels 1 and 2.

The control building normal HVAC system utilizes units with prefilters and chilled water coils supplied by the normal chilled water system. Electric duct heaters are used for heating.

The control building normal HVAC system for levels 1 and 2 supplies a high percentage of outside air as makeup air for the toilet, locker room, laboratory, and other contaminated areas. This air is exhausted by the control building locker and toilet exhaust system, the control building laboratory hood, and the laboratory and service area vent systems.

Motors and electric heaters are connected to the normal 480-V ac system.

9.4.1.2.3 Control Building Locker and Toilet Exhaust System

The control building locker and toilet exhaust system removes the air from the area by exhausting it to the atmosphere as shown in drawing AX4DB223.

The control building locker and toilet exhaust system utilizes a centrifugal fan connected to a duct system.

The exhaust fan electric drive motor is connected to the normal 480-V ac system.

9.4.1.2.4 Control Building Laboratory Hood and Laboratory Area Vent System

The control building laboratory hood and laboratory area vent system includes a supply system and an exhaust system as shown in drawing AX4DB215. The supply system consists of a fan, prefilter, heater, and ducts to the hoods in the radio-chemical laboratory and low-level laboratory. No outside air is supplied to the sample room fume hoods by this system. The exhaust subsystem consists of a filtration unit with moisture eliminator, electric heater, upstream high-efficiency particulate air (HEPA) filters, 4-in. activated carbon adsorber, downstream HEPA filters, a centrifugal fan, and a duct system from the laboratory hoods.

Makeup air for the radiochemical laboratory, low-level laboratory, and sample room hoods is taken from the respective rooms. Where the hoods require more air than is required to maintain room design conditions, the additional air is supplied directly to the low-level laboratory and radiochemical laboratory hoods by the supply system. For the sample room hoods, makeup air is taken from the room. This airflow from the room into the hood ensures that all contaminated

air will be drawn to the filters and not pass into the room. The control building laboratory hood and laboratory area vent system has provisions to keep the control building laboratory and service areas at a slightly negative pressure to prevent exfiltration of air to other low activity areas.

The control building laboratory hood and laboratory area vent system is connected to a normal 480-V ac system.

9.4.1.2.5 Control Building Cable Spreading Rooms HVAC Systems

The control building cable spreading rooms HVAC systems provide normal ventilation and air-conditioning for control building cable spreading rooms, auxiliary relay rooms, computer rooms, and the HVAC equipment area at el 260 ft 0 in. and are also a means of smoke exhaust for the cable spreading rooms. The systems have two redundant, full-capacity supply units for each level and one smoke exhaust fan. Each supply unit consists of a prefilter, fan, and cooling coil with ductwork. Two computer rooms and four air-conditioners are provided ─ two redundant units for each room. Drawings AX4DB216 and AX4DB225 provide a schematic of the systems.

The control building cable spreading rooms HVAC systems are supplied with chilled water from the normal chilled water system and powered from the normal 480-V ac system. The control building cable spreading rooms HVAC systems are designed to maintain a space temperature between 40°F and 100°F and to limit the relative humidity to 60-percent maximum. A smoke exhaust fan will remove the smoke from the cable spreading rooms in case of a fire. The recirculation damper closes, and the exhaust damper fully opens to discharge the air to the atmosphere.

9.4.1.2.6 Control Building Normal HVAC Equipment and Electrical Equipment Rooms System for Level 4

The control building normal HVAC equipment rooms system consists of two fans and three electric unit heaters. There are two common, normal HVAC equipment rooms on level 4 of the control building. The control building normal air-conditioning equipment room has an exhaust fan and two electric unit heaters; the control building control room normal chiller room has an exhaust fan and one electric unit heater.

The electrical equipment area system consists of one air-conditioning unit, one electric duct heater, and one exhaust fan. The electrical equipment area is located on level 4 and consists of a battery room and a battery switchgear room for each unit. The air-conditioning unit supplies air into the two rooms. The battery room has an exhaust fan and an electric duct heater.

All components are powered from the normal 480-V ac system. Drawing AX4DB241 shows the schematic of these systems.

9.4.1.2.7 Central Alarm Station Backup HVAC System

The central alarm station backup HVAC system consists of an air cooling unit and an air-cooled chiller. Chilled water is recirculated by a motor-driven pump.

The central alarm station backup HVAC system is powered by the security diesel generator.

9.4.1.3 System Operation

A. Control Room Normal Air-Conditioning System

The control room normal air-conditioning system operates during normal modes of operation. Outside air received through the air intake plenum at el 281 ft 0 in. is mixed with recirculated air and filtered through prefilters and high-efficiency filters, cooled and discharged into a duct system which distributes the air to the control room, kitchen, conference room, records storage files, and emergency storage. Zone electric duct heaters, controlled by zone thermostats, regulate the temperature of each zone. Outside air is supplied to make up for air exhausted from the kitchen and toilet areas. The exhaust air from the kitchen, toilets, conference room, record storage files, and janitor's room is exhausted through a normal exhaust fan to the atmosphere at el 281 ft 0 in.

In case of a fire in the control room, operations may be transferred to the remote shutdown panels from which the plant may be brought to a safe shutdown condition. The return/exhaust fan will be used to remove the products of combustion and noxious fumes produced and exhaust them directly to the atmosphere through an exhaust plenum at el 302 ft 0 in. One hundred-percent outside makeup air is provided through a separate air intake at el 281 ft 0 in. in the smoke removal mode. The smoke removal mode of operation is discussed in section 6.4.

The system is started manually and can be stopped manually. In case of emergency, the normal HVAC system is automatically isolated and the essential HVAC system is activated. The essential HVAC systems, including the radiation detectors, are described in section 6.4.

B. Control Building Normal HVAC System

The control building normal HVAC system starts manually and operates during normal operation. Recirculating air mixed with outside air from the intake plenums at el 281 ft 0 in., el 224 ft 0 in., and el 220 ft 0 in. is filtered, cooled by the normal chilled water system, and distributed to the respective zones. Air from the locker, toilet, and storage areas is exhausted to the atmosphere at el 281 ft 0 in. Smoke detectors are located in each room; upon receipt of a smoke signal, the smoke removal mode is manually initiated to exhaust smoke to the smoke exhaust shaft.

The smoke from the smoke exhaust shaft discharges to the atmosphere at el 281 ft 0 in. The control building wing area levels A and B HVAC system exhausts smoke to the atmosphere at el 240 ft 0 in. when operating in the smoke removal mode.

C. Control Building Laboratory Hood and Laboratory Area Vent System

The control building laboratory hood and laboratory area vent system is started by a manual switch located in the control room. Makeup air from the outside is from the intake plenum at el 281 ft 0 in. The supply and exhaust fans are interlocked. If airflow in the exhaust system is not proven within a preset time, the supply fan is deenergized automatically. The exhaust from potentially contaminated areas is routed to the plant vent.

D. Control Building Cable Spreading Rooms HVAC System

The control building cable spreading rooms HVAC system is started manually. Outdoor air for ventilation is mixed with the recirculated air and cooled to 55°F for distribution to the various areas via the ductwork system. Smoke detectors are located in each room; upon receipt of a smoke signal, the fans will be stopped with manual controls. To remove smoke, the smoke removal mode is manually initiated to open the outside air dampers, start the supply units, open exhaust dampers to the smoke exhaust shaft, close return air dampers, and start smoke exhaust fans. The intake and exhaust plenums are at el 281 ft 0 in.

E. Control Building Normal HVAC and Electrical Equipment Room System

The control building normal HVAC equipment room system operates during normal modes of operation. The system will be started automatically upon receipt of an actuation signal when the air temperature in the rooms under normal condition is not within the specified limits. Air is supplied from the intake louvers at el 291 ft 4 in. and exhausted at el 289 ft 5 in. The system provides ventilation during summer and a means of heating inside room air during the winter. The system can be started manually.

The control building normal electrical equipment rooms system operates during normal modes of operation. The system will be started automatically upon receipt of an actuation signal when the air temperature in the switchgear room is not within the specified limits. Air is supplied from the intake plenum at el 295 ft 2 in. The system provides cooling during summer and a means of heating inside room air during the winter. The battery room exhaust fans exhaust the battery room air to the atmosphere at el 296 ft 0 in. The system can be started manually.

F. Central Alarm Station Backup HVAC System

Upon failure of the control building level 1 and 2 normal air-conditioning unit or upon loss of offsite power, the backup HVAC system is manually initiated to provide the necessary cooling for the central alarm system room, inverter/charger room, and battery room. The ventilation system is designed to limit the hydrogen concentration to less than 2 percent by volume within the battery room in accordance with Regulatory Guide 1.128. Initiation of the backup air handling unit automatically starts the air-cooled chiller and the chilled water pump. Chilled water is delivered to the air cooling coil, and the flow is controlled by an air-operated valve for proper cooling of air supplied to the areas. A room thermostat controls the proper flow of cooling water to the coil.

9.4.1.4 System Components

Table 9.4.1-3 provides design parameters for major components in the system. The control building normal HVAC system is comprised of the following components:

A. Prefilters (Moderate Efficiency Filters)

Prefilter elements are made of fine glass fiber sheet media. Each element is capable of handling a nominal flowrate of 1000 ft^3/min. The minimum average efficiency of the filter, using atmospheric dust, is 40 percent by American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 52.[1]

B. High-Efficiency Filter

High-efficiency filter elements precede the chilled water cooling coils of the air handling unit to maintain a clean cooling coil surface for the air being processed. The filter medium is fiberglass encased in galvanized carbon steel. The airflow capacity is 1000 ft^3/min per filter element. The minimum average efficiency of the filter is 90 percent in accordance with ASHRAE Standard 52.[(1)]

C. Water Cooling Coil

The cooling coils are of nonferrous construction with copper helical fins mechanically bonded to seamless copper tubing. Coils are arranged for counter flow using chilled water. The tube bundle is enclosed in a steel frame. Coils are arranged for horizontal airflow and include vent and drain connections. The chilled water system is discussed in subsection 9.2.9.

D. Fans

Fans are capable of delivering the design flowrate with all filters at their maximum anticipated pressure drop. Fans were chosen with a steeply rising pressure-flow characteristic to maintain a reasonably constant airflow over the full filter train life.

E. Heaters

Finned tubular elements (installed in the ducts) are used to heat the room supply air. Each consists of 80-percent nickel and 20-percent chromium resistance wire (iron-free) embedded within magnesium oxide refractory insulated within a protective sheath. Frames are of copper-plated steel permanently attached to the copper-plated steel tubes. Fins are spaced not more than five fins per inch. The electric heater provided for the lab hood filtration unit is designed to reduce the relative humidity of an entering air stream mixture from 100- to 70-percent relative humidity for efficient operation of the activated carbon adsorber.

F. Electric Unit Heaters

Electric unit heaters supplement the heating of the HVAC control room air-conditioning equipment rooms. Each unit heater consists of a coil and fan with an electric motor driver.

G. Moisture Separator

The moisture separator is a two-stage unit using louvers followed by relatively coarse glass fiber pads. The moisture separator will remove 99.7 percent of all free water droplets down to 2 mm in diameter without any visible carryover. The louvers are stainless steel, and the glass fiber pads are bonded with phenolic resin. The moisture separator is designed in accordance with Regulatory Guide 1.140.

H. HEPA Filters

HEPA filter elements are of pleated fiberglass with aluminum separator design, measure 24 x 24 x 11.5 in., and are capable of handling a nominal flowrate of 1000 ft^3/min each. The filter medium is cased in stainless steel, has face guards on both sides, and is water and fire resistant. HEPA filter elements are manufactured and tested prior to installation in accordance with MIL-F-51068.[(2)] The filter element minimum acceptance criterion is removal of 99.97 percent of 0.3-μm, thermally generated, monodispersed dioctyl phthalate particles. HEPA

filters are designed to be consistent with the requirements of Regulatory Guide 1.140, as discussed in section 1.9.

I. Carbon Adsorbers

The carbon adsorber for the laboratory hood filtration unit is of the bulk type, 4-in. deep, and has an all-welded design. Minimum air residence time in the carbon is 0.5 s at a nominal face velocity of 40 ft/min. An 8 x 16 mesh of impregnated, activated charcoal is used in the filter. The amount of carbon exceeds the amount needed to accommodate the iodine potentially released from the containment. The acceptance criteria for the carbon adsorber shall be in accordance with the recommendations of Regulatory Guide 1.140, as discussed in section 1.9.140. The carbon adsorbers are of a rechargeable type. The fire protection system for the carbon adsorbers is discussed in subsection 9.5.1.

J. Chilled Water Unit

The central alarm station backup chiller is an air-cooled chiller package consisting of refrigerant compressors, water cooler, air-cooled condenser, and refrigerant piping and accessories.

K. Chilled Water Pump

The chilled water pump is a motor-driven centrifugal pump sized to deliver chilled water to the cooling coils.

9.4.1.5 Safety Evaluation

Since the control building normal HVAC system has no safety design bases, no safety evaluation is provided.

9.4.1.6 Tests and Inspection

The normal air-conditioning systems are tested and inspected prior to installation. The control room air-conditioning equipment is located in equipment rooms in the control building and can be inspected visually during normal operation. The filter pressure drop and the high-efficiency filter efficiency are checked periodically and alarmed in the control room on high differential pressure. Fans are factory tested in accordance with Air Moving and Conditioning Association (AMCA) Standard 210;[3] filters are tested in accordance with ASHRAE Standard 52;[1] coils are tested in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 410.[4]

Filters and adsorbers are tested in the manufacturer's shop, after initial installation, and subsequent to each filter or adsorber change. Filter and adsorber tests and inspections will be performed in accordance with the requirements of Regulatory Guide 1.140, as discussed in section 1.9.

All charcoal adsorbers will be factory tested in accordance with Regulatory Guide 1.140, as discussed in section 1.9. Charcoal samples will be tested for efficiency in an independent laboratory in accordance with Regulatory Guide 1.140, as discussed in section 1.9. In-place testing is performed with a suitable refrigerant to check for bed bypass leakages, in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Prefilters will not undergo factory or in-place testing, since no credit is taken for removal of particulates.

HEPA filters will be factory tested with dioctyl phthalate aerosol to demonstrate a minimum particulate removal efficiency of no less than 99.97 percent for 0.3-mm particulates. In-place leak testing will be carried out in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Air-conditioning units will be performance tested by the manufacturer to ensure design heat removal capabilities.

Ductwork is leak tested in accordance with Sheet Metal and Air-Conditioning Contractors National Association, Incorporated (SMACNA)[7] and American National Standards Institute (ANSI) N510, Section 6.[6]

Major components are accessible during normal plant operation for inspection, maintenance, and periodic testing.

9.4.1.7 Instrumentation Application

Fans can be operated from the control room (except for the control room kitchen exhaust fan).

Thermostats located in the various levels of the control building and the ductwork control space temperatures. The indication of the amount of filter loading for all filters associated with the air handlers is provided at each of the air handlers.

The following instrumentation is provided in the control room:

- Alarm on high-pressure differential across filter unit.
- Alarm on high moisture content downstream of the moisture eliminator.
- Alarm on high temperature in charcoal filter.
- Alarm on low airflow.
- Alarm on smoke detection.
- Position indication for isolation dampers.
- Indication of the operational status of the fans.

All instrumentation provided with the filtration unit is as recommended by Regulatory Guide 1.140, as applicable.

9.4.1.8 Onsite Technical Support Center HVAC

The onsite technical support center normal HVAC consists of a chilled water system and air handling unit, supply and exhaust systems, and recirculation filtration unit.

The onsite technical support center HVAC supply system provides conditioned outside and recirculated air for ventilation and cooling during normal plant operations and following an abnormal occurrence or accident in which the plant is required to be placed in a safe shutdown condition. The system provides filtration of outside and recirculated air following post-accident radiological releases. The system is shown schematically in drawings AX4DB235 and AX4DB242-1. Table 9.4.1-4 provides design parameters for major components in the system.

9.4.1.8.1 Design Bases

9.4.1.8.1.1 Safety Design Bases. The normal HVAC system located in the technical support center does not perform any safety-related function. However, failure of nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related equipment, component, or structures.

9.4.1.8.1.2 Power Generation Design Bases

A. The onsite technical support center normal HVAC system provides a suitable environment for personnel and equipment during normal and post-accident operation, including provision for post-accident radiological releases.

B. The HVAC system provides a supply of cooling air sufficient to maintain area temperatures at 75±5°F.

C. During accident conditions a filtration unit provides filtered cooling air meeting the requirements of 10 CFR 50, Appendix A, General Design Criterion 19, for airborne contaminants and providing for personnel breathing requirements for continuous occupancy of 25 people. The filtration unit also inhibits infiltration of contaminated air by pressurizing the technical support center with outside air.

D. The system provides the capability to detect and protect the onsite technical support center personnel from smoke. The system also provides protection of the onsite Technical Support Center from airborne radioactivity.

E. Portable air breathing equipment and anticontamination clothing is provided.

9.4.1.8.2 System Description

9.4.1.8.2.1 General Description. The normal HVAC system for the onsite technical support center consists of an air-cooled water chiller unit, a pump and expansion tank, an air handling unit, a filtration unit, duct heaters for heating and humidity control, exhaust fans, and instrumentation and controls associated with the above equipment. The seismic and quality classifications of components, instrumentation, and ducting are given in table 3.2.2-1.

9.4.1.8.2.2 Component Description.

A. Chilled Water Unit

The water chiller is an air-cooled unit with dual compressors and six air cooling fans. The unit is located on the roof of the technical support center.

B. Chilled Water Pump and Expansion Tank

The chilled water pump is a centrifugal, motor-driven pump located in the mechanical HVAC room on the first floor of the building. The expansion tank is a steel tank located in the HVAC room and provided with appropriate instrumentation.

C. Air Handling Unit

The technical support center air handling unit consists of steel housing, a medium-efficiency filter, cooling coils, and a centrifugal fan. The unit is located in the mechanical HVAC room.

D. Filtration Unit

The emergency filtration unit consists of steel housing, a prefilter, an electric heating coil, upstream HEPA filters, a charcoal adsorber, downstream HEPA filters, and a supply fan. The supply fan is a backward inclined, centrifugal fan with flow regulating dampers to compensate for the increase in filtration resistance as the dust loading increases. The unit is located in the mechanical HVAC room.

E. Preadsorber

The preadsorber unit consists of a moderate efficiency filter and a charcoal adsorber. This unit is mounted in series with ductwork upstream of the filtration unit, and is located in the vestibule north of the mechanical HVAC room.

F. Exhaust Fans

The exhaust fans are centrifugal fans driven by electric motors.

G. Duct Heaters

The duct heaters are electric resistance heaters mounted directly in the duct for temperature and humidity control.

H. Deleted.

I. Access Doors

To minimize inleakage, the access doors to the technical support center are equipped with self-closing devices that shut the doors automatically following the passage of personnel. A set of two doors, with a vestibule between, acting as an airlock, are provided at each of the four entrances to the technical support center.

J. Isolation Dampers

System isolation dampers are capable of automatically closing within 6 s after receipt of an actuation signal, as verified by testing. The isolation dampers are tested as bubble-tight dampers for zero leakage.

K. Radiation Detectors

The technical support center filtration unit is activated upon a control room isolation signal. One input to this signal is high radiation detected in the control room air intake as described in paragraph 6.4.3.2. A portable area radiation monitor is provided as described in paragraph 12.3.4.1.8.

L. Smoke Detectors

A smoke detector is installed in the outside air intake duct. This detector indicates the presence of smoke entering the area from outside. The smoke detector actuates an alarm in the technical support center HVAC control panel.

M. Deleted.

N. Breathing Apparatus

Self-contained portable breathing equipment with air bottles is stored within the habitability area of the technical support center.

9.4.1.8.2.3 System Operation.

9.4.1.8.2.3.1 Normal Mode. The onsite technical support center air-conditioning system operates during normal modes of operation. Outside air from the intake plenum at el 233 ft 2 in. is mixed with recirculated air and filtered through a medium-efficiency filter, cooled, and discharged into a duct system that distributes the air to the onsite technical support center area. Outside air is preheated with a thermostatically controlled electric duct heater. The CRT display room, computer room, communications room, and conference room have electric reheat coils for close temperature and humidity control. Outside air is supplied to makeup for air exhausted from the battery and toilet areas. The ventilation system is designed to limit the hydrogen concentration to less than 2 percent by volume within the battery area in accordance with Regulatory Guide 1.128. The exhaust air from the battery room and toilet area is exhausted through a normal exhaust fan to the atmosphere at el 241 ft 0 in.

9.4.1.8.2.3.2 Safety Actuation Mode. If high radiation is detected in the control room outside air intake duct or if control room isolation occurs for other reasons, the technical support center filtration unit automatically starts and the air-conditioning unit continues to operate. The toilet and battery room fans are automatically deenergized. The outside air isolation damper to the supply unit closes, and the outside air damper to the filtration unit opens. The isolation dampers in the toilet and battery room exhaust ducts close.

During the high radiation mode of operation, outside air passes through the preadsorber unit, then through the filtration unit, and is mixed with return air from the building. The filtration unit is sized to process approximately 25 percent of the total air circulated by the supply system. A sufficient quantity of outside air is introduced to maintain the pressure of 0.125 in. WG above atmospheric pressure in the CRT display computer area, communications area, conference room, and work areas. All other areas are at a slight positive pressure.

9.4.1.8.2.3.3 Isolation Mode. Manual action by the operator is required to close isolation dampers and deenergize the battery and toilet room exhaust fans. The supply air unit continues to operate to recirculate the air. Outside air is not introduced. There is no air pressure difference between the onsite technical support center and the outside.

9.4.1.8.2.3.4 Smoke. When smoke is detected in the outside air intake, it is alarmed on the onsite technical support center HVAC control panel. Manual action by the operator is required to close isolation dampers and start the filtration unit, if required.

9.4.1.8.2.3.5 Chilled Water. The onsite technical support center air-conditioning system consists of a room cooler, air-cooled chilled water pump, and interconnecting chilled water lines that collect room heat and dispose it to the atmosphere.

The air-cooled water chiller is a package-type unit consisting of a hermetically sealed compressor-motor, air-cooled condenser, controls, and prepiped refrigerant connections. Chilled water is processed to provide a water temperature differential of 10°F between the incoming and outgoing water system. Chilled water is pumped to the room cooler through distribution pipes with modulating valves to vary the flow of chilled water to the room air cooler to satisfy room temperature design.

9.4.1.8.2.4 Safety Evaluation. Since the onsite technical support center HVAC system has no safety design bases, no safety evaluation is provided.

9.4.1.8.2.5 Tests and Inspections. The system is designed to permit periodic inspection. The system is tested for function and capability in the preoperational testing. Testing of the onsite technical support center HVAC is essentially the same as the testing described in paragraph 9.4.1.6.

9.4.1.8.2.6 Instrumentation Application. A portable area radiation monitor is provided to warn personnel of unacceptable radiation levels. Smoke detection capability is provided in the supply air duct.

The following instrumentation is provided in the onsite technical support center:

- Alarm on high-pressure differential across filter unit.
- Alarm on high temperature in charcoal filter.
- Alarm on low airflow.
- Position indication of isolation dampers.
- Indication of operational status of the fans.

9.4.1.9 References

1. "Methods of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter," ASHRAE Standard 52, 1976.
2. "Filter, Particulate, High-Efficiency, Fire-Resistant," MIL-F-51068D.
3. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.
4. "Forced-Circulation Air Cooling and Air Heating Coils." ARI Standard 410-1972.
5. Deleted.
6. "Testing of Nuclear Air-Cleaning Systems." ANSI/ASME N510-1980.
7. "High-Pressure Duct Construction Standards," SMACNA, 1975.

9.4.2 FUEL HANDLING BUILDING VENTILATION SYSTEM

The normal operation and the emergency operation systems of the fuel handling building (FHB) heating, ventilation, and air-conditioning (HVAC) systems are discussed in this subsection. Fuel handling building normal ventilation systems include subsystem equipment units and ducting which service the spent fuel pool area, the railroad corridor, the spent fuel pool heat exchanger rooms, and the FHB general ventilation. Emergency or post-accident ventilation systems include subsystem equipment units and ducting which service the spent fuel pool heat exchanger rooms, the spent fuel pool area, and the FHB enclosure. The FHB ventilation system is shared by both Units 1 and 2. Both the normal and emergency FHB ventilation systems exhaust to the Unit 1 plant stack.

9.4.2.1 Normal Operation of the Fuel Handling Building Ventilation System

The FHB ventilation subsystems described in this subsection include those subsystems which function to ventilate the spent fuel area during normal plant operation.

9.4.2.1.1 Design Bases

9.4.2.1.1.1 Safety Design Bases. There are no safety design bases for the normal ventilation subsystems serving the FHB. However, the failure of nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components. The system is not required to function post-SSE.

9.4.2.1.1.2 Power Generation Design Bases.

A. The normal ventilation subsystems are designed to maintain the area atmosphere at the proper temperature and humidity to provide personnel comfort and equipment operability by providing once-through, 100-percent outside air ventilation at the rate of at least three air changes per hour.

B. The normal subsystems maintain the area between 40°F and 104°F during all modes of normal plant operation.

C. During fuel handling operations, the ventilation system maintains the fuel handling area at 80°F. All other areas are maintained below 104°F.

D. The FHB is maintained at a negative pressure with respect to atmosphere.

E. Redundant radiation monitors are provided in the exhaust ductwork to detect high radiation levels. If high radiation levels are detected, a signal isolates the normal exhaust system and initiates the post-accident exhaust system. (See section 11.5.)

F. The normal subsystems function only during normal operational modes. The normal supply and exhaust units are isolated in the event of accident conditions.

G. The ductwork is arranged so that short circuiting of input air to exhaust does not occur.

9.4.2.1.1.3 Codes and Standards. Conformance to Regulatory Guide 1.140 is described in subsection 1.9.140.

9.4.2.1.2 System Description

9.4.2.1.2.1 General Description. The normal FHB ventilation subsystems are shown in drawings AX4DB204-1 and AX4DB204-2. Flow diagrams are given in drawing AX4DB260-1. Component data is provided in table 9.4.2-1. The subsystems consist of two 100-percent-capacity supply air handling units, reheat coils, two 100-percent-capacity exhaust units, two recirculating air units serving the spent fuel pool area, one recirculating air unit serving the railroad corridor, and associated piping, ductwork, dampers, registers, and controls. The seismic and quality classifications of components, instrumentation, and ducting are given in table 3.2.2-1. The components are connected to the normal 480-V ac system.

9.4.2.1.2.2 Component Description.

A. Supply Air Handling Units

Each supply air handling unit consists of a filter, heating coils, a cooling coil, and a fan. Each unit is rated at 27,000 ft^3/min at 5 in. WG static pressure.

B. Exhaust Units

Each exhaust unit consists of a fan, two high-efficiency particulate air (HEPA) filters, one charcoal filter, moisture eliminator, and a heating coil. Each unit is rated at 30,000 ft^3/min at 15 in. WG.

C. Recirculation Units

The two recirculation units serving the spent fuel pool area each consist of a fan, cooling coil, and reheating coil. Each unit is rated at 2500 ft^3/min at 2 in. WG.

The recirculation unit serving the railroad corridor consists of a cooling coil and a fan. The unit is rated at 3100 ft^3/min at 2.12 in. WG.

D. Reheat Coil

Reheat coils are provided primarily to control temperature or relative humidity. Heating elements are finned tubular type with 80-percent nickel and 20-percent chromium resistance wire embedded in insulation inside of a Monel sheath. Fins are Monel permanently attached to the tubes. The elements are supported in a type 304 stainless steel casing. The electric heaters are provided with the filter units designed in accordance with American National Standards Institute (ANSI) N509.[(1)]

E. Dampers

1. Isolation Dampers

   Where a means of system isolation is required, butterfly type dampers are utilized. The type of operator employed is pneumatically actuated and is dependent upon the specific design and/or usage requirements.

2. Tornado Dampers

   Tornado dampers are employed where isolation from the effects of extreme wind or tornado conditions is required. These dampers close with the flow produced by the differential pressure associated with the tornado or high winds.

3. Flow Control Dampers

   Opposed-blade type dampers are utilized, as necessary, to provide a means of system balancing. In general, these are manually operated.

4. Backdraft Dampers

   Backdraft dampers are employed, where required, to maintain the proper direction of flow.

5. Fire Dampers

   Fire dampers are located in fire barriers, as necessary, to maintain the fire ratings of the barriers. Dampers are the 3-h rated curtain type.

F. Cooling Coils

Cooling coils are constructed of copper tubes and fins mechanically bonded to the tubes. The coils are arranged for counter flow design using chilled water. The tube bundles are enclosed in a steel frame. Coils are arranged for horizontal airflow and include vent and drain connections. The chilled water system is discussed in subsection 9.2.9.

9.4.2.1.2.3 System Operation. The FHB ventilation system under normal operating conditions draws 100-percent outside air from the intake plenums at el 288 ft 10 in., which is filtered and conditioned for distribution to the different zoned spaces. During winter, outside air is preheated to 56°F. The electric preheating coil is capable of heating 100-percent outside air from 17°F to 56°F. Each zone is provided with electric heating coils actuated by thermostats to meet the design temperature requirement for comfort and process needs. FHB air ambient temperature is maintained at a minimum of 40°F and a maximum of 104°F during normal plant operation.

A minimum outside air purge of three volume air changes per hour is supplied to the spent fuel pool area. Supplementary recirculating units for the fuel pool areas (Units 1 and 2) are provided.

Each recirculating unit consists of a fan, chilled water coils fed from the normal chilled water system, and duct mounted electric reheat coils to carry the partial air-conditioning load off the normal air supply system.

Exhaust air from the different areas of the FHB is collected through the ductwork system and is processed through filter trains prior to exhaust to the Unit 1 plant stack. Filter trains and exhaust fans are sized to compensate for the air inleakage to the building due to the design negative pressurization for confinement of potentially radioactive contaminants. Factoring the building inleakage and the increases in filter resistance, the exhaust fans are fitted with flow control mechanisms. Each filter train is provided with the necessary instrumentation for proper operation and monitoring of the system. Two 100-percent supply air handling units and two 100-percent exhaust units are provided.

When high radiation levels are detected at the exhaust duct a train-oriented FHB isolation signal (FHBI-A and FHBI-B) is initiated and the following actuations and events will follow:

A. The isolation dampers close at the interconnecting ductwork between the normal and emergency exhaust filter units.

B. The normal supply and exhaust isolation dampers close at the FHB pressure boundary duct penetrations.

C. The normal supply and exhaust fans automatically cease running, due to the low airflow resulting from the closure of the isolation dampers.

D. The FHBI signal will start the post-accident filtration system to provide continuity of negative pressurization during accident and post-accident conditions. (Refer to paragraph 9.4.2.2.)

The fuel pool area recirculating unit, having no immediate response to the FHBI signal, remains operative until manually reset. These units are sized for supplementary cooling only and do not have the capacity to control the temperature and humidity during accident or post-accident conditions when the normal system is not operating.

The design of the HVAC system allows the normal exhaust system, if available, to be used in addition to the post-accident filtration system and for post-accident air cleanup of potentially radioactive contaminants inside the fuel building.

This post-accident operation involves manually starting the normal exhaust filtration system, which is otherwise deenergized as a result of the FHBI signal, and opening of the associated dampers to initiate recirculation. Air is collected through the ductwork and directed to the air filtration system for processing. The discharge is ducted to the fuel pool area.

Each spent fuel pool heat exchanger and pump room is provided with a dedicated recirculating unit consisting of a fan and two chilled water coils. One of the cooling coils is connected to the normal chilled water system and the other to the engineered safety feature (ESF) chilled water system. These units operate under both normal and emergency conditions, and are actuated by either a temperature switch set at 90°F (normal operation) or by the safety injection signal (emergency operation).

The railroad corridor and railroad unloading areas have separate recirculating fan-coil systems that maintain the areas at the designed level of cooling. No positive ventilation is provided, but ventilation occurs through inleakage of outside air to the area created by the building negative pressurization. The unit is started manually or automatically by a high limit temperature switch. Supply air at 56°F is distributed to the areas for even temperature control. The space is heated by wall-mounted infrared radiant heaters actuated by handswitch.

9.4.2.1.3 Safety Evaluation

Since there are no safety design bases for the normal ventilation subsystems, no safety evaluation is provided.

9.4.2.1.4 Tests and Inspections

The normal ventilation subsystem is designed to permit periodic inspection of system components. Each component is inspected prior to installation. Components of each system are accessible for periodic inspection during normal plant operation. A system air balance test and adjustment to design conditions is conducted in the course of the plant preoperational test program. Instruments are calibrated during testing. Automatic controls are tested for actuation at the proper setpoints. Alarm functions are checked for operability. Prefilters do not undergo factory or in-place testing, since no credit is taken for removal of particulates by the prefilters.

All charcoal adsorbers are factory tested in accordance with the recommendations of Regulatory Guide 1.140 as described in section 1.9.

In-place testing is performed with a suitable refrigerant in accordance with Regulatory Guide 1.140, as discussed in section 1.9. High-efficiency particulate absolute filters are factory tested with monodispersed dioctyl phthalate aerosol to demonstrate a minimum particulate removal efficiency of no less than 99.97 percent for 0.3-μm particulates. Testing is in accordance with Regulatory Guide 1.140, as discussed in section 1.9. A functional test of the HEPA and/or charcoal filter bank is performed whenever a filter element is replaced. Charcoal samples will be tested for impregnant efficiency, in an independent laboratory in conformance with Regulatory Guide 1.140 as discussed in section 1.9. A preoperational test is conducted to verify that a negative pressure exists in the spent fuel pool area when the normal ventilation system is in operation.

Ductwork is leak tested in accordance with American National Standards Institute (ANSI) N510, Section 6[(5)] and Sheet Metal and Air-Conditioning Contractors National Association, Incorporated (SMACNA) standards.[(3)]

Fans are tested in accordance with Standard 210 of the Air Moving and Conditioning Association (AMCA).[4]

Testing and inspection are in conformance with Regulatory Guide 1.140, as discussed in section 1.9.

9.4.2.1.5 Instrumentation Applications

System parameters are monitored and controlled by temperature, pressure, and flow instrumentation. Operation of heating and cooling coils is automatically regulated by temperature-indicating controllers. Fans are operable from the control room.

Radiation monitors in the exhaust duct monitor and alarm high radioactivity. Isolation dampers automatically close in the event of high radiation.

The following instrumentation for the normal FHB ventilation system is provided in the control room:

- Alarm on high pressure differential across the total exhaust filter unit.
- Alarm on high moisture content downstream of the moisture eliminator.
- Alarm on high temperature in the charcoal filter.
- Alarm on high radioactivity in the exhaust ducting.
- Alarm on low airflow.
- Low supply air temperature.
- Position indication for isolation dampers between the normal and emergency systems.
- Indication of the operational status of the fans.
- Indication of radioactive concentrations in the exhaust ducting.

9.4.2.2 Post-Accident or Emergency Operation of the FHB Ventilation System

The FHB ventilation subsystems described in this subsection include those which function during emergency or post-accident conditions.

9.4.2.2.1 Design Bases

9.4.2.2.1.1 Safety Design Bases.

A. The FHB post-accident ventilation system is designed to prevent exfiltration of contaminated air by filtering and exhausting air from the area after the area has been isolated from the normal ventilation subsystem. A single failure will not prevent the system from operating as designed.

B. The post-accident ventilation subsystem is designed to maintain a negative pressure within the area following a fuel handling accident.

C. The FHB post-accident ventilation system is powered so that the failure of one Class 1E power supply cannot impair the function of both ESF trains.

D. The FHB post-accident ventilation system is protected from the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, and external missiles. The subsystem is designed to perform its intended function following a hazard such as fire, internal missiles, or pipe break.

9.4.2.2.1.2 Power Generation Design Bases. The post-accident ventilation subsystem does not operate during normal modes of plant operation and so has no power generation design bases.

9.4.2.2.1.3 Codes and Standards. The FHB post-accident exhaust system conformance to Regulatory Guide 1.52 is described in subsection 1.9.52.

9.4.2.2.2 System Description

9.4.2.2.2.1 General Description. The post-accident ventilation subsystems are shown in drawings AX4DB204-1, AX4DB204-2, 1X4DB228, and 2X4DB228. Flow diagrams are shown in drawing AX4DB260-1. The subsystem consists of two 100-percent-capacity exhaust filtration units, two cooling recirculation units in the spent fuel pool heat exchanger rooms, and associated piping, ductwork, dampers, and controls. Applicable codes and standards are listed in table 3.2.2-1.

9.4.2.2.2.2 Component Description. System components are described briefly in this section. Further details regarding ESF filter trains are provided in subsection 6.5.1.

A. Exhaust Filtration Units

Each exhaust filtration unit consists of a moisture eliminator, a heating coil, two HEPA filters, one charcoal filter, and a fan. Each unit is rated at 5000 ft^3/min at 15 in. WG.

B. Cooling Recirculating Units

Each cooling recirculating unit consists of two cooling coils and a fan. Each unit is rated at 4700 ft^3/min at 2.19 in. WG. Further details of the recirculating fan coolers are provided in paragraph 9.4.3.2.

C. Dampers

1. Isolation Dampers

Where a means of system isolation is required, butterfly dampers are utilized. The type of operator employed is pneumatically actuated and is dependent upon the specific design and/or usage requirements.

2. Tornado Dampers

Tornado dampers are employed where isolation from the effects of extreme wind or tornado conditions is required. These dampers close with the flow produced by the differential pressure associated with the tornado or high winds.

3. Flow Control Dampers

   Opposed-blade-type dampers are utilized, as necessary, to provide a means of system balancing. In general, these are manually operated.

4. Backdraft Dampers

   Backdraft dampers are employed, where required, to maintain the proper direction of flow.

5. Fire Dampers

   Fire dampers are located in fire barriers, as necessary, to maintain the fire ratings of the barriers. Dampers are the 3-h rated curtain type.

9.4.2.2.2.3 System Operation.

In the event of a fuel handling accident that releases radioactivity, radiation monitors in the exhaust duct sense high radioactivity and transmit a high radiation signal to the balance of plant (BOP) safety actuation system. This system in turn generates a FHBI signal which causes the isolation dampers to close, isolating the FHB from the normal supply and exhaust. (See section 11.5 for further details regarding radiation monitoring.) Upon receipt of the FHBI signal the exhaust filtration units automatically start. The FHB post-accident exhaust system can also be actuated manually from the control room. The FHB ESF isolation is discussed in subsection 7.3.5.

The FHB post-accident exhaust system provides the necessary building negative pressurization and no outside makeup air is supplied during post-accident operation. The exhaust from the filtration units is ducted to the plant vent.

Air infiltration into the FHB is the supply air for this mode of operation, and the building is maintained under a negative pressure to minimize release of radioactivity to the atmosphere.

A moisture controller is provided to actuate an electric heating coil located upstream of the charcoal adsorber to reduce the relative humidity of the air through the adsorber as discussed in paragraph 6.5.1.2.2.

9.4.2.2.3 Safety Evaluation

A. The post-accident FHB ventilation subsystem prevents exfiltration of contaminated air by imposing a negative pressure on the building. Two 100-percent-capacity exhaust units are provided so that a single failure will not nullify the negative pressure and thus allow an uncontrolled release of radioactivity. The normal ventilation subsystem supply and exhaust ducts are provided with redundant isolation dampers, so the area is isolated from the normal ventilation system after an accident. Table 9.4.2-2 presents the results of a failure modes and effects analysis.

   The contaminated air is filtered through HEPA and charcoal filters to remove airborne radioactive contamination before release to the plant stack. Though no credit is taken in dose calculations, the filters provide aid in limiting the radiological consequences of a fuel handling accident to less than 10 CFR 100 limits.

B. The exhaust units are each rated at 5000 ft^3/min. This is sufficiently in excess of the possible infiltration into the building to ensure that the building will be under negative pressure.

C. Each train of the FHB post-accident ventilation system is connected to a separate Unit 1 Class 1E power supply.

D. The safety-related portions of the post-accident FHB ventilation system are located in the FHB, which is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. The ESF fans are designed and constructed as Seismic Category 1 to ensure that they will function during and after an SSE. Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the basis for the adequacy of the structural design of the FHB. Section 3.6 discusses protection from pipe break effects.

E. The subsystem is designed, constructed, and qualified as Seismic Category 1 to ensure that it will remain functional during and after an SSE.

9.4.2.2.4 Tests and Inspections

Fan units are tested by the manufacturer prior to shipment in accordance with AMCA Standard 210.[4] The system is inspected and an air balance test and adjustment is performed during the plant preoperational test program. Instruments are calibrated during this testing. Ductwork is tested for leakage after installation.

HEPA filter units are tested individually prior to installation to verify an efficiency of 99.97 percent, and HEPA filter banks are tested in place prior to operation and periodically thereafter in accordance with Regulatory Guide 1.52, as discussed in section 1.9.

The entire filtration trains are tested regularly in accordance with Position C.5 of Regulatory Guide 1.52, as discussed in section 1.9.

The activated carbon is batch tested prior to loading, and samples are tested periodically thereafter.

A summary of the conformance to Regulatory Guide 1.52 is given in subsection 1.9.52.

9.4.2.2.5 Instrumentation Application

The FHB post-accident exhaust system is automatically actuated by radiation monitoring as discussed in paragraph 9.4.2.2.2.3. Moisture, temperature, and pressure instruments allow the operator to monitor the condition of the air as it goes through the filter unit. Flow switches and radiation sensors are provided on the discharge lines.

The following instrumentation for the emergency FHB ventilation system is provided in the control room:

- Alarm on high pressure differential across the first HEPA filter.
- Alarm on high pressure differential across total post-accident filter unit.
- Alarm on high moisture content downstream of the moisture eliminator.
- Alarm on high temperature in charcoal filter.
- Alarm on high-high temperature in charcoal filter.

- Alarm on high or low airflow at filter outlet.
- Alarm on high radioactivity in the exhaust ducting.
- Position indication for isolation dampers.
- Indication of the operating status of the fans.
- Indication of radioactive concentrations in exhaust ducting.
- Differential pressure across the first HEPA filter.
- Differential pressure across total post-accident filter unit.
- Flow at filter unit outlet.
- Moisture content downstream of the moisture eliminator.
- Temperature of filter unit.

9.4.2.3 References

1. "Nuclear Power Plant Air-Cleaning Units and Components," ANSI/ASME N509-1976.
2. Deleted.
3. "High-Pressure Duct Construction Standards," SMACNA, 1975.
4. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.
5. "Testing and Nuclear Air-Cleaning Systems," ANSI/ASME N510-1980.

9.4.3 AUXILIARY AND RADWASTE BUILDING VENTILATION SYSTEM

The auxiliary building is provided with two ventilation systems, one for normal plant operation and one for emergency conditions.

The heating, ventilation, and air-conditioning (HVAC) systems for the auxiliary and radwaste buildings are designed to provide the necessary space environmental control including the control of airborne radioactivity.

9.4.3.1 Auxiliary Building Normal Ventilation System

The system described in this subsection includes those components which function to provide ventilation during normal modes of plant operation.

9.4.3.1.1 Design Bases

9.4.3.1.1.1 Safety Design Bases. There is no safety design basis for the auxiliary building normal HVAC system. However, the failure of nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components. The system is not required to function after an SSE.

9.4.3.1.1.2 Power Generation Design Bases.

A. The auxiliary building normal ventilation system maintains temperatures and radiation in the access areas at safe levels for plant personnel.

B. The normal ventilation system provides sufficient ventilation to the equipment rooms to maintain temperatures within the allowable limits.

C. The normal ventilation system is designed to maintain the building at a negative pressure to prevent release of radioactivity to the atmosphere.

9.4.3.1.1.3 Codes and Standards. Conformance to Regulatory Guide 1.140 is described in subsection 1.9.140.

9.4.3.1.2 System Description

9.4.3.1.2.1 General Description. Drawings 1X4DB208-1, 2X4DB208-1, 1X4DB208-2, and 1X4DB208-3 show the auxiliary building normal ventilation system. Flow diagrams are given in drawings 1X4DB261-1, 1X4DB261-2, 1X4DB261-3, 1X4DB261-4, 1X4DB261-5, 1X4DB261-6, 1X4DB261-7, 1X4DB261-8, and 1X4DB261-9. Component data is provided in table 9.4.3-1. The auxiliary building normal ventilation system consists of two air supply units which draw the supply air from outside the building, three exhaust filtration units, and associated ductwork, piping, dampers, registers, and controls. Classifications of equipment and applicable codes and standards are listed in table 3.2.2-1. The components are connected to the 480-V ac normal power supply.

A chilled water type cooling coil unit with fan, which supplements, but is not connected to, the auxiliary building normal ventilation system, is provided for steam generator blowdown heat exchanger room C108/C125 and C02/C135. This unit filters, cools, and recirculates air within the room during normal plant operating modes. Drawings 1X4DB208-1, 2X4DB208-1, 1X4DB208-2, 1X4DB208-3, 1X4DB261-1, 1X4DB261-2, 1X4DB261-3, 1X4DB261-4, 1X4DB261-5, 1X4DB261-6, 1X4DB261-7, 1X4DB261-8, and 1X4DB261-9 show the room cooler and associated air flow parameters.

9.4.3.1.2.2 Component Description.

A. Air Supply Units

Each air supply unit consists of a prefilter, a fan, heating coils, and a cooling coil.

B. Exhaust Filtration Units

Each exhaust filtration unit consists of a moisture eliminator, a heating coil, two high-efficiency particulate air (HEPA) filter sections, a charcoal filter, and a fan.

9.4.3.1.2.3 System Operation. The air supply units draw air from outside at el 262 ft 0 in., filter it, heat or cool it as required, and distribute it through the system ductwork to registers supplying air to the various equipment rooms, switch-gear rooms, and access areas in the auxiliary building.

Air is also supplied to the piping penetration area, where it is distributed to the various valve galleries and penetration rooms.

The air is collected through return registers and conveyed through ductwork to the exhaust filtration units, where it is filtered and discharged to the plant vent. The exhaust fans are provided with flow control mechanisms to regulate the exhaust flow. Pressure boundaries are established within the building for confinement of radioactive contaminants.

Smoke removal is integrated into the system as a mode of operation. Smoke detectors are located throughout the building, and upon receipt of a smoke signal, the exhaust air filtration suction dampers may be manually actuated to bypass the HEPA filters and charcoal. This prevents clogging of the filters with smoke.

9.4.3.1.3 Safety Evaluation

Since the normal ventilation system has no safety design bases, no safety evaluation is required.

9.4.3.1.4 Tests and Inspections

The normal HVAC system components are tested and inspected prior to installation. The filter pressure drop and the high-efficiency filter are checked periodically and alarmed in the control room on high differential pressure. Fans are tested in accordance with Air Moving and Conditioning Association (AMCA) Standard 210;[(1)] filters are tested in accordance with American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 52;[(2)] coils are tested in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 410.[(3)]

Filters and adsorbers are tested in the manufacturer's shop after initial installation and subsequent to each filter or adsorber change. Filter and adsorber interim tests and inspections will be performed in accordance with the recommendations of Regulatory Guide 1.140, as discussed in section 1.9.

All charcoal adsorbers are factory tested in accordance with the recommendations of Regulatory Guide 1.140 as described in section 1.9. Charcoal samples will be tested for efficiency in an independent laboratory in accordance with Regulatory Guide 1.140 as described in section 1.9. In-place testing is performed with a suitable refrigerant to check for bed bypass leakages in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Prefilters will not undergo factory or in-place testing, since no credit is taken for removal of particulates.

HEPA filters will be factory tested with dioctyl phthalate (DOP) aerosol to demonstrate a minimum particulate removal efficiency of no less than 99.97 percent for 0.3-μm particulates. In-place leak testing will be in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Air-conditioning units will be performance tested by the manufacturer to ensure design heat removal capabilities.

Ductwork is leak tested in accordance with ANSI N510, Section 6[(8)] and Sheet Metal and Air-Conditioning Contractors National Association, Incorporated (SMACNA).[(5)]

Major components are accessible during normal plant operation for inspection, maintenance, and periodic testing.

9.4.3.1.5 Instrumentation Applications

Temperature instrumentation controls heating and cooling in the supply units.

Conditions through the exhaust filtration units are monitored by moisture, differential pressure, and temperature instrumentation. The fans are operable from the control room. Instrumentation provided with the auxiliary building normal exhaust filter adsorber unit is as recommended by Regulatory Guide 1.140.

The following instrumentation for the auxiliary building normal ventilation system is provided in the control room:

- Alarm on high pressure differential across total exhaust filter unit.
- Alarm on high temperature in charcoal filter.
- Alarm on high moisture content downstream of the moisture eliminator.
- Alarm on low airflow.
- Alarm on high temperature in engineered safety features (ESF) pump rooms.
- Position indication for isolation dampers.
- Indication of the operation status of the fans.

9.4.3.2 Auxiliary Building Emergency Ventilation System

The auxiliary building emergency ventilation system includes those components which function after an accident to keep ESF equipment rooms cooled, maintains a negative pressure on the area to prevent release of radioactivity to the atmosphere, and filters the exhaust from the negative pressure boundary. The auxiliary building emergency ventilation system consists of two subsystems, ESF room coolers, and a piping penetration area filtration and exhaust system.

9.4.3.2.1 Design Bases

9.4.3.2.1.1 Safety Design Bases.

A. The system is designed to maintain air temperatures as required in rooms containing safety-related equipment during the following conditions: loss-of-coolant accident (LOCA), loss of offsite power, and other postulated accidents including line rupture with release of radioactivity inside building.

B. Each equipment room is cooled by a unit whose fan is powered from the same safety features bus as the equipment in the room.

C. The system is protected from the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, and external missiles; it is designed to function after a postulated hazard, such as a fire, internal missiles, or pipe break.

D. The system is designed so that any single failure cannot cause loss of an ESF function.

E. The normal ventilation system has provisions for isolation from the area during emergency system operation.

F. The auxiliary building emergency ventilation system is designed to maintain a negative pressure on the area to minimize the release of radioactivity to the atmosphere outside the building.

9.4.3.2.1.2 Power Generation Design Bases. The auxiliary building emergency ventilation system has no power generation design base.

9.4.3.2.1.3 Codes and Standards. Conformance to Regulatory Guide 1.52 is discussed in subsection 1.9.52.

9.4.3.2.2 System Description

9.4.3.2.2.1 General Description. Drawings 1X4DB228, 1X4DB205-1, 2X4DB205-1, and 1X4DB205-2 show the post-accident auxiliary building ventilation systems. Component data are provided in table 9.4.3-2 and 9.4.3-3. The system consists of individual recirculating fan cooler units located in each ESF equipment room, the piping penetration filtration and exhaust system located in the penetration area, and the two penetration area coolers. Classifications of equipment and applicable codes and standards are listed in table 3.2.2-1.

9.4.3.2.2.2 Component Descriptions.

A. Piping Penetration Area Filtration and Exhaust System The two exhaust filtration units each consist of a moisture eliminator, a heating coil, two HEPA filter banks, a charcoal filter, and a fan. Each unit is rated at 16,000 ft^3/min at 16 in. WG static pressure. Additional information regarding ESF filtration units is provided in subsection 6.5.1.

B. Penetration Area Coolers

There are two coolers, one cooled by nuclear service cooling water and one by essential chilled water. Each cooler has two coils; one carries train A water and the other, train B water.

C. Recirculating Fan Coolers

Each fan cooler consists of a fan and a cooling coil cooled by essential chilled water. The units in the electric switchgear rooms, the residual heat removal pump rooms, the charging pump rooms, and the spent fuel pool heat exchanger and pump rooms have a second cooling coil which is cooled by normal chilled water. This allows these units to cool during normal operation by means of normal chilled water. The units in the containment spray pump rooms, component cooling water pump rooms, and safety injection pump rooms have only one cooling coil cooled by essential chilled water.

D. Dampers

1. Isolation Dampers

Where a means of system isolation is required, parallel-blade-type dampers are utilized. The type of operator employed is pneumatically actuated and is dependent upon the specific design and/or usage requirements.

2. Tornado Dampers

   Tornado dampers are employed where isolation from the effects of extreme wind or tornado conditions is required. These dampers close with the flow produced by the differential pressure associated with the tornado or high winds.

3. Flow Control Dampers

   Opposed-blade-type dampers are utilized, as necessary, to provide a means of system balancing. In general, these are manually operated.

4. Backdraft Dampers

   Backdraft dampers are employed, where required, to maintain the proper direction of flow.

5. Fire Dampers

   Fire dampers are located in fire barriers, as necessary, to maintain the fire ratings of the barriers.

9.4.3.2.2.3 System Operation. The auxiliary building normal ventilation system is deenergized during emergency conditions. The containment ventilation isolation (CVI) signal automatically starts the emergency fan and filter system. The auxiliary building emergency HVAC system cools the equipment rooms and penetration areas and maintains a building negative pressure to minimize release of potentially radioactive particulates in the atmosphere.

Recirculated air is cooled through two sets of redundant cooling coils connected to train-oriented ESF chilled water and nuclear service cooling water system. The CVI signal also automatically closes the dampers isolating the emergency HVAC system from the normal HVAC system. A moisture controller actuates an electric heating coil located upstream of the charcoal adsorber to reduce the relative humidity of the air through the adsorber as discussed in paragraph 6.5.1.2.2.

Drawings 1X4DB205-1, 2X4DB205-1, and 1X4DB205-2 show the HVAC system for the piping penetration areas.

The ESF equipment rooms are provided with dedicated recirculating fan-coil units. Each fan-coil unit is capable of being started manually from the control room, automatically by the safety injection system signal or upon initiation of its respective ESF pump. Train-oriented cooling coils are provided.

9.4.3.2.3 Safety Evaluations

A. The system is designed with ample cooling capacity to maintain temperatures in the equipment rooms within the required limits.

B. Each equipment room is cooled by a unit whose power and chilled water come from the same safety features train as that associated with the equipment in the room. Thus, a failure of one train will not prevent cooling of redundant equipment in the other train. The failure modes and effects analysis is presented in table 9.4.3-4.

C. The system is designed and constructed as Seismic Category 1 to ensure that it will remain functional during and after an SSE. The system is located in the auxiliary building, which is designed to withstand the effects of earthquakes,

tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the basis for the adequacy of the structural design of the auxiliary building. Section 3.6 discusses the protection against pipe break effects.

D. Two redundant, 100-percent-capacity filter exhaust units are provided; therefore, no single failure can cause loss of any ESF function. Table 9.4.3-5 presents the results of a failure modes and effects analysis.

E. The normal exhaust and supply ducts are provided with isolation dampers so that the area is isolated from the normal ventilation system upon a CVI signal.

9.4.3.2.4 Tests and Inspections

All safety-related systems and boundary isolation provisions will undergo preoperational testing before plant startup.

The ESF HVAC system components are tested and inspected prior to installation. The filter pressure drop and the HEPA filter efficiency are checked periodically and alarmed in the control room upon high differential pressure. Fans are tested in accordance with AMCA Standard 210;[(1)] filter units are tested in accordance Regulatory Guide 1.52, as discussed in section 1.9; coils are tested in accordance with ARI Standard 410.[(3)]

Filters and adsorbers are tested in the manufacturer's shop, after initial installation and subsequent to each filter or adsorber change. Filters and adsorbers tests and inspections are performed in accordance with recommendations of Regulatory Guide 1.52, as discussed in section 1.9 and the VEGP Technical Specifications.

The HEPA filters are manufactured and tested prior to installation in accordance with MIL-F-51068[(6)]. The HEPA filter banks are tested in place prior to operation to verify retention of at least 99.95 percent in accordance with Regulatory Guide 1.52, as discussed in section 1.9.

Impregnanted, activated carbon is batch tested prior to loading into the adsorber bed. Acceptance criteria are in accordance with Regulatory Guide 1.52 as discussed in section 1.9. Tests include particle size distribution, hardness, density, moisture content, impregnant content, ash content, impregnant leachout, and elemental iodine and methyl iodine removal efficiencies at postulated accident conditions. The charcoal adsorber is leak tested prior to operation to verify a minimum retention. In addition, a laboratory test of a representative sample of the impregnated activated charcoal is performed to verify iodine removal efficiencies in accordance with Regulatory Guide 1.52, as discussed in section 1.9. Moisture separators are laboratory tested in accordance with American National Standards Institute (ANSI) N509, paragraph 5.4,[(7)] as capable of removing at least 99 percent of the entrained moisture in an air stream. Inservice testing of the ESF filtration systems is conducted in accordance with the surveillance requirements given in the Technical Specifications.

The ESF room coolers are performance tested by the manufacturer to ensure design heat removal capabilities.

Ductwork is leak tested, in accordance with SMACNA[(5)] and ANSI N510, Section 6.[(8)]

Major components are accessible during normal plant operation for inspection, maintenance, and periodic testing.

9.4.3.2.5 Instrumentation Applications

Thermostats, located at the various levels of the building and the HVAC ductwork, control space temperatures.

The amount of filter loading for all filters associated with both the air handlers and the filter adsorbers is available at the unit.

The following instrumentation for each train of the auxiliary building emergency ventilation system is provided in the control room:

- Alarm on high pressure differential across first HEPA filter.
- Alarm on high pressure differential across total filter unit.
- Alarm on high moisture content downstream of the moisture eliminator.
- Alarm on high temperature in charcoal filter.
- Alarm on high or low airflow at filter outlet.
- Alarm on high temperature in ESF equipment rooms.
- Position indication for isolation dampers.
- Indication of the operational status of the fans.
- Indication of the differential pressure across first HEPA filter.
- Indication of the differential pressure across total filter unit.
- Indication of the flow at filter unit outlet.
- Indication of the moisture content downstream of the moisture eliminator.
- Indication of the temperature of filter unit.

9.4.3.3 Radwaste Building Ventilation Systems

The radwaste transfer building, radwaste transfer tunnel, and the radwaste solidification building ventilation systems have been abandoned except for the auxiliary building filtration system exhaust duct as shown on drawings AX4DB353 sheet 2, and AX4DB378 sheet 2 which serves the following areas:

- Alternate radwaste building area exhaust.
- Alternate radwaste building process connection.
- Radwaste transfer tunnel pipe chase R-104/transfer tunnel R-A32 exhaust.

9.4.3.3.1 Alternate Radwaste Building

Ducts into the auxiliary building filtration system are provided for continuous exhaust of the alternate radwaste building. A vent line connection is provided to interface with the vendor-supplied container vent system to exhaust the potentially contaminated process air through the auxiliary building filtration system. Provisions are included to exhaust air from the radwaste tunnel area and portions of the radwaste transfer building through the auxiliary building filtration system.

9.4.3.3.2 Alternate Radwaste Building Control Room and Dress-Out Area

The HVAC system for the control room and dress-out area is a constant volume recirculation system with approximately 28 percent fresh outside air provided. The control room and dressout area is maintained at a slightly positive internal pressure to prevent infiltration from adjacent areas. Heating and cooling are provided by electric heater and direct expansion refrigerant coils which are part of the air handling unit. The air handling unit refrigerant cooling coil is served by a separate condensing unit located outside of the building. The heating and cooling cycles are controlled by a thermostat located within the control room.

9.4.3.3.3 Deleted

9.4.3.3.4 Safety Evaluation

Since there is no safety design basis for the alternate radwaste building ventilation system, no safety evaluation is required.

9.4.3.3.5 Tests and Inspections

The radwaste solidification building and radwaste transfer building ventilation systems are designed to permit periodic inspection of system components to ensure the integrity and capability of the system.

The fans are performance tested by the manufacturer in accordance with AMCA Standard 210.(1)

HEPA filter elements are tested individually prior to installation to verify an efficiency of 99.97 percent with a thermally generated, monodispersed, 0.3-μm DOP aerosol. HEPA filter banks are tested in place prior to operation and periodically thereafter in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Ductwork is leak-tested in accordance to ANSI N510, Section 6(8), and SMACNA.(5)

9.4.3.3.6 Instrumentation Applications

Instrumentation augments the HVAC equipment for automatic operation and performance monitoring. Airflow and pressure sensing devices monitor system status and maintain airflow within specified design parameters.

Thermostats located at various levels of the building and/or in ductwork maintain space temperatures. Within the radwaste solidification building control room and health physics facility, humidity sensing instrumentation controls humidifiers to maintain the desired humidity level.

The HVAC system equipment is provided with local and panel-mounted start-stop switches with indications of their operational status.

The instruments located in the radwaste solidification building control room include:

- Filter pressure drop indications.
- Temperature indications.

- Airflow indications.
- Operational status of the fans.

A trouble alarm for the radwaste solidification building HVAC systems is provided in the main control room. Radiation concentrations of selective cubicles and the exhaust from the radwaste solidification building vent are indicated in the main control room.

Instrumentation provided with a filtration unit is as recommended by Regulatory Guide 1.140, as applicable.

9.4.3.4 Radwaste Processing Facility

The radwaste processing facility ventilation system is shown on drawing AX4DB400. The system services the process area, electrical and mechanical equipment rooms, and the control room and dressout area.

9.4.3.4.1 Radwaste Processing Facility Process Area

An outside air supply duct with multiple registers provides a continuous supply of air to the process area. A HEPA filtration unit fan draws air from a supply duct in the potentially contaminated process area to create a slight negative pressure. The exhaust air passes through HEPA filters prior to being released through the radwaste processing facility vent. A radiation monitor (subsection 11.5.2) is provided to monitor this effluent path.

Four unit heaters are provided to maintain the temperature above its minimum.

9.4.3.4.2 Radwaste Processing Facility Electrical and Mechanical Equipment Rooms

Both the electrical and mechanical equipment rooms have a dedicated air makeup unit, each to maintain design temperature in the rooms. The air makeup unit supplies 100-percent outside air to each room. Air is exhausted through backdraft dampers to the outside.

9.4.3.4.3 Radwaste Processing Facility Control Room and Dressout Area

The HVAC system for the control room and dressout area is a constant volume recirculation system with approximately 8-percent fresh outside air provided. The control room and dressout area are maintained at a slightly positive internal pressure to prevent infiltration from adjacent areas. Heating and cooling are provided by the heat pump.

9.4.3.4.4 Safety Evaluation

Since there is not safety design basis for the radwaste processing facility, no safety evaluation is required.

9.4.3.4.5 Tests and Inspections

The radwaste processing facility ventilation systems are designed to permit periodic inspection of system components to ensure the integrity and capability of the systems.

The fans are performance tested by the manufacturer in accordance with AMCA Standard 210.[1]

HEPA filter elements are tested individually prior to installation to verify an efficiency of 99.97 percent with a thermally generated, monodispersed, 0.3-μm DOP aerosol. HEPA filter banks are tested in place prior to operation and periodically thereafter in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Ductwork is leak-tested in accordance to ANSI N510, Section 6[8], and SMACNA.[5]

9.4.3.4.6 Radwaste Processing Facility Instrumentation Application

A temperature-indicating controller varies HEPA filtration unit fan speed to maintain process area temperature within design limits. A differential pressure controller maintains the process area at a slightly negative pressure while the HEPA filtration unit is running by modulating the outside air damper. Dedicated thermostats are provided for each unit heater in the process area.

The HEPA filtration unit has instrumentation for locally displaying differential pressure across each filter and total differential pressure across the prefilter and HEPA filter combined. Alarms for high unit differential pressure and low airflow are provided in the radwaste processing facility control room.

In the electrical and mechanical equipment rooms, dedicated temperature indicating controllers control both fan speed and electric heat cycles of the respective air makeup unit.

A differential pressure gauge is provided in the control room to indicate differential pressure between the process area and the control room/dressout area. A thermostat/humidistat, located within the control room, controls heating and cooling cycles of the heat pump and the humidity in the control room.

9.4.3.5 References

1. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.
2. "Methods of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter," ASHRAE Standard 52, 1976.
3. "Forced Circulation Air Cooling and Air Heating Coils," ARI Standard 410-1972.
4. Deleted.
5. "High-Pressure Duct Construction Standards," SMACNA, 1975.
6. "Filter, Particulate, High-Efficiency, Fire Resistant," MIL-F-15068D.
7. "Nuclear Power Plant Air-Cleaning Units and Components," ANSI/ASME N509-1976.
8. "Testing of Nuclear Air-Cleaning Systems," ANSI/ASME N510-1980.

9.4.4 TURBINE BUILDING VENTILATION SYSTEM

The turbine building area ventilation systems described in this section operate during normal plant operations. The systems function to limit the air temperatures in the various equipment rooms and areas to temperatures allowable for proper operation of the equipment and to maintain proper working conditions for personnel. The condenser vacuum exhaust filter system and the steam packing exhauster filter system filters any contaminated air discharged from the steam jet air ejectors, vacuum pumps, and turbine gland seals to reduce any possible radioactivity to an acceptable level for plant discharge.

9.4.4.1 Design Bases

9.4.4.1.1 Safety Design Bases

The turbine building area ventilation system has no safety design bases.

9.4.4.1.2 Power Generation Design Bases

A. The system is designed to maintain the temperature in the spaces served within limits required to allow proper equipment operation.

B. The system maintains the temperature in the battery room between 70°F and 85°F and minimizes the accumulation of hydrogen gas within the battery room.

C. The system provides ventilation and temperature control adequate for personnel in the area.

D. A radiation monitor in the condenser vacuum exhaust filter system monitors the condenser vacuum exhaust and the steam packing exhauster blower discharge for radioactivity and automatically initiates filtration when the monitor's setpoint is exceeded.

9.4.4.1.3 Codes and Standards

Conformance to Regulatory Guide 1.140 is described in subsection 1.9.140.

9.4.4.2 System Description

9.4.4.2.1 General Description

Drawings 1X4DB229-1, 1X4DB229-2, and 1X4DB229-3 show the process and instrumentation requirements for the turbine building area ventilation system, and drawings 1X4DB301, 1X4DB301-1, and 1X4DB301-2 provide airflow data for the system. Component data is provided in table 9.4.4-1. The system consists of supply air handling units, air filtration units, supply fans, exhaust fans, heaters, cooling coils, dampers and associated piping, ductwork, and controls.

See table 3.2.2-1 for classifications of equipment and applicable codes and standards. The components are connected to the 480-V ac normal power supply.

9.4.4.2.2 Component Description

A. Air Handling Units

Each air handling unit is a horizontal draw-through cabinet type, single-zone unit, consisting of a flat prefilter section, fin tube water coil, and centrifugal fans. Additional design parameters for these units are given in table 9.4.4-1.

The chilled water coils used for the air handling units are designed in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 410-64.(1)

The fans used for the air handling units are centrifugal type, designed in accordance with the applicable portions of Air Movement and Control Association 99-76,(2) Standards Handbook, and Air Moving and Conditioning Association (AMCA) 210-74.(3)

The motors used in the air handling units are designed in accordance with the applicable portions of National Electrical Manufacturers Association (NEMA) MG1-78;1(4) Institute of Electrical and Electronic Engineers (IEEE) 112-78;(5) and IEEE 85-73.(6)

B. Exhaust Fans

The roof exhaust fans for various areas of the turbine building area are of the propeller type.

The lube oil reservoir room, toilets at levels 1 and 3, miscellaneous lube storage area, condensate chemical injection room, and the lube oil conditioning room are equipped with centrifugal-type exhaust fans. The fans are designed in accordance with the applicable portions of Air Movement and Control Association 99-76(2) and AMCA 210-74.(3)

Motors used in the exhaust fans are designed in accordance with the standards referenced in paragraph 9.4.4.2.2.

C. Ventilation Fans

Ventilation fans for various areas of the turbine building consist of vaneaxial type, centrifugal type, and horizontal cabinet type. Additional design parameters for the fans are given in table 9.4.4-1.

The fans used for ventilation are designed in accordance with the standards referenced in paragraph 9.4.4.2.2.A.

Motors used in the ventilation fans are designed in accordance with the standards referenced in paragraph 9.4.4.2.2.A.

D. Electric Heaters

Unit heaters are of the draw-through type with dynamically balanced fans for horizontal airthrow, complete with integral thermostat and transformer for stepping down line voltage to 120-V control voltage. Additional design parameters for these heaters are given in table 9.4.4-1.

The fans used in these heaters are propeller type and of aluminum construction, directly connected to the fan motor.

Heaters and motors are designed in accordance with National Board of Fire Underwriters, Pamphlet No. 90A-9,[7] and National Fire Protection Association (NFPA) No. 70.[8]

E. Condenser Vacuum Exhaust Filter System

The condenser vacuum exhaust filter system is served by one full-capacity filtration unit consisting of a moisture separator, a heating coil, a high-efficiency particulate air (HEPA) filter upstream of the charcoal filter bed, a 4-in.-deep charcoal filter, and a HEPA filter downstream of the charcoal filter bed. The filtration system is located inside the turbine building. The gases released from the condenser vacuum exhaust and from the steam jet air ejectors are routed through the filtration system upon a high level of radiation being detected by the radiation monitoring system.

The filter housing and its components are designed and constructed in accordance with American National Standards Institute (ANSI) N509.[9]

The HEPA filters are factory tested to demonstrate a minimum particulate removal efficiency of 99.97 percent of particulate matter 0.3 μm or larger in size. Additional design parameters are given in table 9.4.4-1.

The charcoal filter is an impregnated, activated 4-in.-deep carbon bed. The bed is filled with carbon adsorber meeting the acceptance criteria in accordance with Regulatory Guide 1.140 as described in section 1.9.140. Additional design parameters are given in table 9.4.4-1.

F. Steam Packing Exhauster Filter System

The steam packing exhauster filter system is served by one full-capacity filtration unit consisting of a moisture separator, a heating coil, an upstream HEPA filter, a 4-in.-deep charcoal filter bed, a downstream HEPA filter, and a fan. The filtration system is located inside the turbine building. The gases released from the steam packing exhauster are routed through the filtration system upon a high level of radioactivity being detected by the radiation monitoring system.

The filter housing and its components are designed and constructed in accordance with ANSI N509[9] with the exception of the recommended clearance between section components for maintenance and service.

The HEPA filters are capable of removing 99.97 percent (minimum) of particulate matter which is 0.3 μm or larger in size. Additional design parameters are provided in table 9.4.4-1.

The charcoal filter is an impregnated, activated 4-in.-deep carbon bed. The bed is filled with carbon adsorber meeting acceptance criteria in accordance with Regulatory Guide 1.140 as described in section 1.9. Additional design parameters are provided in table 9.4.4-1.

9.4.4.2.3 System Operation

The condenser vacuum exhaust filtration system and the steam packing exhauster filtration system are designed to filter and exhaust contaminated air discharged by the steam jet air ejector, turbine gland seals, and vacuum pumps to remove radioactive material to an acceptable level for discharge to the outside. During normal operation, the air is exhausted to the atmosphere at el 313 ft 0 in., bypassing the air filtration unit. The radiation monitor located

downstream of the air filtration unit detects the radioactivity in the air stream and transfers the airflow through the air filtration unit. The filtered air then exhausts to the atmosphere at el 313 ft 0 in.

A. Turbine Building Ventilation System

The system is controlled by thermostats located at level A, el 195 ft 0 in., and at level 3, el 270 ft 0 in., and by hand switches located in the turbine building and the main control room. When the thermostats at level 3, which control the louvers at level 1 (el 221 ft 6 in.), not associated with supply air fans, reach their setpoints on a temperature rise, the louvers open. When the thermostats at level 3 controlling the louvers at el 221 ft 6 in. associated with supply air fans reach their first-stage setpoints on a temperature rise, the louvers and backdraft dampers at the roof exhaust fans, el 295 ft 0 in., open to allow ventilation by natural convection currents through the turbine building. When these thermostats reach their second-stage setpoints, the roof exhaust fans are energized. When the thermostats at level A reach their setpoints on a temperature rise, supply air fans at level 1 are energized, forcing outside air into level A. Reverse operation occurs upon a temperature decrease below the setpoints of the thermostats.

The system is designed in accordance with Regulatory Guide 1.128, to maintain hydrogen concentrations in the turbine building battery rooms below 2 percent by volume by providing an air change rate that equals or exceeds 15 per hour.

Hand switches are provided to override thermostats and allow manual operation of the entire system. With turbine building hand switches in the remote position, system operation is initiated and/or terminated by the hand switch in the control room.

B. Turbine Building Heating System

The system is controlled by integral thermostats on each unit heater. When the temperature drops to the setpoint (40°F), the heater element and fan will be energized. When the temperature rises above the setpoint, the heater element will be deenergized. The fan will continue to run, circulating air through the heater until the fan is deenergized by a time delay relay.

C. Other Turbine Building Heating, Ventilation, and Air-Conditioning (HVAC) Systems

All other systems' operations are as detailed on the system drawings included in drawings 1X4DB229-1, 1X4DB229-2, and 1X4DB229-3.

9.4.4.3 Safety Evaluation

Since the turbine building area ventilation system has no safety design bases, no safety evaluation is provided.

9.4.4.4 Tests and Inspections

9.4.4.4.1 Turbine Building HVAC System

Fans are tested and rated in accordance with the standards of the AMCA.[3] Water coils are tested and rated in accordance with standards of the ARI.[1]

Each component is inspected prior to installation, and all components of the system are accessible for periodic inspection during plant operation.

Instruments will be calibrated during testing, automatic controls will be tested for actuation at the proper setpoints, and alarm functions will be checked for operability and limits prior to the system being put into operation.

9.4.4.4.2 Condenser Vacuum Exhaust and Steam Packing Exhauster Filter Systems

The condenser vacuum exhaust and steam packing exhauster filter systems and their components are tested prior to startup and periodically during operation. Written test procedures establish minimum acceptance values for all tests. A record of test results will be useful in enabling early detection of faulty performance.

Instruments will be calibrated during testing. Automatic controls will be tested for actuation at the proper setpoints. Alarm functions will be checked for operability and limits during preoperational testing.

Each HEPA filter is tested with dioctyl phthalate (DOP). The charcoal filter is tested with fluorocarbon refrigerant.

9.4.4.5 Instrumentation Applications

9.4.4.5.1 Turbine Building HVAC Systems

During power operation, temperature and pressure indicators verify the proper operation of the HVAC systems. Space temperatures are controlled by thermostats, which cycle fans and heaters and cycle or modulate flow through chilled water coils. Trouble alarms for the turbine building HVAC system and battery room are provided in the control room. Radiation concentration of the steam packing exhauster and condenser vacuum exhaust is indicated in the control room.

9.4.4.5.2 Condenser Vacuum Exhaust Filter System

The following instrumentation for the condenser vacuum exhaust filter system is displayed locally:

A. Position indication for all normal flow and bypass dampers and for deluge valve.

B. Differential pressure across each filter.

C. Differential pressure across total filter system.

D. Moisture indicator in moisture separator.

E. Temperature indicator for charcoal filter.

9.4.4.5.3 Steam Packing Exhauster Filter System

The following instrumentation for the steam packing exhauster filter system is displayed locally:

A. Position indication for all normal flow and bypass dampers and for deluge valve.

B. Differential pressure across each filter.

C. Differential pressure across total filter system.

D. Moisture indicator in moisture separator.

E. Temperature indicator for charcoal filter.

9.4.4.6 References

1. "Standard for Forced Circulation, Air Cooling, and Air Heating Coils," ARI Standard 410-1964.
2. Air Movement and Control Association Standard 99-1976, Standards Handbook.
3. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210-1974.
4. "Standards for Motors and Generators," NEMA MG1-1978.
5. "Test Procedure for Polyphase Induction Motors and Generators," IEEE 112-1978.
6. "Test Procedure for Airborne Sound Measurements on Rotating Electric Machinery," IEEE 85-1973.
7. National Board of Fire Underwriters, Pamphlet No. 90A-9.
8. National Electrical Code, NFPA No. 70.
9. "Nuclear Power Plant Air Cleaning Units and Components," ANSI/ASME N509-1976.
10. "Testing of Nuclear Air-Cleaning Systems," ANSI/ASME N510-1980.
11. "High-Pressure Duct Construction Standard," SMACNA, 1975.

9.4.5 CONTROL BUILDING ENGINEERED SAFETY FEATURES (ESF) VENTILATION SYSTEMS

Several features serve to reduce or limit the release of fission products to the control building following a postulated loss-of-coolant accident (LOCA) or fuel handling accident. Among them are control room habitability systems discussed in section 6.4 and ESF filtration systems discussed in subsection 6.5.1. Section 6.4 provides a discussion of the control room heating, ventilation, and air-conditioning (HVAC) system operation upon detection of high radiation, high toxic gas, and smoke. Subsection 6.5.1 provides only discussion of the function of the emergency filter systems to mitigate the consequences of an accident. This subsection provides the design bases and safety evaluation for the control building safety feature electrical equipment HVAC systems and control building HVAC equipment room ESF ventilation system for level 3.

9.4.5.1 Design Bases

9.4.5.1.1 Safety Design Bases

9.4.5.1.1.1 Control Building Safety Feature Electrical Equipment Room HVAC System.

A. The control building safety feature electrical equipment room HVAC system provides a proper environment and temperature for electrical equipment and maintenance personnel during normal conditions and postulated accident conditions.

B. The safety features electrical equipment room HVAC system shall remain functional during a safe shutdown earthquake (SSE), design basis tornado, LOCA, major pipe rupture of main steam or feedwater line, or single failure of any component of the system.

C. Each train of the safety features electrical equipment room HVAC system is powered from a separate and independent Class 1E power system.

D. The system minimizes the accumulation of hydrogen gas within the battery rooms.

9.4.5.1.1.2 Control Building ESF HVAC Equipment Room Ventilation System.

A. The safety feature control building ESF HVAC equipment room system provides a proper environment and temperature for ESF HVAC equipment during normal operation and postulated accident conditions.

B. The safety feature HVAC equipment room level 3 system remains functional during an SSE, design basis tornado, or LOCA along with a single failure of any component of the system.

9.4.5.1.2 Power Generation Bases

9.4.5.1.2.1 Control Building Safety Feature Electrical Equipment Room HVAC System.

A. The safety feature electrical equipment room HVAC systems are designed to maintain space temperatures between 65°F and 100°F.

Switchgear and inverter rooms	100°F DB (summer)
	65°F DB (winter)
Battery rooms	70°F DB (summer)
	80°F DB (winter)
Auxiliary relay room	100°F DB (summer)
	65°F DB (winter)

B. The battery room exhaust fan maintains the hydrogen concentration below 2 percent, which is less than the lower flammability level of 4 percent.

9.4.5.1.2.2 Control Building ESF HVAC Equipment Room Ventilation System. The ESF HVAC equipment room ventilation system is designed to provide the proper environment and temperature for ESF HVAC equipment.

9.4.5.1.3 Codes and Standards

The control building safety features electrical equipment HVAC system and control building HVAC equipment room ESF ventilation systems are designed to conform to the applicable codes and standards listed in table 3.2-2.

9.4.5.2 System Description

Classifications of equipment and applicable codes and standards are listed in table 3.2.2-1.

9.4.5.2.1 Control Building Safety Feature Electrical Equipment Room HVAC System

The ESF switchgear rooms, battery rooms, and auxiliary relay rooms for train A are located at el 200 ft 0 in. and 180 ft 0 in. Auxiliary relay rooms for train B are located at el 240 ft 0 in. The essential HVAC units are located at el 180 ft 0 in. and el 240 ft 0 in. of the control building.

The safety features electrical equipment room HVAC system consists of two parts, safety features electrical equipment room HVAC system for level B and ESF control building auxiliary relay rooms system.

The essential HVAC systems for the ESF switchgear, ESF equipment rooms, battery rooms, auxiliary relay rooms, and shutdown panel rooms are shown in drawings AX4DB216, AX4DB225, and 1X4DB207-1. Design data for major components are shown in table 9.4.5-1. Flow diagrams are given in drawing 1X4DB258-1.

The safety features electrical equipment room HVAC system has two completely independent, full-capacity trains for each nuclear unit. Each train consists of an air-conditioning unit with prefilter for particulate matter, two cooling coils, fan, and associated ductwork and controls. Chilled water for the cooling coils shall be supplied from their respective chilled water systems, normal chilled water system for normal operation, and essential chilled water system for accident conditions.

Both air-conditioning units start with a safety injection actuation signal. The operator may manually transfer one filter train into emergency standby when only one train operation is desired. The safety features electrical equipment room HVAC system supplies the conditioned air. The air is passed through a prefilter to remove particulate matter and a chilled water cooling coil to cool the air.

Each battery room is supplied air through a supply register. The exhaust fans exhaust the air directly to the atmosphere.

There are four battery rooms for each unit, and two redundant 100-percent exhaust fans are provided for each two rooms. There is a motorized damper in each exhaust duct. The supply fan and battery room exhaust fan operate at all times to minimize any hydrogen buildup in the battery room. The battery room is maintained at a slightly negative pressure.

The control building auxiliary relay room ESF system has two air-conditioning units for each train; i.e., one completely independent 100-percent-capacity unit is provided for each of four auxiliary relay rooms.

Each air-conditioning unit consists of a fan and a cooling coil supplied by the essential chilled water system. The ESF system starts on the safety injection signal, train related. The normal ventilation of the ESF room is accomplished by the cable spreading room HVAC system.

9.4.5.2.2 Control Building ESF HVAC Equipment Room Ventilation System

The control building ESF HVAC equipment room ventilation system for level 3 is shown in drawing AX4DB241. Two common intake ducts provide air to the filter and chiller rooms for each train associated with the two units. Each room contains a nonsafety-related electric heater unit. A safety-related exhaust fan is located in each of the four chiller rooms. The fans exhaust the air from the chiller room and the associated filter room directly to the atmosphere. One intake duct supplies air for the filter rooms; the other duct supplies air for the chiller rooms.

9.4.5.3 System Operation

9.4.5.3.1 Control Building Safety Feature Electrical Equipment Room HVAC System

9.4.5.3.1.1 Upon receipt of a train-related safety injection (SI) signal, the essential ESF switchgear, ESF equipment, battery room, and auxiliary relay rooms HVAC system is automatically put into operation. Transfer to the essential system may also be initiated manually from the control room.

The recirculation fans draw outside and recirculated air through prefilters and the chilled water coils and discharge the air into the ESF switchgear rooms and the battery rooms. Battery rooms are provided with electric reheat coils to maintain a room design temperature range of 70°F to 80°F. Outside air from the intake plenum at el 280 ft 6 in. is brought in to make up for the battery room air exhausted to the atmosphere at el 280 ft 6 in.

9.4.5.3.2 Control Building ESF HVAC Equipment Room Ventilation System

Air is supplied from the air intake plenum at el 291 ft 4 in. and exhausted at el 302 ft 0 in.

The ventilation system is started manually from the control room. An electric unit heater with an integral temperature controller, preset at 65°F, cycles the heater to meet the minimum space design condition.

Each ESF equipment room is provided with a temperature switch which provides a high or low alarm in the control room when the temperature is 105°F or 50°F, respectively.

9.4.5.4 Safety Evaluations

9.4.5.4.1 ESF Electrical Equipment Room HVAC Systems

A. The essential HVAC systems for the ESF switchgear, ESF equipment rooms, battery rooms, and auxiliary relay rooms are capable of filtering and cooling the air supplied to the rooms under accident conditions, of maintaining the room air temperatures within the specified limits, and of providing ventilation and exhaust for the ESF battery rooms. The ESF electrical equipment room HVAC system for levels A and B is provided with two chilled water coils. One is connected to the essential chilled water system, to be used during the emergency modes; the other is connected to the normal chilled water system, to be used during the normal mode of plant operation. The battery rooms have redundant separate exhausts.

The essential HVAC systems for the ESF switchgear, ESF equipment rooms, and battery room are designed to Seismic Category 1 requirements. The systems are located in the control building, which is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the basis for the adequacy of the structural design of the control building.

B. A single active failure in the essential HVAC system or in its supporting systems, including a loss of offsite power, does not impair its capability to perform the system's safety function. The results of a failure modes and effects analysis are presented in table 9.4.5-2.

C. Each electrical equipment room is cooled by a unit whose fan is powered from the same ESF bus as that associated with the equipment in the room. Thus, a failure of one power train will not prevent cooling of redundant equipment powered by the other train.

D. The battery rooms are ventilated to prevent the accumulation of hydrogen gas. The ventilation system is designed to provide outside air for dilution and limit the hydrogen concentration to less than 2 percent by volume at any location within the battery rooms in accordance with Regulatory Guide 1.128. A hydrogen concentration survey may be required if the battery room configuration or battery room ventilation system is modified in a manner that reduces air flow or creates a new dead air space in the battery room.

9.4.5.4.2 Control Building ESF HVAC Equipment Room Ventilation System

A. The control building HVAC equipment room level 3 ventilation system is capable of providing ventilation and exhaust for HVAC equipment rooms and of maintaining the room's air temperature within the specified limits given in table 9.4.1-2.

B. A single active failure in the HVAC equipment room level 3 ventilation system does not impair its capability to perform the system's safety function. The results of the failure modes and effects analysis are provided in table 6.4.4-1.

9.4.5.5 System Components

The control building ESF HVAC systems are comprised of the following components:

A. Air Handling Unit Housings

The air handling unit housings are Seismic Category 1 and are of all welded, carbon steel construction.

B. Prefilters

Prefilter elements are of fine glass fiber sheet media. The elements measure 24 x 24 x 12 in. and are capable of handling a nominal flowrate of 1000 ft^3/min each. The minimum average efficiency of the filter, using atmospheric dust, is 20 to 60 percent when tested by American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 52.[(1)]

C. Cooling Coil

The cooling coils are of seamless 90-percent copper and 10-percent nickel tubing with copper plate fins mechanically bonded to them. Coils are arranged for counter flow using chilled water. The tube bundle is enclosed in a steel frame. Coils are arranged for horizontal airflow and include vent and drain connections. The chilled water cooling coils are served by the essential chilled water system.

D. Fans

Fans are Seismic Category 1 and are capable of delivering the design flowrate with all filters at their maximum anticipated pressure drop. Fans are chosen with a steeply rising pressure-flow characteristic to maintain a reasonably constant airflow over the full filter train life. Fan and motor materials are suitable for operation under the most severe environmental conditions postulated to occur in the control building.

E. Ductwork

The system ductwork and dampers are Seismic Category 1. Accessibility and adequate working space for maintenance and testing operations are provided in the design and layout of the system equipment.

F. Battery Room Exhaust fans

The battery room exhaust fans are designed to Seismic Category 1 requirements.

G. Heaters

Finned tubular elements for the battery room consist of 80-percent nickel and 20-percent chromium resistance wire (iron-free) embedded within the magnesium oxide refractory insulated from a protective sheath.

Frames are of copper-plated steel permanently attached to the copper-plated steel tubes and spaced not more than five fins per inch.

H. Electric Unit Heaters

Electric unit heaters supplement the heating of the HVAC control building air-conditioning ESF equipment rooms. Each unit heater consists of a coil and fan with an electric motor driver.

9.4.5.6 Tests and Inspections

The ESF air-conditioning systems are tested and inspected prior to installation. The control building air-conditioning equipment is located in equipment rooms and can be inspected visually during normal operation. Fans are factory tested in accordance with Air Moving and Conditioning Association (AMCA) Standard 210;[2] coils are tested in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 410.[3]

Air-conditioning units will be performance tested by the manufacturer to ensure design heat-removal capabilities.

Ductwork is leak tested in accordance with Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).[4]

Major components are accessible during normal plant operation for inspection, maintenance, and periodic testing.

9.4.5.7 Instrumentation Applications

The following instrumentation and control of the HVAC systems are provided in the control room:

- Operational control of the HVAC system for the electrical equipment rooms, the battery room exhaust fans.
- Alarm on low airflow at fan exhaust.
- Alarm on high or low temperature in the battery rooms.
- Indication of isolation damper positions.
- Control switches for control of damper position.

Thermostats, located at various levels of the building and at the HVAC ductwork, control space temperatures.

9.4.5.8 References

1. "Methods of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter," ASHRAE Standard 52, 1976.
2. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210-1974.
3. "Forced-Circulation Air Cooling and Air Heating Coils," ARI Standard 410-1972.
4. "High-Pressure Duct Construction Standards," SMACNA, 1975.

9.4.6 CONTAINMENT BUILDING VENTILATION SYSTEM

The containment building heating, ventilation, and air-conditioning (HVAC) systems described in this section include those systems that function during normal plant operation, containment preaccess period, or extended shutdown. These systems (except the containment cooling system and post-loss-of-coolant accident (LOCA) cavity purge system) are not required to operate during any design basis accident (DBA). The operation of the containment fan cooler system, the containment post-LOCA purge system, and the post-LOCA cavity purge system

under LOCA and main steam line break (MSLB) accident conditions is discussed in subsections 6.2.2 and 6.2.5.

The following normal operation systems are described in this section:

- Containment coolers (drawing 1X4DB212).
- Auxiliary containment air coolers (drawing 1X4DB212).
- Preaccess filter system (drawing 1X4DB213-2).
- Preaccess purge system (drawing 1X4DB213-2).
- Minipurge system (drawing 1X4DB213-1).
- Containment control rod drive mechanism (CRDM) unit fan (drawing 1X4DB214-1).
- Reactor support cooling system (drawing 1X4DB214-1).
- Cavity cooling system (drawing 1X4DB214-1).
- Lower level air circulating system (drawing 1X4DB212).

Flow diagrams for the containment building HVAC systems are given in drawings 1X4DB251-1, 1X4DB252, and 1X4DB253-1.

The containment requires normal air-conditioning, heating, and ventilation to maintain the required temperature to ensure equipment operability and to provide the required ventilation and control of airborne radioactivity for personnel access.

9.4.6.1 Design Bases

9.4.6.1.1 Safety Design Bases

There is no safety design basis regarding the function of the containment HVAC systems described in this subsection (except for those associated with the containment coolers, the post-LOCA purge system, and the post-LOCA cavity purge system, which are required to function as mentioned in subsections 6.2.2 and 6.2.5). However, the failure on nonsafety, nonseismic HVAC equipment and ductwork within the containment will not compromise any safety-related equipment, component, or structures. Additionally, those portions of containment HVAC systems which penetrate the containment boundary are designed as Seismic Category 1 insofar as they are required to function to maintain containment isolation capability.

9.4.6.1.2 Power Generation Design Bases

A. The containment normal HVAC systems are designed to maintain a containment ambient air temperature between 60°F and 120°F during normal plant operation to permit continuous operation of equipment within the containment. The system is also designed to prevent concrete structures within the containment from exceeding the maximum operating temperature of 150°F. Localized areas, such as around a penetration, are allowed to have increased operating temperatures not exceeding 200°F.

B. The containment cooling system is designed to provide adequate internal recirculation to ensure thorough mixing of air throughout the containment, with the containment closed to the outside atmosphere and pressurized to design pressure, so that periodic containment integrated leakage rate tests can be conducted in accordance with 10 CFR 50, Appendix A, General Design Criterion 52, and 10 CFR 50, Appendix J.

C. The containment preaccess purge system is designed to purge the containment atmosphere to the plant vent stack while introducing filtered and treated makeup air from the outside to provide adequate ventilation for personnel comfort when the plant is shut down during refueling operations and maintenance.

The containment minipurge system is designed to purge the containment atmosphere to the plant vent stack while introducing filtered and treated makeup air from the outside. The minipurge system is designed to reduce the containment airborne radioactivity to facilitate personnel access and to control pressure buildup inside the containment.

D. The preaccess filter units are designed to reduce the concentration of airborne radioactivity in the containment atmosphere prior to routine personnel access during operation or in advance of a scheduled plant shutdown.

E. The CRDM unit fans are designed to provide a minimum total airflow rate of 40,000 ft^3/min to cool the CRDM shroud.

F. The reactor cavity cooling system is designed to maintain a cavity concrete temperature of 200°F or below and 135°F in the inservice inspection tunnel around the reactor vessel in the vicinity of the neutron detectors.

G. Nonsafety-related containment HVAC systems are designed to maintain structural integrity after an SSE; that is, the equipment must not fall and damage other safety-related equipment. The systems are not required to function after an SSE.

9.4.6.1.3 Codes and Standards

The containment building HVAC system is designed to conform to the applicable codes and standards listed in table 3.2.2-1.

Conformance to Regulatory Guide 1.140 is described in subsection 1.9.140.

9.4.6.2 System Description

9.4.6.2.1 General Description

A. The containment cooling system consists of eight air cooling units of 25-percent capacity each, located at el 238 ft 0 in. They are cooled by nuclear service cooling water (NSCW).

B. Two 100-percent auxiliary containment air coolers located at el 261 ft 0 in. augment the fan cooler capacity by an amount equivalent to the heat rejection from the CRDMs.

C. The preaccess filter system for the containment building consists of two filtering units of 100-percent capacity located at el 261 ft 0 in. These units clean the containment atmosphere prior to personnel access.

D. The preaccess purge system for the containment is used for high flowrate purge during refueling and is closed during normal power generation. It consists of a supply air handling unit and an exhaust charcoal air filtration unit.

The minipurge system is used for low flowrate purge during power access periods. This system utilizes the supply air handling unit and exhaust charcoal filtration unit of the normal purge system but uses separate low flowrate fans. The purge supply and exhaust units are located at el 220 ft 0 in. of the equipment building.

The minipurge exhaust system also includes an alternate, orificed flow path which allows a low flowrate purge with actual containment pressure of up to 4.4 psig. This flow path protects ductwork and equipment from overpressurization.

Containment supply and exhaust penetrations and isolation valves for the normal purge lines are 24 in. in diameter and for the minipurge lines are 14 in. in diameter.

E. Four 50-percent-capacity fan units located on the missile shield above the reactor constitute the cooling system for the CRDMs.

F. Four 50-percent-capacity fan assemblies provide for ventilation of the reactor supports.

G. The normal cavity system consists of two 100-percent fan coil units located at el 206 ft 0 in.

H. Nine axial fans located between el 181 ft 9 in. and 214 ft 0 in. circulate the air horizontally below the operating deck to prevent hot spots.

9.4.6.2.2 System Components

A brief description of system components is provided below. Design data for the major system components are provided in tables 9.4.6-1 through 9.4.6-3. The NSCW system is discussed in subsection 9.2.1.

A. Each containment fan cooler unit consists of a steel housing, NSCW cooling coils on three sides, a two-speed vaneaxial fan, and associated ductwork and dampers. The cleanable H-plugs on the containment coolers are aluminum-bronze alloy castings (approved by American Society of Mechanical Engineers (ASME) Code Case N-294). The use of this metal does not affect the hydrogen generation inside the containment.

B. Each auxiliary containment air cooler consists of a steel housing, NSCW cooling coils on four sides, and a vaneaxial fan.

C. Each preaccess filtration unit consists of housing with a moisture separator, heating coil, high-efficiency particulate air (HEPA) filter, charcoal adsorber with activated charcoal followed by a HEPA filter, and a fan.

D. The supply unit for the containment purge system consists of steel housing with a moderate efficiency filter and heating coil.

Two fans in parallel are located at the unit. One fan is rated at 15,000 ft^3/min and is used for purge operations during refueling. The minipurge fan is rated at 5000 ft^3/min and is used for low flowrate purge during power access periods.

The exhaust unit consists of a filtration unit with a moisture separator, heating coil, HEPA filter, charcoal adsorber, and HEPA filter. Two fans in parallel are located at the unit outlet, one for normal purge and the other for minipurge. Each fan has the same capacity as the corresponding supply unit fans.

Debris screens are provided on the minipurge supply and exhaust openings inside the containment to prevent lightweight debris which could preclude tight valve shutoff. The screens are designed to withstand post-LOCA pressures.

American Society of Testing Materials (ASTM) A276 TP 304 crossbars 3/16- x 2-in. spaced on 1 3/16-in. centers are welded into a 30- x 14-in. ASTM A240 TP 304 reducer/flange assembly. This assembly is bolted to the mating flange of the piping spool connected to the purge supply/exhaust isolation valves.

E. Each CRDM fan unit (reactor cavity coolers) consists of a fan housing with a rotor, vane control, NSCW cooling coil, and direct-drive motor.

F. Each reactor support cooling fan consists of a direct-drive vaneaxial fan with associated plenum and ductwork.

G. The units for the cavity cooling system each consist of a NSCW cooling coil, a vaneaxial fan, and associated ductwork and dampers.

H. The lower level air circulating fans consist of four tube axial fans each rated at 18,360 ft^3/min, four tube axial fans each rated at 14,280 ft^3/min, and one tube axial fan rated at 1160 ft^3/min.

9.4.6.2.3 System Operation

The containment HVAC system normal mode of operation is described as follows:

A. The normal cooling system for the containment is designed to maintain 120°F temperature and 18- to 50-percent relative humidity during normal operation. The containment air cooling during normal operation can be maintained by four of the eight units. The units are controlled from the control room. In the event of a loss of offsite power, the containment air cooling function is maintained. All eight units are connected to the ESF buses. Emergency operation is discussed in subsections 6.2.2 and 7.3.11. Temperature of the containment building atmosphere is indicated in the control room.

B. The auxiliary containment air cooling system is designed to augment the containment cooling system cooling capacity by an amount equivalent to the heat rejected from the CRDM unit fans. The units are manually operated from the control room.

C. The preaccess filter system, together with the normal purge system discussed below, is designed to control the airborne radioactivity below the level required for personnel access for inspection, maintenance, and refueling operations. The preaccess filter system will only clean up the internal air without providing new air makeup.

D. Air is supplied to the purge system from an intake at el 226 ft 0 in. The containment purge high flowrate system is designed to maintain the airborne radioactivity below the level required for personnel occupancy during refueling. The exhaust from the purge filtration unit is ducted to the plant vent.

The minipurge system is designed to:

- Operate during normal operation. Air is supplied through the same intake plenum used for normal purge during refueling.
- Maintain the airborne radioactivity below the level required for personnel ` occupancy during reactor power operation.
- Control pressure buildup caused by heat load imposed on the containment atmosphere during startup and the operation of pneumatic controllers.

This system and the preaccess filter system minimize iodine, particulate, and noble gas concentration during the entire period of containment building occupancy.

The purging operation is initiated manually from the control room. The outside air supply is introduced through a prefilter and preheated to 60°F. The containment is maintained at atmospheric pressure during the purge cycle. Two flow paths exist from the containment to the minipurge exhaust system depending on containment pressure. At normal ambient pressure, ± 0.30 psig, the minipurge exhaust fan draws through 14-in. piping and ductwork.

When internal containment pressure is from (+) 0.3 psig to the containment safety injection pressure of (+) 4.4 psig, the 14-in. shutoff damper is closed with the minipurge exhaust fan shut off. Flow is then to be directed through an 8-in. bypass line which contains a flow orifice. This provides overpressurization protection of downstream ductwork and equipment. The exhaust from the minipurge system is routed through the filtration unit before being routed to the plant vent.

In the event that the concentration in the containment of airborne particulates is higher than desired levels, air cleaning is accomplished by activating the recirculation filtration unit. This unit is equipped with charcoal and HEPA filters to reduce containment airborne radioactivity to acceptable levels. The operation of this unit is initiated from the control room by manually energizing the fan.

The containment penetrations of the normal supply and normal purge exhaust are equipped with motor-operated isolation valves inside and outside the containment.

The containment isolation valves of the minipurge supply and the minipurge exhaust are equipped with air operators inside and outside the containment. The containment penetrations, including the isolation valves and appropriate seismic restraints, are designed in accordance with Seismic Category 1 and Quality Class 2 requirements as defined in section 3.2. The air-operated valves are designed to fail closed in the event of loss of power. The valves are controlled automatically by the containment isolation system (discussed in subsection 6.2.4), which overrides all manual signals. The minipurge isolation valves shut within 5 s of receiving an actuator signal. The valves are designed to shut against the containment pressure following a DBA. Table 9.4.6-4 is a comparison of the minipurge system with Branch Technical Position CSB 6-4.

E. The cooling unit fans for the CRDM are designed to satisfy the environmental conditions for equipment operation. The CRDM fan motors are powered from Non-1E buses which are emergency diesel backed. The system functions by induction of containment air through the CRDM. The containment air enters through openings in the cooling shroud structure, and hot air is exhausted upward into the containment atmosphere.

These fan units are automatically loaded onto the emergency onsite power supply following a loss of offsite power. The units are not automatically started following a LOCA but may be manually loaded onto the emergency power supply.

The CRDM fan units function continuously during normal plant operation and may be running during plant shutdown periods, depending upon the heat loads. The units are manually operated from the control room. Normally, one fan from each train (each fed from a separate non-1E bus) is running while the other two fans (one per train) are off. A backdraft damper is located on the outlet of each fan to prevent short circuiting of cooling flow air as well as to prevent reverse rotation of the fan rotor when the fan is idle.

F. The reactor support cooling system operates in conjunction with the reactor cavity cooling system and provides cooling of the reactor supports to maintain the surrounding concrete temperature below 150°F at the supports and 200°F in the general cavity area. The system functions continuously during normal plant operation.

The system includes four 50-percent-capacity fans. Normally, two fans are operating and the other two fans are on standby. Motorized dampers, which are located on the inlet side of the fan, are electrically interlocked with the fan drive motors. The dampers close upon fan shutdown. These units are automatically loaded on a bus energized by the diesel generator upon loss of offsite power, but following a LOCA the fans must be loaded manually.

G. The reactor cavity cooling system operates in conjunction with the containment cooling units and provides cooling of the primary shield and reactor cavity to maintain the concrete temperature below 200°F. The system functions continuously during normal plant operation. Portions of the system may be running during plant shutdown periods, depending on the heat loads.

The system includes two 100-percent-capacity fan coil units. Normally, one unit is operating and the other unit is on standby. The units are manually operated from the control room. The standby unit can be manually energized to prevent the reactor cavity temperature from exceeding the allowable maximum. Two cavity high temperature alarm channels monitoring the supply airstream temperature are annunciated in the control room.

Backdraft dampers, which are located downstream from the fans, close upon fan shutdown. The fans are automatically loaded on a bus energized by the diesel generator upon loss of offsite power, but following a LOCA the fans must be loaded manually.

H. The lower level air circulating system functions continuously during normal operations to prevent hot spots.

I. The auxiliary containment air cooling system and the reactor cavity cooling system normally served by train B of NSCW may also be used for additional

cooling. This branch can be manually isolated from the remainder of the NSCW system and connected to the normal chilled water system. This allows the containment to be cooled to a lower temperature than would be possible using only NSCW.

9.4.6.3 Safety Evaluation

Since there are no safety design bases associated with the function of these containment HVAC systems, no safety evaluation is provided. Containment building HVAC ducts, dampers, and components are supported by Seismic Category 1 supports; HVAC equipment and ducts in the containment are designed to preclude damaging safety-related systems, components, or structures. Those portions of containment HVAC systems which penetrate the containment boundary are designed to Seismic Category 1 and Safety Class 2 requirements, as detailed in section 3.2 and subsection 6.2.4.

9.4.6.4 Testing and Inspection

Fans are test rated in accordance with the Air Moving and Conditioning Association (AMCA) Standard 210.(1) All systems are balanced to provide design air quantities within a tolerance of +10 percent.

The testing and inspection of the isolation valves associated with this function are discussed in subsection 6.2.4.

The HEPA filter units are manufactured and tested prior to installation in accordance with MIL-F-51068. The HEPA filter elements are tested individually prior to installation to verify an efficiency of 99.97 percent with a thermally generated monodisperse 0.3-mm dioctyl phthalate aerosol in accordance with the recommendations of Regulatory Guide 1.140, as discussed in section 1.9.

The HEPA filter banks are tested in place prior to operation and periodically thereafter in accordance with Regulatory Guide 1.140, as discussed in section 1.9.

Impregnated, activated carbon is batch tested prior to loading into the adsorber section. Acceptance criteria are as described in section 1.9.140. The carbon adsorber section is filled with carbon in a manner to ensure a uniform packing density and to minimize dusting. The adsorber section is leak-tested in accordance with Regulatory Guide 1.140, as discussed in section 1.9, prior to operation and periodically thereafter to verify less than 0.05-percent bypass. In addition, a periodic laboratory test of a representative sample of the impregnated activated carbon is performed to verify iodine removal efficiency in accordance with Regulatory Guide 1.140, as discussed in section 1.9, for the assigned decontamination efficiency and bed depth.

The preaccess filter system is leak-tested only after HEPA or carbon replacement.

9.4.6.5 Instrumentation Applications

Indication of the operational status of the containment purge exhaust fans and all the fans in the containment is provided in the control room. All fans and air handlers operate from the control room, except the containment cooling units which may be also operated from the remote shutdown panels.

All instrumentation provided with the containment atmospheric control system and the containment purge system filter adsorber units is as required by Regulatory Guide 1.140.

Indications of levels of gaseous, particulate, and iodine radioactivity being exhausted from the containment and released through the unit vent are available in the control room.

The temperatures of the air leaving each of the neutron detector wells, two of the reactor vessel supports, the upper cavity area, and the bottom of the reactor cavity, as well as the concrete temperatures below two of the reactor vessel supports and along the cavity walls at the middle and bottom of the vessel, are available in the control room.

The containment temperature and the containment relative humidity are monitored in the control room.

9.4.6.6 References

1. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.
2. "Filter, Particulate, High-Efficiency, Fire Resistant," MIL-F-51068D.

9.4.7 DIESEL GENERATOR BUILDING VENTILATION SYSTEM

The diesel generator building heating, ventilation, and air-conditioning (HVAC) system functions to remove heat from the building during diesel generator operation and to supply sufficient heat, when diesels are not operating, to allow easy starting of the diesel generators and to allow personnel occupancy. The system is divided into two subsystems, one engineered safety features (ESF) and one non-ESF. A separate HVAC system is provided for each of the two diesel generator building trains.

9.4.7.1 Design Bases

9.4.7.1.1 Safety Design Bases

A. The system is designed on the basis of limiting the maximum temperature of the building to 120°F with the diesel generator operating. The building is ventilated with 100-percent outside air at summer design temperatures and employs recirculation and outside ventilation air as the outside air temperatures drop toward winter temperatures.

B. The safety functions of the diesel building ventilation system can be performed, assuming a single active component failure coincident with the loss of offsite power.

C. The diesel generator building ventilation system is connected to the 480-V ac Class 1E bus of the same train as the diesel generator set being ventilated.

D. The diesel generator building ventilation system is protected from the effects of natural phenomena, such as earthquakes, hurricanes, floods, and tornado missiles.

E. The non-ESF diesel generator building heating and ventilation systems have no safety design bases. However, the failure of the nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components.

9.4.7.1.2 Power Generation Design Bases

A. The non-ESF heating system maintains the building temperature at 50°F minimum when the diesel generators are not running.

B. The non-ESF subsystem ventilates the building as required to allow for maintenance and personnel access.

9.4.7.1.3 Codes and Standards

The diesel generator building HVAC system is designed to conform to applicable codes and standards listed in table 3.2.2-1.

9.4.7.2 System Description

9.4.7.2.1 General Description

Drawing 1X4DB217 shows the diesel generator ventilation system. Component data are provided in table 9.4.7-1. Drawing 1X4DB267 is a flow diagram.

The non-ESF subsystem consists of 10 unit heaters, one non-ESF normal ventilation fan with a motor-operated damper and associated controls for each diesel generator room. The ESF subsystem consists of two 50-percent-capacity supply fans. Each diesel generator room is provided with air inlets/outlets located on level 1 and discharge/intake openings located on level 2. Automatic dampers are provided in each opening.

An exhaust fan is provided for continuously venting the fuel oil day tank room.

9.4.7.2.2 Component Description

A. Non-ESF Normal Ventilation Fans

The non-ESF ventilation fans are propeller type and are V-belt driven by electric motors. These fans are located on the floor of the diesel generator building, level 2, and installed in series with a motor-operated damper.

B. Non-ESF Exhaust Fans

The non-ESF fuel oil day tank room exhaust fans are centrifugal type, directly driven by electric motor.

C. Unit Heaters

Each unit heater consists of a resistance heater and a fan, both in one metal housing.

D. ESF Ventilation Fans

The two 50-percent-capacity ESF ventilation fans for each diesel generator room are heavy duty, vaneaxial type, directly driven by electric motors. These fans are located in the diesel generator building, level 2, and are provided with motor operated dampers.

9.4.7.2.3 System Operation

During normal plant power operation, the diesel generator room is ventilated by the non-ESF fan exhausting to the atmosphere at el 266 ft 0 in. Supply air for the normal ventilation is drawn in through air-operated intake dampers in the wall openings located on the first floor (el 224 ft 0 in.). The exhaust fan motors are started automatically by separate room thermostats whenever the temperature in the building exceeds thermostat settings of 85°F.

Each of the 10 unit heaters operates on a separate thermostatic control to maintain a 50°F minimum air temperature by heating and recirculating the air in the room. These heaters operate automatically and independently from the ventilation system. The fuel oil day tank room exhaust fan exhausts air to the atmosphere at el 241 ft 0 in.

One ESF fan starts automatically on a diesel generator running/start signal. A second ESF fan starts automatically only if the diesel generator is running, on a high temperature of 80°F in the diesel generator building. During emergency operation, the airflows are reversed, and the air is drawn in through the openings at level 2 (el 266 ft 0 in.) and exhausted through the openings at el 224 ft 0 in.

9.4.7.3 Safety Evaluation

A. The ESF supply fans are sized to supply sufficient outside air to hold the maximum temperature in the building to the required limits.

B. Two 50-percent-capacity fans are provided to ensure that a single failure cannot cause complete loss of the cooling/ventilation safety function.

C. The ESF supply fans are connected to the safety bus of the same train as the diesel generator in that room. Thus, a failure of one emergency power train cannot cause loss of function of the redundant generator and power train.

D. The safety-related portions of the diesel generator building ventilation system are located in the diesel building, which is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, tornado missiles, and other appropriate natural phenomena. The ESF fans are designed and constructed as Seismic Category 1 to ensure that they will function during and after a safe shutdown earthquake (SSE). Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the bases for the adequacy of the structural design of the diesel generator building.

9.4.7.4 Tests and Inspections

The system is designed to permit periodic inspection; it is tested for function and capability in the preoperational testing. Fans are tested in accordance with Air Moving and Conditioning Association (AMCA) Standard 210.[1]

9.4.7.5 Instrumentation Applications

Unit heaters are controlled by thermostats. Air flowing through the ESF supply fans is monitored by temperature instrumentation. These fans are operable from both the control room and remote shutdown panel.

The following instrumentation for the diesel generator building ventilation system is provided in the control room:

- Alarm for high temperature in the diesel generator building.
- Alarm for low temperature in the diesel generator building.
- Position indication of intake and discharge dampers.
- Indication of the operational status of fans.

9.4.7.6 Standard Review Plan Evaluation

The VEGP is not fully in conformance with item 2 of subsection A and item 1 of subsection C of NUREG/CR-0660.

Dust mitigation in the diesel generator building is addressed in paragraph 8.3.1.1.3.K. Further information is provided below.

The design of the ventilation system for the diesel generator building has two modes of operation which are related to the air intake and exhaust locations. During the normal mode of operation, ventilating air at low velocity is taken at approximately ground level and exhausted at about 20 ft above grade. The direction of airflow is reversed for emergency operation (suction 20 ft above grade). The rationale for flow reversal is to allow natural convection to aid airflow rather than hampering flow when the cooling load is low (diesel generator not operating). The likelihood of entraining significant amounts of dust at 20 ft above grade is considered remote.

Filtration of ventilation air has not been provided because filters were not considered feasible. The large quantity of outdoor air required would dictate greater filter area than is available within the building dimensions. The number of filters required would present a significant maintenance requirement.

9.4.7.7 Reference

1. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.

9.4.8 AUXILIARY FEEDWATER PUMPHOUSE HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) SYSTEM

The auxiliary feedwater pumphouse normal and essential HVAC systems provide a suitable environment for equipment operation and for maintenance personnel.

9.4.8.1 Design Bases

9.4.8.1.1 Safety Design Bases

A. The essential HVAC system operates whenever the engineered safety features (ESF) pumps are operating during all modes of operations including normal operation, shutdown, loss-of-coolant accident (LOCA), loss of offsite power, or other accident conditions.

B. The safety functions of the auxiliary feedwater pumphouse HVAC system can be performed, assuming a single active component failure coincident with the loss of offsite power.

C. The system has sufficient ventilation capacity to limit the building temperature to a maximum of 120°F during all ambient temperature conditions with the exception of the turbine-driven auxiliary feedwater pump room ESF natural ventilation system. The turbine-driven pump room will not exceed 122°F (the applicable equipment qualification temperature) if the outside air temperature reached 98°F.

D. The essential HVAC systems serving the electric motor-driven pumps shall be powered so that failure of one safety features bus cannot impair function of both ESF trains.

E. The auxiliary feedwater pumphouse HVAC system is protected from the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, and external missiles. The system is designed to perform its intended function following a hazard such as fire, internal missiles, or pipe break.

F. The auxiliary feedwater pumphouse normal HVAC systems have no safety design bases. However, the failure of the nonsafety, nonseismic HVAC equipment will not compromise any safety-related systems, structures, or components.

9.4.8.1.2 Power Generation Design Bases

The auxiliary feedwater pumphouse normal HVAC system maintains the turbine-driven auxiliary feedwater pump room below a maximum temperature of 120°F, when the turbine-driven auxiliary feedwater pump is operating. During normal plant operation, when the turbine-driven pump is not operating, the maximum temperature is maintained below 104°F.

9.4.8.1.3 Codes and Standards

The auxiliary feedwater pumphouse HVAC system is designed to conform to the applicable codes and standards listed in table 3.2.2-1.

9.4.8.2 System Description

9.4.8.2.1 General Description

The auxiliary feedwater pumphouse ventilation system provides outside air for ventilation and cooling during normal plant operation and maintenance. The component data for major system components is provided in table 9.4.8-1. The system is shown in drawing 1X4DB227, and the system operating characteristics are shown in drawing 1X4DB268. Each pump room is provided with a separate system. Electric unit heaters are provided in the motor-driven pump rooms and the turbine-driven pump rooms. The electric unit heaters are powered from the normal 480-V-ac system.

The ventilation system consists of three air supply fans mounted in the building walls to supply outside air to the building; motor-operated shutoff dampers for these fans; recirculating air unit heaters with electric heating coils; one outside air inlet and one room exhaust (each with a pneumatically operated shutoff damper) in the turbine-driven pump room; and one room exhaust in each of the motor-driven pump rooms.

9.4.8.2.2 Component Description

A. Non-ESF Outside Air Supply Unit

The non-ESF supply fan is a propeller type directly driven by electric motors and is provided with motor-operated dampers.

B. ESF Outside Air Supply Units

The ESF supply fans are propeller type directly driven by electric motors and are provided with motor-operated dampers.

C. Non-ESF Recirculating Unit Heaters

Each unit heater consists of a resistance heater and fan, both in one metal housing.

9.4.8.2.3 System Operation

The ventilation fans are started automatically by room thermostats when the room temperature reaches the high temperature setpoint. The system utilizes 100-percent outdoor air to remove room heat. The fans may be activated by a remote hand switch located in the control room.

The ventilation fans each take outside air at el 223 ft 0 in. and supply it directly to each pump room. Air from the turbine-driven pump room is exhausted to the pipe chase, which has exhaust openings to the atmosphere at el 235 ft 0 in. and directly to the outside via ductwork.

During periods when the auxiliary feedwater pumps or the fans are shut down, the ventilation system can be manually activated to provide cooling, if necessary, during occupation of the building. The system may be started manually by the remote hand switch located in the control room.

The ESF fans are designed to limit the temperature in the electric motor-driven pump rooms to 120°F, and the non-ESF fan serving the turbine-driven auxiliary feedwater pump is designed to maintain the room below a maximum temperature of 104°F during normal plant operation.

In the unlikely event that neither onsite nor offsite power is available, the operation of the turbine-driven auxiliary feedwater pump actuates a signal to open the pneumatically operated dampers allowing ventilation of the turbine-driven pump room by natural convection. These dampers are normally closed and are designed to fail open. Damper actuation can also be accomplished by a remote switch located in the control room.

The non-ESF unit heaters are designed to maintain temperatures above a minimum of 40°F. The unit heaters start automatically on a low-temperature switch actuation.

9.4.8.3 Safety Evaluation

A. Section 3.2 delineates the quality group classification and seismic category applicable to the safety-related portion of this system. All the power supplies and control functions necessary for the safe function of the pumphouse ventilation systems are Class 1E, as described in chapters 7 and 8.

B. As indicated by table 9.4.8-2, no single failure will compromise the system's safety functions. All required power can be supplied by either onsite or offsite power systems, as described in chapter 8.

C. The auxiliary feedwater pumphouse HVAC system is designed to maintain temperatures in the pump rooms at a maximum of 120°F with the exception of the turbine-driven auxiliary feedwater pump room ESF natural ventilation system. The turbine-driven pump room will not exceed 122°F (the applicable equipment qualification temperature) if the outside air temperature reached 98°F.

D. The units in the electric motor-driven pump rooms are powered from the same ESF train as the pump in that room, so that a failure of one ESF bus cannot impair function of the other ESF train. Natural air circulation provides adequate ventilation to the turbine-driven auxiliary feedwater pump room during a loss of offsite and onsite power. Power for ESF intake dampers is from Class 1E buses.

E. The safety-related portions of the auxiliary feedwater pumphouse HVAC system are located in the auxiliary feedwater pumphouse, which is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. The ESF fans are designed and constructed as Seismic Category 1 to ensure that they will function during and after a safe shutdown earthquake (SSE). Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the bases for the adequacy of the structural design of the auxiliary feedwater pumphouse. Section 3.6 discusses protection from pipe break effects.

9.4.8.4 Tests and Inspections

Fan units are tested by the manufacturer prior to shipment in accordance with Air Moving and Conditioning Association (AMCA) Standard 210.[1] Inspection and testing of the system takes place during the plant preoperational test program. During normal plant operation, the units are all located where they can be visually inspected.

9.4.8.5 Instrumentation Applications

A monitoring system consisting of the following safety-related instruments is provided in the control room:

Ductwork is leak-tested in accordance with ANSI 510, Section 6[2] and SMACNA[3].

A. High-temperature alarms and low-flow alarm for the ventilation fans.

B. Damper position indication.

C. Low-temperature alarms for the unit heaters.

D. Fans operational status indication.

9.4.8.6 References

1. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.
2. "Testing of Nuclear Air-Cleaning Systems," ANSI/ASME N510-1980.
3. "High-Pressure Duct Construction Standards," SMACNA, 1975.

9.4.9 MISCELLANEOUS HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) SYSTEMS

A number of minor ventilation systems exist throughout the plant to provide a favorable environment for the operation of systems and components. The flow diagrams are shown in drawings 1X4DB250-1 and 2X4DB250-1. The following are the most significant systems falling within this category:

- Equipment building ventilation system.
- Electrical tunnel ventilation system.
- Piping penetration and MSIV area ventilation systems.

9.4.9.1 Equipment Building Ventilation System

The equipment building ventilation system is designed to remove room heat and maintain an acceptable indoor temperature.

9.4.9.1.1 Design Bases

9.4.9.1.1.1 Safety Design Bases. The equipment building ventilation system has no safety design bases. However the failure of the nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components.

9.4.9.1.1.2 Power Generation Bases. The equipment building ventilation system is designed to meet the design room temperature during normal operations. The system utilizes 100-percent outside air for heat removal.

9.4.9.1.1.3 Codes and Standards. Codes and standards applicable to the equipment building ventilation systems are listed in table 3.2.2-1.

9.4.9.1.2 System Description

9.4.9.1.2.1 General Description. Drawings 1X4DB203 and 2X4DB203 shows the equipment building ventilation system. The flow diagram is given in drawings 1X4DB250-1 and 2X4DB250-1. The equipment building ventilation system consists of roof ventilators, tendon gallery supply fan, electric heaters, dampers, and associated piping, ductwork, and controls.

9.4.9.1.2.2 Component Description. Table 9.4.9-1 provides design parameters for major components in the system.

A. Area 2F1 and Area 301

Each area has separate, powered roof ventilators.

B. Tendon Gallery Supply Fan

The supply fan is vane axial with a direct-driven fan motor.

C. Electric Heaters

Each unit heater consists of a resistance heater and a fan, both in one metal housing.

9.4.9.1.2.3 System Operation. The equipment building exhaust fans located at el 263 ft 8 in. and 236 ft 0 in. are started automatically by room thermostats. When the 90°F preset limit of the thermostat is reached, the exhaust fans are started and the associated air intake dampers are energized to an open position and admit outside air from el 240 ft 0 in. and 222 ft 0 in. for ventilation.

When the space temperature drops below the room minimum temperature design of 40°F, the electric space heaters are energized. Space heaters are actuated automatically by the room temperature switches.

The tendon gallery supply fan is manually activated to purge the area with outside air during maintenance or servicing operations. The supply fan is located at the top of the service shaft, which is opened during maintenance periods only. The supply fan delivers outside air to the tendon gallery at el 148 ft 6 in.

9.4.9.1.3 Safety Evaluation

Since the ventilation system has no safety design bases, no safety evaluation is provided.

9.4.9.1.4 Tests and Inspections

The equipment building ventilation system is designed to permit periodic inspection of system components to ensure the integrity and capability of the system.

The fans are performance tested by the manufacturer in accordance with Air Moving and Conditioning Association (AMCA) Standard 210.[1]

During testing, instruments are calibrated and automatic controls are tested for actuation at the proper setpoints. Alarm functions are checked for operability and limits during preoperational testing.

9.4.9.1.5 Instrumentation Applications

Operations of heating coils and ventilation fans are controlled automatically by temperature indicating controllers. Damper position is automatically controlled and remotely indicated.

9.4.9.2 Electrical Tunnel Ventilation System

The electrical tunnel ventilation system provides ventilation in the tunnels carrying train-oriented and/or normal cables. Each tunnel is served by its own subsystem.

9.4.9.2.1 Design Bases

9.4.9.2.1.1 Safety Design Bases.

A. The essential electrical tunnel ventilation system is designed to prevent excessive temperature rise; it provides the required ventilation for train-oriented cable tunnels during normal operation, shutdown, refueling, and accident conditions.

B. The safety functions of the essential electrical tunnel ventilation system can be performed, assuming a single active component failure coincident with the loss of offsite power. The essential ventilation system serving the nuclear service cooling water (NSCW) tower cable tunnels and diesel power cable tunnels are powered so that the failure of one Class 1E power supply cannot impair function of both engineered safety features (ESF) trains.

C. The electrical tunnel ventilation system is protected from the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, and external missiles.

D. The normal cable tunnel ventilation system for the east-west normal electric tunnel between the turbine and control buildings has no safety design bases. However, the failure of the nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related systems, structures, or components.

9.4.9.2.1.2 Power Generation Bases. The normal cable tunnel ventilation system is provided for the east-west normal electric tunnel between the turbine and control buildings. The system is designed to maintain acceptable tunnel temperatures during normal operation. All heat removal is accomplished by 100-percent outside air.

9.4.9.2.1.3 Codes and Standards. Codes and standards applicable to the electric tunnel ventilation systems are listed in table 3.2.2-1.

9.4.9.2.2 System Description

9.4.9.2.2.1 General Description. Drawing 1X4DB238 shows the electrical tunnel ventilation system. Each tunnel ventilation system consists of one 100-percent-capacity ventilating fan, fan housing, intake angle filter box with screen, and associated ductwork. The tunnels serviced by essential system components are the two diesel power cable tunnels (train A and train B), the two NSCW tower cable tunnels (train A and train B), and the turbine building and auxiliary building train A tunnel. The tunnel serviced by normal system components is the turbine building chase to control building tunnel.

9.4.9.2.2.2 Component Description. Table 9.4.9-2 provides design parameters for major components in the systems.

A. Normal Fans

The normal tunnel ventilation fans are centrifugal, direct motor-driven fans provided with vibration isolators.

B. Essential Fans

The fans for the diesel, NSCW tower, and train A cable tunnels are of the vaneaxial type directly driven by electric motors.

Prefilters for dust collection are provided at the outside air intake locations so that the tunnels are kept in a clean condition.

9.4.9.2.2.3 System Operation. The fan motors are started automatically by thermostats when the tunnel temperature reaches 90°F, with the exception of the Unit 1 Train A electrical tunnel fan. In response to a high Train A electrical tunnel temperature alarm in the control room, an operator will open the fire door located at the fuel handling building/auxiliary building interface and manually start the fan from the handswitch in the control room. The remaining fans may also be activated manually by a remote hand switch located in the control room. The east-west normal electric tunnel ventilation system intake is at el 246 ft 8 in., and the turbine building and auxiliary building tunnel ventilation system intake is at el 264 ft 6 in. These two systems exhaust through a common plenum at el 222 ft 2 in.

The NSCW tower cable tunnels' and diesel power cable tunnels' air intakes are located at el 222 ft 0 in. The NSCW tower cable tunnels exhaust to the atmosphere at el 224 ft 0 in., and the diesel power cable tunnels exhaust to the atmosphere at el 242 ft 2 in.

9.4.9.2.3 Safety Evaluation

A. The tunnel ventilation system has sufficient cooling capability to maintain the cable tunnels at or below 104°F.

B. As indicated by table 9.4.9-3, no single failure will compromise the system's ability to provide sufficient cooling for the tunnels. The fan motors serving essential cable tunnels are powered from the same Class 1E power train as the cables routed in the particular tunnel.

C. The tunnel ventilation system is located in the electrical tunnels which are designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the basis for the adequacy of the structural design of the tunnels.

9.4.9.2.4 Tests and Inspections

The system is designed to permit periodic inspection. The system is tested for function and capability in the preoperational testing. Fans are tested in accordance with AMCA Standard 210.[1]

9.4.9.2.5 Instrumentation Applications

The following instrumentation is provided in the control room:

- High temperature alarm.
- Remote hand switches for the fans.
- Fan status indication.

Local temperature indication is also provided in each electrical tunnel.

9.4.9.3 Piping Penetration and MSIV Area Ventilation Systems

The piping penetration ventilation system cools the main steam and feedwater piping restraints in the main steam and feedwater valve rooms of the control building, the main steam piping restraints in the main steam valve room of the auxiliary buildings, and the main steam tunnels. The MSIV ventilation system supplies tempered outside air to the control and auxiliary building MSIV areas.

9.4.9.3.1 Design Bases

9.4.9.3.1.1 Safety Design Bases. This system has no safety function. The piping penetration and MSIV ventilation systems are not designed to function during accident conditions. However, the failure of nonsafety, nonseismic HVAC equipment/ductwork will not compromise any safety-related equipment, component, or structures.

9.4.9.3.1.2 Power Generation Bases. The piping penetration ventilation system provides ventilation air across the main steam and feedwater pipe restraints located in the main steam and feedwater valve rooms and associated tunnels to maintain concrete temperatures below 200°F.

When forced ventilation is required the piping restraints in the main steam and feedwater rooms are provided a reliable source of ventilation by employing two 50-percent capacity fans capable of being powered automatically from the emergency onsite power supply following a loss of offsite power. The MSIV ventilation system supplies tempered outside air to the MSIV areas to maintain the ambient temperature in the vicinity of the MSIV actuators within the normal environmental design limits during plant operation (47°F - 115°F).

9.4.9.3.1.3 Codes and Standards. The piping penetration system is designed to conform to the applicable codes and standards listed in table 3.2.2-1.

9.4.9.3.2 System Description

9.4.9.3.2.1 General Description. Drawings 1X4DB245 and 2X4DB245 shows the piping penetration and MSIV area ventilation systems. The piping restraints for each of the main steam and feedwater piping trains in the main steam and feedwater valve rooms of the control building are provided with dedicated fans for forced ventilation. In the auxiliary building the piping restraints for each of the main steam piping trains in the main steam and valve rooms are

provided with dedicated fans for forced ventilation. The feedwater piping restraints in the auxiliary building feedwater valve rooms are cooled by natural convection cooling. The main steam piping restraints in the tunnels are provided with one dedicated fan for forced ventilation. The MSIV areas of the auxiliary and control buildings are each provided with two 100-percent capacity ventilation units which supply tempered outside air directly on the MSIV actuators. The piping penetration ventilation system includes associated ductwork and instrumentation.

9.4.9.3.2.2 Component Description. Table 9.4.9-4 provides design parameters for major components in the system. The piping restraint cooling fans are vaneaxial type, directly driven by electric motors. The restraint cooling fans are provided with stainless steel screens and have adjustable pitch blades. The MSIV ventilation system air handling units each contain a disposable prefilter, electric heating coil, and centrifugal fan with adjustable inlet vanes.

9.4.9.3.2.3 System Operation. The piping penetration system provides cooling to the piping restraints, thereby maintaining the concrete surrounding to temperatures below 200°F.

The forced ventilation fans are started manually for normal operation by a remote hand switch located in the control room. The system is designed to function during normal plant operation, during startup, cold shutdown, cooldown and hot standby, and during refueling operations.

The system is designed to remain functional during loss of offsite power and is powered from the non-Class 1E, standby power system.

The ductwork for the system is arranged such that no short-circuiting of discharge and intake air is possible. It is arranged so that there is adequate distribution of air.

The MSIV ventilation system provides tempered outside air to the MSIV actuators to maintain the ambient temperature within the normal environmental limits of the actuators. The air handling units are manually operated by local handswitches located on the control and auxiliary building MSIV ventilation system control panels in the MSIV areas.

The control and auxiliary building MSIV areas are each provided with two 100-percent capacity air handling units designed to operate during all modes of normal plant operation including plant startup and cooldown.

9.4.9.3.3 Safety Evaluation

Since the piping penetration and MSIV area ventilation systems have no safety design bases, no safety evaluation is provided.

9.4.9.3.4 Tests and Inspections

The fans are tested in accordance with AMCA Standard 210[(1)] to ensure fan characteristic performance curves.

9.4.9.3.5 Instrumentation Applications

Provisions are incorporated to allow the operator to monitor system status from the QHVC control panel in the control room. Monitoring of the piping penetration ventilation system includes indication of the fan energized and low airflow alarm. The MSIV ventilation system has a high/low temperature alarm and a low flow alarm located on the control room QHVC panel. In

addition, this system will automatically deactivate if the supply air temperature falls below acceptable limits.

9.4.9.4 Reference

1. "Laboratory Methods of Testing Fans for Rating Purposes," AMCA Standard 210, 1974.

TABLE 9.4.1-1

OUTSIDE DESIGN CONDITIONS

HVAC Design Condition	Outside
Summer design temperature	98°F dry bulb, 80°F wet bulb (ASHRAE 1% column)
Winter design temperature	17°F
Latitude	33°2' north
Elevation	220 ft above sea level

TABLE 9.4.1-2 (SHEET 1 OF 2)

NORMAL ENVIRONMENTAL DESIGN CONDITIONS

Building/ Area	Space Temperatures Maximum (°F)	Minimum (°F)	Relative Humidity (%)
Control Building			
Control room	80	70	50
Computer room	80	70	50
Battery room	80	70	50
Offices	80	70	50
Electrical penetration areas	100	40	(b)
Central alarm station	80	70	50
All other areas	100[d]	65	60
Containment			
Lower containment	120	60	50
Upper containment	120	60	50
Main steam and main feedwater valve area	126	17	(b)
Fuel Handling Building			
Fuel pool area	104	40	50
All other areas	104	40	60
Auxiliary Building			
Piping penetration	100[d]	40	60
All other areas	100[d]	40[a]	60
Onsite Technical Support Center			
CRT display, computer, and communications	80	70	70
Work area and conference room	80	70	(b)
Battery room			
Toilet and corridor	80	68	(b)
All other areas	85[d]	68	(b)

TABLE 9.4.1-2 (SHEET 2 OF 2)

Building/ Area	Space Temperatures Maximum (°F)	Minimum (°F)	Relative Humidity (%)
Turbine Building	104	40	(b)
Radwaste Transfer Tunnel and Pipechase	(c)	40	(b)
Equipment Building	120	40	(b)
Auxiliary Feedwater Pumphouse	120[(e)]	0	(b)
NSCW Chemical Control Building			
Office	104	60	(b)
All other areas	104	40	(b)
Diesel Generator Building	120	50	(b)
Plant Entry and Security	80	70	50

a. Tank areas containing boric acid shall be 65°F minimum design.

b. Relative humidity is not controlled.

c. Space temperature to be designed to a 10° rise based on the 5-percent outdoor air ambient temperature recommended by ASHRAE.

d. Maximum space temperatures are nominal design values. See table 3.11.B.1-1 for maximum space temperatures of individual rooms.

e. Turbine-driven auxiliary feedwater pump room maximum space temperature is 122°F.

TABLE 9.4.1-3 (SHEET 1 OF 5)

HEATING, VENTILATION, AIR-CONDITIONING,
AND COOLING SYSTEMS

Control Building Control Room Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	31,500
Static pressure (in. WG)	4.0
Motor (hp)	100
Cooling capacity (Btu/h)	1,610,000
Chilled waterflow (gal/min)	258

Control Building Control Room Return and Exhaust Fan Unit

Quantity	2
Airflow (ft^3/min)	29,160
Static pressure (in. WG)	2.75
Motor (hp)	30

Control Building Wing Area Normal Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	21,928
Static pressure (in. WG)	4.0
Motor (hp)	60
Cooling capacity (Btu/h)	1,620,000
Chilled waterflow (gal/min)	263

Control Building Light Switchgear Normal Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	20,000
Static pressure (in. WG)	5.0
Motor (hp)	60
Cooling capacity (Btu/h)	1,280,000
Chilled waterflow (gal/min)	203

Control Building Fume Hoods Supply Fan

Quantity	1
Airflow (ft^3/min)	2860
Static pressure (in. WG)	1.0
Motor (hp)	3.0

TABLE 9.4.1-3 (SHEET 2 OF 5)

Control Building Fume Hoods Filter Unit

Quantity	1
Airflow (ft^3/min)	11,130
Static pressure (in. WG)	16
Motor (hp)	75
Heating capacity (Btu/h)	29

Control Building Contamination Area Vent Fan

Quantity	1
Airflow (ft^3/min)	6000
Static pressure (in. WG)	2.0
Motor (hp)	10

Control Building Cable Spreading Room Normal Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	12,645
Static pressure (in. WG)	4.8
Motor (hp)	30
Cooling capacity (Btu/h)	742,600
Chilled waterflow (gal/min)	123

Control Building Control Room Kitchen, Toilet, and Conference Room Exhaust Fan Unit

Quantity	1
Airflow (ft^3/min)	1370
Static pressure (in. WG)	1.5
Motor (hp)	1.5

Control Building Smoke Exhaust Fan

Quantity	1
Airflow (ft^3/min)	16,380
Static pressure (in. WG)	5
Motor (hp)	30

Control Building Levels 1 and 2 Service Area Normal Air-Conditioning Unit

Quantity	1
Airflow (ft^3/min)	42,475
Static pressure (in. WG)	3.9
Motor (hp)	100
Cooling capacity (Btu/h)	2,762,000
Chilled waterflow (gal/min)	455

Control Building Levels 1 and 2 Service Area Normal Return and Exhaust Fan

TABLE 9.4.1-3 (SHEET 3 OF 5)

Quantity	1
Airflow (ft^3/min)	25,200
Static pressure (in. WG)	3.5
Motor (hp)	60

Control Building Cable Spreading Room Normal Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	12,645
Static pressure (in. WG)	5.0
Motor (hp)	25
Cooling capacity (Btu/h)	821,000
Chilled waterflow (gal/min)	131

Computer Room Air-Conditioner

Quantity	2
Airflow (ft^3/min)	6730
Static pressure (in. WG)	0.5
Motor (hp)	7.5
Cooling capacity (Btu/h)	309,000
Chilled waterflow (gal/min)	62

Control Building Smoke Exhaust Fan

Quantity	1
Airflow (ft^3/min)	20,000
Static pressure (in. WG)	5.0
Motor (hp)	50

Control Building Normal Air-Conditioning Equipment Room Exhaust Fan

Quantity	1
Airflow (ft^3/min)	14,000
Static pressure (in. WG)	0.375
Motor (hp)	5.0

Control Building Control Room Normal Chiller Room Exhaust Fan

Quantity	1
Airflow (ft^3/min)	18,000
Static pressure (in. WG)	0.375
Motor (hp)	7.5

Control Building Switchgear and Battery Room Air-Conditioning Unit

	Unit 1	Unit 2
Quantity	1	1

TABLE 9.4.1-3 (SHEET 4 OF 5)

Airflow (ft^3/min)	4500	4700
Static pressure (in. WG)	3.5	3.5
Motor (hp)	7.5	7.5
Cooling capacity (Btu/h)	252,600	263,800
Chilled waterflow (gal/min)	30	32
Control Building Battery Room Exhaust Fan		
Quantity	1 (per unit)	
Airflow (ft^3/min)	260	
Static pressure (in. WG)	0.5	
Motor (hp)	0.33	
Control Building Wing Area Normal Exhaust and Return Fan		
Quantity	2	
Airflow (ft^3/min)	18,555	
Static pressure (in. WG)	3.0	
Motor (hp)	30	
Control Building Levels 1 and 2 Locker, Toilet, and Storage Area Exhaust Fan		
Quantity	1	
Airflow (ft^3/min)	7570	
Static pressure (in. WG)	2.0	
Motor (hp)	5	
Central Alarm System		
Water Chiller		
Quantity	1	
Cooling capacity (tons)	20.2	
Compressor type	Reciprocating, hermetic	
Evaporator		
Water temperature - entering (°F)	56	
Water temperature - exiting (°F)	44	
Waterflow (gal/min)	40.4	
Condenser		
Type	Air-cooled	
Air temperature - entering (°F)	105	
Total power required (kW)	25.8	
Chilled Water Pump		
Quantity	1	
Type	Centrifugal	

TABLE 9.4.1-3 (SHEET 5 OF 5)

Flow capacity (gal/min)	40
Pump head	30
Pump motor (hp)	3/4
Expansion Tank	
Quantity	1
Capacity	40

TABLE 9.4.1-4 (SHEET 1 OF 2)

DESIGN PARAMETERS FOR ONSITE TECHNICAL SUPPORT CENTER
HVAC SYSTEM COMPONENTS

Air Handling Unit	
Quantity	1
Airflow (ft^3/min)	15,000
Static pressure (in. WG)	1.5
Air Filtration Unit	
Quantity	1
Airflow (ft^3/min)	3000
Static pressure (in. WG)	6.7
Normal Supply Fan	
Quantity	1
Airflow (ft^3/min)	15,000
Static pressure (in. WG)	4.0
Filtration Unit Fan	
Quantity	1
Airflow (ft^3/min)	3000
Static pressure (in. WG)	10
Exhaust Fan	
Quantity	1
Airflow (ft^3/min)	870
Static pressure (in. WG)	1
Battery Room Exhaust Fan	
Quantity	1
Airflow (ft^3/min)	280
Static pressure (in. WG)	1

TABLE 9.4.1-4 (SHEET 2 OF 2)

Water Chiller	
Quantity	1
Cooling capacity (tons)	40.3
Compressor type	Reciprocating, hermetic
Evaporator	
Water temperature - entering (°F)	54
Water temperature - exiting (°F)	44
Waterflow (gal/min)	96.8
Condenser	
Type	Air-cooled
Air temperature - entering (°F)	105
Total power required (kW)	51.8
Chilled Water Pump	
Quantity	1
Type	Centrifugal
Flow capacity (gal/min)	100
Pump head	60
Pump motor (hp)	3
Expansion Tank	
Quantity	1
Capacity (gal)	60

TABLE 9.4.2-1 (SHEET 1 OF 2)

FUEL HANDLING BUILDING VENTILATION SYSTEM COMPONENT DATA

Normal Air-Conditioning Unit

Quantity	2
Airflow (ft^3/min)	25,380
Static pressure (in. WG)	5
Motor (hp)	50
Cooling capacity (Btu/h)	2,567,000
Chilled waterflow (gal/min)	425
Heating capacity (kW)	380

FHB Normal Exhaust Unit

Quantity	2
Airflow (ft^3/min)	28,728
Static pressure (in. WG)	15
Motor (hp)	125
Heating capacity (kW)	115

Post-Accident Filter Unit

Quantity	2
Airflow (ft^3/min)	5000
Static pressure (in. WG)	15
Motor (hp)	40
Heating capacity (kW)	20

Fuel Pool Area Recirculating Air Handling Unit

Quantity	2
Airflow (ft^3/min)	2500
Static pressure (in. WG)	2
Motor (hp)	3
Cooling capacity (Btu/h)	466,600
Chilled waterflow (gal/min)	40
Heating capacity (kW)	40

Railroad Corridor Recirculating Air Handling Unit

Quantity	1
Airflow (ft^3/min)	3100
Static pressure (in. WG)	2.12
Motor (hp)	3
Cooling capacity (Btu/h)	111,300
Chilled waterflow (gal/min)	20

TABLE 9.4.2-1 (SHEET 2 OF 2)

Spent Fuel Pool Heat Exchanger and Pump Room Cooler

Quantity	4
Airflow (ft^3/min)	4700
Static pressure (in. WG)	2.19
Motor (hp)	5
Cooling capacity-normal coil (Btu/h)	120,000
Cooling capacity-ESF coil (Btu/h)	155,000
Chilled waterflow (gal/min)	10 Normal 13 Essential

TABLE 9.4.2-2 (SHEET 1 OF 4)

FUEL HANDLING BUILDING VENTILATION FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
1	No. 8 breaker on 1ABA 480-V; IE bus; train A; NC (normally closed)	Provides continuity and protection to fan motor, item 3	A	Inadvertent opening	MCC alarm Motor indicating light Flow alarm low	None; loss of train A; train B available	2
2	No. 8 motor starter on 1ABA; 480-V; IE bus; train A; NO (normally open)	Provides continuity to fan motor, item 3	A	Fails to close	Motor indicating light Flow alarm low	None; loss of train A; train B available	3
3	A-1542-N7-001-M01 fan and motor ND (normally deenergized); train A	Provides motive power to circulate air	A	Fails to start and operate	Motor indicating light Flow alarm low	None; loss of train A; train B available	4
4	No. 35 breaker on 1AYE1 120-V; IE bus; train A; NC	Provides continuity and protection to HV 12512, item 5	A	Inadvertent opening	Flow alarm low Position indicating light	None; loss of train A; train B available	5
5	HV 12512 open-close louver; NC; train A	Enables discharge air from post-accident filter unit to stack	A	Fails to open	Position indicating light Flow alarm low	None; loss of train A; train B available	6
6	No. 35 breaker on 1AYE1 120-V; IE bus; train A; NC	Provides continuity and protection to HV 12510, item 7	A	Inadvertent opening	Position indicating light Flow alarm low	None; loss of train A; train B available	7
7	HV 12510, open-close louver; NC; train A	Enables air from FHB corridor to post-accident filter unit	A	Fails to open	Position indicating light Flow alarm low	None; loss of train A; train B available	8

TABLE 9.4.2-2 (SHEET 2 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
8	No. 10 breaker on 1ABA 480-V; IE bus; train A; NC	Provides continuity and protection to heater, item 9	A	Inadvertent opening	MCC alarm Moisture alarm (high) Temperature indicator	None; loss of train A; train B available	9
9	A-1542-N7-001-H01 heater	Reduces relative humidity	A	No heating	Moisture alarm high Temperature indicator	None; no credit is taken for the heaters; loss of train A; train B available	10
10	No. 8 breaker on 1BBA 480-V; IE bus; NC; train B	Provides continuity and protection to fan motor, item 12	A	Inadvertent opening	MCC alarm Motor indicating light Flow alarm low	None; loss of train B; train A available	11
11	No. 8 starter on 1BBA 480-V; 1E bus; NO; train B	Provides continuity to fan motor, item 12	A	Fails to close	Motor indicating light Flow alarm low	None; loss of train B; train A available	12
12	A-1542-N7-002-M01, fan and motor; ND; train B	Provides motive power to circulate air	A	Fails to start and operate	Motor indicating light Flow alarm low	None; loss of train B; train A available	13
13	No. 32 breaker on 1BYC1 120-V; IE bus; NC; train B	Provides continuity and protection to HV 12513, item 14	A	Inadvertent opening	Flow alarm low Position indicating light	None; loss of train B; train A available	14
14	HV 12513, open-close louver; NC; train B	Enables discharge air from post-accident filter unit to stack	A	Fails to open	Position indicating light Flow alarm low	None; loss of train B; train A available	15
15	No. 32 breaker on 1BYC1; 120-V; 1E bus; train B; NC	Provides continuity and protection to HV 12511, item 16	A	Inadvertent opening	Flow alarm low Position indicating light	None; loss of train B; train A available	16
16	HV 12511, open-close louver; NC; train B	Enables air from FHB corridor to post-accident filter unit	A	Fails to open	Position indicating light Flow alarm low	None; loss of train B; train A available	17

TABLE 9.4.2-2 (SHEET 3 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
17	No. 10 breaker on 1BBA bus; 480-V; IE bus; NC; train B	Provides continuity and protection to heater, item 18	A	Inadvertent opening	MCC alarm Moisture alarm (high) Temperature indicator	None; loss of train B; train A available	18
18	A-1542-N7-002-H01, heater	Reduces relative humidity	A	No heating	Moisture alarm (high) Temperature indicator	None; no credit is taken for the heater; loss of train B; train A is available	19
19	HV 2535, on-off, air-operated damper; NO/FC (fail close)	Isolates safety system from nonsafety normal ac system Enables FHB to maintain negative pressure	A	Fails to close	Position indicating light	None; redundant damper available; item 20	20
20	HV 2534, on-off, air-operated damper; NO/FC	Isolates safety system from nonsafety normal ac system Enables FHB to maintain negative pressure	A	Fails to close	Position indicating light	None; redundant damper available; item 19	21
21	HV 2529, on-off, air-operated damper; NO/FC	Isolates safety system from nonsafety normal ac system Enables FHB to maintain negative pressure	A	Fails to close	Position indicating light	None; redundant damper available; item 22	22
22	HV 2528, on-off, air-operated damper; NO/FC	Isolates safety system from nonsafety normal AC system Enables FHB to maintain negative pressure	A	Fails to close	Position indicating light	None; redundant damper available; item 21	23

TABLE 9.4.2-2 (SHEET 4 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
23	HV 12482, on-off, air-operated damper; NO/FC	Prevents flow to stack	A	Fails to close	Position indicating light	None; redundant damper available; item 24	24
24	HV 12481, on-off, air-operated damper; NO/FC	Prevents flow to stack	A	Fails to close	Position indicating light	None; redundant damper available; item 23	25
25	HV 12479, on-off, air-operated damper; NO/FO	Normally open fail close	A	Fails to close	Position indicating light	None; redundant damper available; item 26	26
26	HV 12480, on-off, air-operated damper; NO/FO	Normally open fail close	A	Fails to close	Position indicating light	None; redundant damper available; item 25	27
27	Fan, filters, valves, dampers; 1-1542-N7-001-000	Provides circulation, filtration, and volume control of air	A	Mechanical failure	Flow alarm low Pressure differential alarm - high Temperature alarm - high	None; loss of train A; train B available	28
28	Fan, filters, valves, and dampers; 1-1542-N7-002-000	Provides circulation, filtration, and volume control of air	A	Mechanical failure High	Flow alarm low Pressure differential - high Temperature alarm -	None; loss of train B; train A available	

a. A - Accident mode trains A and B exhaust filtration systems are started automatically by the FHBI signal and maintain negative pressure within the FHB; however, no credit is taken for operation of the filters.

TABLE 9.4.3-1

AUXILIARY BUILDING NORMAL VENTILATION SYSTEM DESIGN DATA FOR MAJOR COMPONENTS

Auxiliary Building Normal Air-Conditioning Unit	
Unit 1	
Quantity	2
Airflow rate (ft^3/min)	38,900
Total cooling load (Btu/h)	4.2×10^6
Sensible heat load (Btu/h)	2.3×10^6
Water flow rate maximum (gal/min)	630
Chilled water entering temperature (°F)	44
Chilled water exit temperature (°F)	57
Static pressure (in. WG)	4.5
Motor (hp)	100
Heating capacity (kW)	550
Unit 2	
Quantity	2
Airflow rate (ft^3/min)	35,825
Total cooling load (Btu/h)	3.3×10^6
Sensible heat load (Btu/h)	1.82×10^6
Waterflow rate (maximum) (gal/min)	630
Chilled water entering temperature (°F)	44
Chilled water exit temperature (°F)	59
Static pressure (in. WG)	8.6
Motor (hp)	100
Heating capacity (kW)	430
Auxiliary Building Continuous Exhaust Unit	
Unit 1	
Quantity	3
Airflow rate (ft^3/min)	28,400
Static pressure (in. WG)	24.0
Motor (hp)	150
Heating capacity (kW)	125
Unit 2	
Quantity	3
Airflow rate	25,130
Static pressure	23
Motor (hp)	125
Heating capacity	110

TABLE 9.4.3-2 (SHEET 1 OF 3)

ESF ROOM COOLER DESIGN DATA FOR MAJOR COMPONENTS

	Normal	ESF
Electric Switchgear and MCC Room Cooler (Level D)		
Quantity	1	
Airflow rate (ft^3/min)	4150	4150
Cooling capacity (Btu/h)	111,000	120,000
Chilled water entering temperature (°F)	44	50
Chilled water exit temperature (°F)	56	62
Waterflow rate (gal/min)	20	20
Motor (hp)	5	5
Electric Switchgear and MCC Room Cooler (Level 2)		
Quantity	1	
Airflow rate (ft^3/min)	1775	1775
Motor (hp)	5	5
Cooling capacity (Btu/h)	120,000	155,000
Chilled water entering temperature (°F)	44	44
Chilled water exit temperature (°F)	56	56
Waterflow rate (gal/min)	20	20
Electric Switchgear and MCC Room Cooler (Level C)		
Quantity	1	
Airflow rate (ft^3/min)	1100	1100
Cooling capacity (Btu/h)	28,800	31,000
Chilled water entering temperature (°F)	44	50
Chilled water exit temperature (°F)	56	61
Waterflow rate (gal/min)	5	5
Motor (hp)	2	2
Electric Switchgear and MCC Room Cooler (Level B)		
Quantity	1	
Airflow rate (ft^3/min)	1100	1100
Cooling capacity (Btu/h)	28,800	31,000
Chilled water entering temperature (°F)	44	50
Chilled water exit temperature (°F)	57	66
Waterflow rate (gal/min)	5	5
Motor (hp)	2	2

TABLE 9.4.3-2 (SHEET 2 OF 3)

	Normal	ESF
Electric Switchgear and MCC Room Cooler (Level 1)		
Quantity	2	
Airflow rate (ft^3/min)	700	700
Cooling capacity (Btu/h)	25,000	31,000
Chilled water entering temperature (°F)	44	44
Chilled water exit temperature (°F)	56	56
Waterflow rate (gal/min)	5	5
Motor (hp)	2	2
Residual Heat Removal Pump Cooler (Train A)		
Quantity	1	
Airflow rate (ft^3/min)	2600	2600
Cooling capacity (Btu/h)	93,000	93,000
Chilled water entering temperature (°F)	44	44
Chilled water exit temperature (°F)	56	56
Waterflow rate (gal/min)	15	15
Motor (hp)	5	5
Containment Spray Pump Room Cooler		
Quantity	2	
Airflow rate (ft^3/min)	-	2000
Cooling capacity (Btu/h)	-	66,000
Chilled water entering temperature (°F)	-	44
Chilled water exit temperature (°F)	-	56
Waterflow rate (gal/min)	-	15
Motor (hp)	-	3
Component Cooling Water Pump Room Cooler		
Quantity	2	
Airflow rate (ft^3/min)	-	3100
Cooling capacity (Btu/h)	-	98,000
Chilled water entering temperature (°F)	-	44
Chilled water exit temperature (°F)	-	56
Waterflow rate (gal/min)	-	20
Motor (hp)	-	5

TABLE 9.4.3-2 (SHEET 3 OF 3)

Residual Heat Removal Pump Cooler (Train B)

	Normal	ESF
Chemical and Volume Control System Charging Pump Room Cooler		
Quantity	2	
Airflow rate (ft^3/min)	2160	2160
Cooling capacity (Btu/h)	85,000	85,000
Chilled water entering temperature (°F)	44	44
Chilled water exit temperature (°F)	56	56
Waterflow rate (gal/min)	15	15
Motor (hp)	5	5
Safety Injection System Pump Room Cooler		
Quantity	2	
Airflow rate (ft^3/min)	-	2000
Cooling capacity (Btu/h)	-	82,000
Chilled water entering temperature (°F)	-	44
Chilled water exit temperature (°F)	-	56
Waterflow rate (gal/min)	-	15
Motor (hp)	-	3
Spent Fuel Pool Heat Exchanger and Pump Room Cooler		
Quantity	2	
Airflow rate (ft^3/min)	4700	4700
Cooling capacity (Btu/h)	120,000	155,000
Chilled water entering temperature (°F)	44	44
Chilled water exit temperature (°F)	56	56
Waterflow rate (gal/min)	20	20
Motor (hp)	5	5

TABLE 9.4.3-3

AUXILIARY BUILDING EMERGENCY FILTRATION SYSTEM DESIGN DATA FOR MAJOR COMPONENTS (PER UNIT)

Auxiliary Building Emergency Filtration Unit	
Recirculating Fan	
Quantity	2
Airflow (ft^3/min)	15,500
Static pressure (in. WG)	16
Motor (hp)	75
Filtration Unit	
Quantity	2
Airflow (ft^3/min)	15,500
Heater (kW)	80
Filter components	Demister 4-in. charcoal, two-stage HEPA
Piping Penetration Area Cooler	
Quantity	1
Total cooling (Btu/h)	1.176×10^6
Sensible cooling (Btu/h)	0.195×10^6
Latent cooling (Btu/h)	0.981×10^6
Cooling medium	ESF chilled water
Entering water temperature (°F)	44
Exiting water temperature (°F)	56
Waterflow (gal/min)	120
Quantity	1
Total cooling (Btu/h)	1.716×10^6
Sensible cooling (Btu/h)	0.198×10^6
Latent cooling (Btu/h)	1.518×10^6
Cooling medium	Nuclear service cooling water
Entering water temperature (°F)	95
Exiting water temperature (°F)	102
Waterflow (gal/min)	500

TABLE 9.4.3-4 (SHEET 1 OF 11)

AUXILIARY BUILDING - ESF ROOM COOLER FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
1	No. 49 breaker on 1ABD, 480-V, IE MCC, train A, normally closed (NC)	Provide continuity and protection for fan motor, item 3	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
2	No. 49 motor starter train A, normally open (NO)	Provide continuity to fan motor, item 3	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
3	1-1555-A7-001-M01, electric, switchgear, and MCC room cooler motor and fan, train A, normally deenergized (ND)	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
4	No. 49 breaker on 1BBD and train B	Provide continuity and protection for fan motor, item 6	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
5	No. 49 motor starter for item 6	Provide continuity to fan motor, item 6	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
6	1-1555-A7-002-M01 for train B on 1ABD	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
7	No. 50 breaker	Provide continuity and protection for fan motor, item 9	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
8	No. 50 motor starter for item 9	Provide continuity to fan motor, item 9	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
9	1-1555-A7-003-M01	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
10	No. 50 breaker on 1BBD	Provide continuity and protection for fan motor, item 12	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available

TABLE 9.4.3-4 (SHEET 2 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
11	No. 50 motor starter for item 12	Provide continuity to fan motor, item 12	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
12	1-1555-A7-004-M01	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
13	No. 23 breaker 1ABB	Provide continuity and protection for fan motor, item 15	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
14	No. 23 motor starter	Provide continuity to fan motor, item 15	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
15	1-1555-A7-005-M01	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
16	No. 23 breaker 1BBB and train B	Provide continuity and protection for fan motor, item 18	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
17	No. 23 motor starter	Provide continuity to fan motor, item 18	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
18	1-1555-A7-006-M01	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
19	No. 53 breaker on 1ABD	Provide continuity and protection for fan motor, item 21	A2	Inadvertent o pen	MCC alarm Fan motor lights	None; loss of train A; train B available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
			B2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
20	No. 53 motor starter	Provide continuity to fan motor, item 3	A2	Fail to close	Fan motor lights	None; loss of train A; train B available

TABLE 9.4.3-4 (SHEET 3 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
					Temperature alarm high	
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
21	1-1555-A7-007-M01, RHR pump cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
22	No. 53 breaker on 1BBD	Provide continuity and protection for fan motor, item 24	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			A3	Inadvertent open	MCC alarms Fan motor lights	None; loss of train B; train A available
			B2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
23	No. 53 motor starter, item 24	Provide continuity to fan motor, item 24	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available

TABLE 9.4.3-4 (SHEET 4 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
24	1-1555-A7-008-M01 train B	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
25	No. 52 breaker on 1ABD	Provide continuity and protection for fan motor, item 27	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
			B3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
26	No. 52 motor starter, item 27	Provide continuity to fan motor, item 24	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
27	1-1555-A7-009-M01, containment spray pump room cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B3	Fail to start and operate	Fan motor lights	None; loss of train A; train B available

TABLE 9.4.3-4 (SHEET 5 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
					Temperature alarm high	
28	No. 52 breaker on IBBD	Provide continuity and protection for fan motor, item 30	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			B3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
29	No. 52 motor starter, item 30	Provide continuity to fan motor, item 30	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
30	1-1555-A7-010-M01, train B	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
31	No. 28 breaker 1ABB	Provide continuity and protection for fan motor, item 33	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
32	No. 28 motor starter, item 33	Provide continuity to fan motor, item 33	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available

TABLE 9.4.3-4 (SHEET 6 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
33	1-1555-A7-011-M01, component cooling water pump room cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
34	No. 28 breaker 1BBB	Provide continuity and protection for fan motor, item 36	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
35	No. 28 motor starter, item 36	Provide continuity to fan motor, item 36	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
36	1-1555-A7-012-M01, train B	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
37	No. 22 breaker on 1ABD	Provide continuity and protection for fan motor, item 39	A2	Inadvertent	MCC alarm Fan motor lights	None; loss of train A; train B available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
			B4	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
38	No. 22 motor starter, item 39	Provide continuity to fan motor, item 39	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B4	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
39	1-1555-A7-013-M01, charging pump room cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to start and operate	Fan motor lights	None; loss of train A;

TABLE 9.4.3-4 (SHEET 7 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
					Temperature alarm high	
			B4	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
40	No. 22 breaker on 1BBD	Provide continuity and protection for fan motor, item 42	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			B4	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
41	No. 22 motor starter, item 42	Provide continuity to fan motor, item 42	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B4	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
42	1-1555-A7-014-M01, charging pump room cooler motor and fan, train B, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B4	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
43	No. 23 breaker on 1ABD	Provide continuity and protection for fan motor, item 45	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available

TABLE 9.4.3-4 (SHEET 8 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
			B5	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
44	No. 23 motor starter, item 45	Provide continuity to fan motor, item 45	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B5	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
45	1-1555-A7-015-M01, SIS pump cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
			B5	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
46	No. 23 breaker on 1BBD	Provide continuity and protection for fan motor, item 48	A2	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			A3	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
			B5	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available

TABLE 9.4.3-4 (SHEET 9 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
47	No. 23 motor starter, item 48	Provide continuity to fan motor, item 48	A2	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B5	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available
48	1-1555-A7-016-M01, SIS pump cooler motor and fan, train B, ND	Provide motive power to circulate cool air	A2	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			A3	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
			B5	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
49	No. 29 breaker 1ABB	Provide continuity and protection for fan motor, item 51	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train A; train B available
50	No. 29 motor starter, item 51	Provide continuity to fan motor, item 51	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train A; train B available
51	1-1555-A7-017-M01, SFP heat exchanger and pump room cooler motor and fan, train A, ND	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train A; train B available
52	No. 29 breaker 1BBB	Provide continuity and protection for fan motor, item 54	A1 B1	Inadvertent open	MCC alarm Fan motor lights	None; loss of train B; train A available
53	No. 29 motor starter, item 54	Provide continuity to fan motor, item 54	A1 B1	Fail to close	Fan motor lights Temperature alarm high	None; loss of train B; train A available

TABLE 9.4.3-4 (SHEET 10 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
54	1-1555-A7-018-M01, train B	Provide motive power to circulate cool air	A1 B1	Fail to start and operate	Fan motor lights Temperature alarm high	None; loss of train B; train A available
55	Fans, fan shafts, bearings, etc., for air-handling units: 1-1555-A7-001-000 1-1555-A7-003-000 1-1555-A7-005-000 1-1555-A7-007-000 1-1555-A7-009-000 1-1555-A7-011-000 1-1555-A7-013-000 1-1555-A7-015-000 1-1555-A7-017-000	Provide circulation of air	A1 B1	Mechanical failure	Temperature alarm high	None; loss of train A; train B available
56	Fans, fan shafts, bearings, etc., for air-handling units: 1-1555-A7-002-000 1-1555-A7-004-000 1-1555-A7-006-000 1-1555-A7-008-000 1-1555-A7-010-000 1-1555-A7-012-000 1-1555-A7-014-000 1-1555-A7-016-000 1-1555-A7-018-000	Provide circulation of air	A1 B1	Mechanical failure	Temperature alarm high	None; loss of train B; train A available
57	Cooling coils for air-handling units: 1-1555-A7-001-000 1-1555-A7-003-000 1-1555-A7-005-000 1-1555-A7-007-000 1-1555-A7-009-000 1-1555-A7-011-000 1-1555-A7-013-000 1-1555-A7-015-000 1-1555-A7-017-000	Provide cooling and heat removal in the area	A1 B1	Leakage in coil	Waterflow alarm low Temperature alarm high	None; loss of train A; train B available

TABLE 9.4.3-4 (SHEET 11 OF 11)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
58	Cooling coils for air-handling units: 1-1555-A7-002-000 1-1555-A7-004-000 1-1555-A7-006-000 1-1555-A7-008-000 1-1555-A7-010-000 1-1555-A7-012-000 1-1555-A7-014-000 1-1555-A7-016-000 1-1555-A7-018-000	Provide cooling and heat removal in the area	A1 B1	Leakage in cooling coil	Waterflow alarm low Temperature alarm high	None; loss of train B; train A available

a. A1 - Normal and Accident Mode: Each train thermostatically controlled. A2 - Normal and A3 Accident Modes: Each train manually controlled with temperature alarm. Accident Mode - Both trains start and operate automatically on accident initiation. B1 - safety injection (SI). B2 - RHR system start. B3 - Containment spray system start. B5 – SI system start.

TABLE 9.4.3-5 (SHEET 1 OF 6)

PIPING PENETRATION FILTER EXHAUST SYSTEM FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
1	No. 14 breaker on 1AB15 480-V switch-gear, 1E bus train A, NO	Provide continuity and protect motor, item 2	A	Fail to close	Switchgear alarm Motor indicating lights	None; loss of train A; train B available	2
2	1-1561-N7-001-M01, piping penetration room filtration and exhaust unit motor and fan, train A, ND	Provide motive power to circulate air	A	Fail to start and operate	Motor indicating lights Flow alarm low	None; loss of train A; train B available	3
3	No. 33 breaker on 1AYE1 panel (120/240-V), 1ABE MCC 480-V; train A; NC	Provide continuity and protect motor item 5	A	Inadvertent open	Position indicating lights	None; no loss of train A. Item 5 is a NO/failed open (FO) damper; thus it does not block air passage.	4
4	Electric contact to energize item 5; NO	Provide continuity for item 5; NO; remain open	A	Inadvertent closure	Flow alarm low Position indicating lights	None; loss of train A; train B available	5
5	PV2550A, electric/hydraulic ON-OFF damper, NO/FO; train A NO; remain open	Maintain negative pressure inside AB	A	Inadvertent closure	Press differential alarm low Flow alarm low Position indicating light	None; loss of train A; train B available	6
6	No. 33 breaker on 1AYE1 panel (120/240-V), 1ABE MCC 480-V, train A, NC	Provide continuity and protect motor, item 8	A	Inadvertent open	Press differential alarm low Position indicating light	None; loss of train A; train B available. Item 8 is an NC/failed closed (FC) damper; thus it will block air passage discharge to maintain negative pressure.	7

TABLE 9.4.3-5 (SHEET 2 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
7	Electric contact to energize item 8; NO	Provide continuity for item 8	A	Fail to close	Pressure differential alarm low Position indicating light	None; loss of train A; train B available. Item 8 is an NC/FC damper; thus it will block air passage discharge to maintain negative pressure.	8
8	PV2550B, electric/hydraulic ON-OFF damper; NC/FC, train A; NO; remain open	Open to maintain negative pressure inside AB	A	Fail to open	Pressure differential alarm low Position indicating light	None; loss of train A; train B available. Item 8 is an NC/FC damper; thus it will block air passage discharge to maintain negative pressure	9
9	002; tornado damper; NC, train A	Open to allow negative pressure inside AB and prevent backflow into building	A	Fail to open	Pressure differential alarm low	None; loss of train A; train B available	10
10	No. 10 breaker on 1AYE1; panel (120/240-V); 1ABE MCC 480-V; train A; NC	Provide continuity and protect motor, item 12	A	Inadvertent open	Position indicating light	None; loss of train A; train B available	11
11	Electric contact to energize item 12; NO	Provide continuity for item 12; NO; remain open	A	Fail to close	Flow alarm low Position indicating lights	None; loss of train A; train B available	12
12	HV12614, on-off damper; train A; NC/FC	Allow return air to item 2	A	Fail to open	Flow alarm low Position indicating lights	None; loss of train A; train B available	13
13	No. 04 breaker on 1AB15 480-V switchgear; 1E bus; train A; NO	Provide continuity and protect heater, item 14	A	Fail to close	Switchgear alarm Moisture alarm Temperature indicator	None; loss of train A; train B available	14

TABLE 9.4.3-5 (SHEET 3 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
14	1-1561-N7-001-H01, piping penetration room filtration and exhaust unit electric heater; train A; ND	Provide heat to extract moisture	A	Fail to operate	Moisture alarm Temperature indicator	None; no credit is taken for operation of the heater; loss of train A; train B available	15
15	No. 14 breaker on 1BB16; 480-V switchgear; 1E bus; train B; NO	Provide continuity and protect motor, item 16	A	Fail to close	Switchgear alarm Motor indicating lights	None; loss of train B; train A available	16
16	1-1561-N7-002-M01, piping penetration room filtration and exhaust unit motor and fan; train B; ND	Provide motive power to circulate air	A	Fail to start and operate	Motor indicating lights; Flow alarm low	None; loss of train B train A available	17
17	No. 28 breaker on panel (120/240-V); 1BBB MCC 480-V; train B, NC	Provide continuity and protect motor, item 19	A	Inadvertent open	Position indicating lights	None; no loss of train B. Item 19 is an NO/FO damper; thus it does not block air passage.	18
18	Electric contact to energize item 19; NO	Provide continuity for item 19; NO; remain open	A	Inadvertent closure	Flow alarm low Position indicating lights	None; loss of train B; train A available	19
19	PV2551A, electric/hydraulic ON-OFF damper; NO/FO; train B; NO; remain open	Maintain negative pressure inside AB	A	Inadvertent closure	Pressure differential alarm Flow alarm low Position indicating light	None; loss of train B; train A available	20
20	No. 28 breaker on 1BYC1 panel (120/240-V); 1BBC MCC 480-V; train B, NC	Provide continuity and protect motor, item 22	A	Inadvertent open	Pressure differential alarm low Position indicating light	None; loss of train B; train A available. Item 22 is an NC/FC damper; thus it will block air passage discharge to maintain negative pressure.	24

TABLE 9.4.3-5 (SHEET 4 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
21	Electric contact to energize item 22; NO	Provide continuity for item 22; NO; remain open	A	Fail to close	Pressure differential alarm low Position indicating light	None; loss of train B; train A available. Item 22 is an NC/FC damper; thus it will block air passage discharge to maintain negative pressure.	22
22	PV2551B, electric/hydraulic ON-OFF damper; NC/FC; train B; NO; remain open	Open to maintain negative pressure inside AB	A	Fail to open	Pressure differential alarm low Position indicating light	None; loss of train B; train A available. Item 22 is an NC/FC damper; thus it will block air passage discharge to maintain negative pressure.	23
23	001, tornado damper; NC; train B.	Open to allow negative pressure inside AB and prevent backflow into building	A	Fail to open	Pressure differential alarm low	None; loss of train B; train A available	24
24	No. 30 breaker on 1BYC1 panel (120/240-V), 1BBC MCC 480-V, train B, NC	Provide continuity and protect motor, item 26	A	Inadvertent open	Position indicating light	None; loss of train B; train A available	25
25	Electric contact to energize item 26; NO	Provide continuity for item 26; NO; remain open	A	Fail to close	Flow alarm low Position indicating lights	None; loss of train B; train A available	26
26	HV12616, on-off damper; train B; NC/FC	Allow return air to item 16	A	Fail to open	Flow alarm low Position indicating lights	None; loss of train B; train A available	27
27	No. 04 breaker on 1BB16; 480-V switchgear 1E bus; train B, NO	Provide continuity and protect heater, item 28	A	Fail to close	Switchgear alarm Moisture alarm Temperature indicator	None; loss of train B; train A available	28

TABLE 9.4.3-5 (SHEET 5 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
28	1-1561-N7-001-H02, piping penetration room filtration and exhaust unit electric heater; train B; ND	Provide heat to extract moisture	A	Fail to operate	Moisture alarm Temperature indicator	None; no credit is taken for operation of the heater; loss of train B: train A is available	29
29	HV12605, air-operated, on-off damper; NO/FC	Isolate normal air supply to piping penetration rooms	A	Fail to close	Position indicator lights	None; redundant damper HV12606 (item 30) available	30
30	HV12606, air-operated, on-off damper; NO/FC	Isolate normal air supply to piping penetration rooms	A	Fail to close	Position indicator lights	None; redundant damper HV12605 (item 29) available	31
31	HV12604, air-operated, on-off damper; NO/FC	Isolate normal air exhaust from piping penetration rooms	A	Fail to close	Position indicator lights	None; redundant damper HV12607 (item 32) available	32
32	HV12607; air-operated, on-off damper; NO/FC	Isolate normal air exhaust from piping penetration rooms	A	Fail to close	Position indicator lights	None; redundant damper HV12604 (item 31) available	33
33	1-1561-N7-001-000, fan, filter, valve, and damper	Provide circulation, filtration, and control of air	A	Mechanical failure	Flow alarm low Pressure differential alarm high Temperature alarm high	None; loss of train A; train B available	
34	1-1561-N7-002-000, fan, filter, valve, and damper	Provide circulation, filtration, and volume of air	A	Mechanical failure	Flow alarm low Pressure differential alarm high	None; loss of train B; train A available	
35	1-1561-E7-001-000, cooling coil	Provide cooling	A	Leakage in cooling coil	Temperature alarm high Water flow alarm low	None; loss of train A; train B available	

TABLE 9.4.3-5 (SHEET 6 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go To Item No.
36	1-1561-E7-002-000, cooling coil	Provide cooling	A	Leakage in cooling coil	Water flow alarm low Temperature alarm high	None; loss of train B; train A available	

a. A - Accident mode, both trains A and B automatically start and operate on containment vent isolation signal; however, no credit is taken for humidity control provided by the heaters.

TABLE 9.4.3-6

ALTERNATE RADWASTE BUILDING DESIGN DATA FOR MAJOR COMPONENTS

Alternate Radwaste Building Control Room and Dress-Out Area Air Handling Unit	
Quantity	1
Fan capacity (ft^3/min)	1800
Static pressure (in. WG)	0.70
Fan (hp)	0.75
Cooling capacity (Btu/h)	65,000
Heating capacity (kW)	17
Filter efficiency (%)	Low
Alternate Radwaste Building Control Room and Dress-Out Area Condensing Unit	
Quantity	1
Capacity (Btu/h)	65,000
Refrigerant	R-22
Fan motor (hp)	0.5

TABLE 9.4.3-7

RADWASTE PROCESSING FACILITY DESIGN DATA FOR MAJOR COMPONENTS

<u>Process Area Air Handling Unit</u>	
Quantity	1
Fan capacity (ft^3/min)	16,000 +/- 10%
Fan (hp)	30
Cooling capacity (Btu/h)	N/A
Heating capacity (kW)	N/A
Filter efficiency (%)	High

TABLE 9.4.4-1 (SHEET 1 OF 7)

TURBINE BUILDING HVAC SYSTEMS, CONDENSER VACUUM EXHAUST FILTER SYSTEM, AND STEAM PACKING EXHAUSTER FILTER SYSTEM COMPONENT DATA

1. Heating, Ventilating, and Air-Conditioning System

A. Air handling units

(1)

Service	Water analysis room, el 220 ft 0 in.	
Number of units	1	
Unit type	Horizontal, single-zone, draw-through	
Components	Fans, coil, filter, dampers	
Fan type/number	Centrifugal/2	
Airflow (total sf^3/min)	9200	
Static pressure (in. WG)	2.25	
Drive	Belt	
Motor (hp/number)	5/2	
Coil	Fin tube, chilled water	
	<u>Cooling</u>	<u>Heating</u>
Total load (Btu/h)	250,000	162,000
Waterflow (gal/min)	44	0
Duct heater (kW)	-	48

(2)

Service	Battery room, el 220 ft 0 in.	
Number of units	1	
Unit type	Horizontal, single-zone, draw-through	
Components	Fan, coil, filter	
Fan (type/number)	Centrifugal/1	
Airflow (total sf^3/min)	1700	
Static pressure (in. WG)	2.0	
Drive	Belt	
Motor (hp/number)	2/1	
Coil	Fin tube, chilled water	
	<u>Cooling</u>	<u>Heating</u>
Total load (Btu/h)	151,000	116,000
Waterflow (gal/min)	25	0
Duct heater (kW)	-	34

TABLE 9.4.4-1 (SHEET 2 OF 7)

(3)	Service	Battery charger room, el 220 ft 0 in.	
	Number of units	1	
	Unit type	Horizontal, single-zone, draw-through	
	Components	Fan, coil, filter	
	Fan (type/number)	Centrifugal/1	
	Airflow (total sf^3/min)	1300	
	Static pressure (in. WG)	1.0	
	Drive	Belt	
	Motor (hp/number)	0.75/1	
	Coil	Fin tube, chilled water	
		Cooling	Heating
	Total load (Btu/h)	17,000	None
	Waterflow (gal/min)	3	-
(4)	Service	Switchgear room, el 220 ft 0 in	
	Number of units	1	
	Unit type	Horizontal, single-zone, draw-through	
	Components	Fans, coil, filter, dampers	
	Fan (type/number)	Centrifugal/2	
	Airflow (total sf^3/min)	9500	
	Static pressure (in. WG)	2.0	
	Drive	Belt	
	Motor (hp/number)	5/2	
	Coil	Fin tube, chilled water	
		Cooling	Heating
	Total load (Btu/h)	262,000	None
	Waterflow (gal/min)	44	-
(5)	Service	Switchgear room, el 245 ft 0 in.	
	Number of units	1	
	Unit type	Horizontal, single-zone, draw-through	
	Components	Fans, coil, filter, dampers	
	Fan (type/number)	Centrifugal/2	
	Airflow (total sf^3/m)	21,000	
	Static pressure (in. WG)	1.5	
	Drive	Belt	
	Motor (hp/number)	7.5/2	
	Coil	Fin tube, chilled water	
		Cooling	Heating
	Total load (Btu/h)	271,000	None
	Waterflow (gal/min)	45	-

B. Exhaust fans

TABLE 9.4.4-1 (SHEET 3 OF 7)

(1)	Service	Turbine building
	Number of units	9
	Unit type	Power roof ventilator
	Components	Fan, damper
	Fan type	Propeller
	Airflow (sf^3/min)	120,000
	Static pressure (in. WG)	0.25
	Drive	Direct
	Motor (hp)	30
(2)	Service	Battery room, el 220 ft 0 in.
	Number of units	1
	Unit type	Horizontal cabinet
	Components	Fan
	Fan type	Centrifugal
	Airflow (sf^3/min)	2000
	Static pressure (in. WG)	0.75
	Drive	Belt
	Motor (hp)	1
(3)	Service	Battery charger room, el 220 ft 0 in.
	Number of units	1
	Unit type	Wall exhauster
	Components	Fan
	Fan type	Propeller
	Airflow (sf^3/min)	1000
	Static pressure (in. WG)	0.125
	Drive	Direct
	Motor (hp)	1/12
(4)	Service	Condensate chemical injection room, el 195 ft 0 in.
	Number of units	1
	Type	Vaneaxial
	Airflow (sf^3/min)	9000
	Static pressure (in. WG)	1.0
	Drive	Direct
	Motor (hp)	5
(5)	Service	Toilets, el 220 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	600
	Static pressure (in. WG)	0.25
	Drive	Direct
	Motor (hp)	1/6
(6)	Service	Toilets, el 270 ft 0 in.
	Number of units	1

TABLE 9.4.4-1 (SHEET 4 OF 7)

	Type	Centrifugal
	Airflow (sf^3/min)	600
	Static pressure (in. WG)	0.125
	Drive	Direct
	Motor (hp)	1/6
(7)	Service	Water analysis room toilets, el 220 ft 0 in.
	Number of units	1
	Type	Inline centrifugal
	Airflow (sf^3/min)	600
	Static pressure (in. WG)	0.125
	Drive	Direct
	Motor (hp)	1/12
(8)	Service	Miscellaneous lubricant storage area, el 195 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	1200
	Static pressure (in. WG)	0.125
	Drive	Direct
	Motor (hp)	1/3

C. Ventilation fans

(1)	Service	Level A, el 195 ft 0 in.
	Number of units	4
	Type	Vaneaxial
	Airflow (sf^3/min)	37,000
	Total pressure (in. WG)	2.1
	Drive	Direct
	Motor (hp)	20
(2)	Service	Level A, el 195 ft 0 in.
	Number of units	1
	Type	Vaneaxial
	Airflow (sf^3/min)	18,000
	Total pressure (in. WG)	1.3
	Drive	Direct
	Motor (hp)	5
(3)	Service	Level A, el 195 ft 0 in.
	Number of units	2
	Type	Vaneaxial
	Airflow (sf^3/min)	18,000
	Total pressure (in. WG)	1.6

TABLE 9.4.4-1 (SHEET 5 OF 7)

	Drive	Direct
	Motor (hp)	7.5
(4)	Service	Level A, el 195 ft 0 in.
	Number of units	4
	Type	Vaneaxial
	Airflow (sf^3/min)	37,000
	Total pressure (in. WG)	1.3
	Drive	Direct
	Motor (hp)	15
(5)	Service	Stairwell No. 1, el 270 ft 0 in
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	4500
	Static pressure (in. WG)	0.39
	Drive	Direct
	Motor (hp)	1
(6)	Service	Stairwell No. 2, el 270 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	6200
	Static pressure (in. WG)	0.36
	Drive	Direct
	Motor (hp)	1.5
(7)	Service	Stairwell No. 3, el 270 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	2200
	Static pressure (in. WG)	0.60
	Drive	Direct
	Motor (hp)	0.75
(8)	Service	Electrical tunnel, el 220 ft 0 in.
	Number of units	1
	Type	Vaneaxial
	Airflow (sf^3/min)	8000
	Total pressure (in. WG)	2.8
	Drive	Direct
	Motor (hp)	7.5
(9)	Service	Lube oil reservoir, el 245 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	9660
	Static pressure (in. WG)	0.5
	Drive	Direct

TABLE 9.4.4-1 (SHEET 6 OF 7)

	Motor (hp)	5
(10)	Service	Lube oil conditioner, el 220 ft 0 in.
	Number of units	1
	Type	Centrifugal
	Airflow (sf^3/min)	3230
	Static pressure (in. WG)	0.5
	Drive	Direct
	Motor (hp)	0.75
(11)	Service	Elevator equipment room, el 358 ft 4 1/2 in.
	Number of units	1
	Unit type	Horizontal cabinet
	Components	Fan, damper
	Fan type	Centrifugal
	Airflow (sf^3/min)	5400
	Static pressure (in. WG)	1.5
	Drive	Belt
	Motor (hp)	3

D. Electric heaters

(1)	Service	Level A, el 195 ft 0 in.
	Number of units	9
	Capacity (kW)	15
(2)	Service	Level A, el 195 ft 0 in.
	Number of units	3
	Capacity (kW)	25
(3)	Service	Level A, el 195 ft 0 in.
	Number of units	7
	Capacity (kW)	20
(4)	Service	Level A, el 195 ft 0 in.
	Number of units	3
	Capacity (kW)	30
(5)	Service	Level 1, el 220 ft 0 in.
	Number of units	15
	Capacity (kW)	40
(6)	Service	Level 1, el 220 ft 0 in.
	Number of units	8
	Capacity (kW)	20
(7)	Service	Level 2, el 245 ft 0 in.

TABLE 9.4.4-1 (SHEET 7 OF 7)

	Number of units	15
	Capacity (kW)	20
(8)	Service	Level 3, el 270 ft 0 in.
	Number of units	10
	Capacity (kW)	20
(9)	Service	Elevator equipment room, el 358 ft 4 1/2 in.
	Number of units	2
	Capacity (kW)	15

2. Condenser Vacuum Exhaust Filter System

Filter train	
Number	1
Type	Single-pass, high efficiency
Rated flow (sf^3/min)	900
Components	Moisture separator, heating coil, HEPA filters, 4-in. fixed bed charcoal filter

Design Efficiency	Percent
HEPA ($\Delta\rho$ clean = 1.0 in. WG)	99.97 (DOP test on 0.3-μm particle)
Charcoal ($\Delta\rho$ clean = 2.5 in. WG)	90.0 (for elemental and organic iodine removal, 4-in. filter depth)

3. Steam Packing Exhauster Filter System

Number	1
Type	Single-pass, high efficiency
Rated flow (sf^3/min)	1230
Components	Moisture separator, heating coil, HEPA filters, 4-in. fixed bed charcoal filter

TABLE 9.4.5-1

ENGINEERED SAFETY FEATURE VENTILATION
SYSTEM COMPONENT DATA (PER UNIT)

Control Building ESF Electrical Equipment Ventilation Unit	
Quantity	2
Airflow (ft^3/min)	10,500 (Minimum)
Static pressure (in. WG)	2.89
Motor horsepower (hp)	40
Cooling capacity (Btu/h)	670,000
Chilled waterflow (gal/min)	110
Control Building Auxiliary Relay Room ESF Ventilation Unit	
Quantity	2
Airflow (ft^3/min)	1500
Static pressure (in. WG)	2.48
Motor horsepower (hp)	2.00
Cooling capacity (Btu/h)	42,000
Chilled waterflow (gal/min)	5
Battery Room Exhaust Fans	
Quantity	4
Airflow (ft^3/min)	1380 (2), 1520 (2)
Static pressure (in. WG)	2
Motor horsepower (hp)	1.5

TABLE 9.4.5-2 (SHEET 1 OF 10)

CONTROL BUILDING SAFETY FEATURE ELECTRICAL EQUIPMENT
ROOM SYSTEM FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
1	No. 29 breaker on 1ABC 480-V, IE bus, train A normally closed (NC)	Provide continuity and protection to motor starter, item 2	A, B C	Inadvertent open	MCC alarm Motor indicating lights	None; loss of train A; train B available	2
2	No. 29 motor starter for item 3, NC	Provide continuity to fan motor	A, B	Inadvertent open	Motor indicating lights Flow alarm low	None; loss of train A; train B available	3
			C	Fail to reclose	Motor indicating lights Flow alarm low	None; loss of train A; train B available	
3	1-1532-A7-001-M01, control building safety feature (CBSF) electrical equipment room air-conditioning unit fan and motor, normally energized (NE) train A	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; loss of train A; train B available	4
			C	Fail to restart and operate	Motor indicating lights Flow alarm low	None; loss of train A; train B available	
4	HV12736 air-operated on-off damper, normally open/fail open (NO/FO) train A	Allow recirculation of cooling air and prevent recirculation in smoke mode	A, C	Inadvertent closed	Position indicating lights Flow alarm low	None; loss of train A; train B available	5
			B	Fail to close	Position indicating lights	None; no loss of train A; train B available	

TABLE 9.4.5-2 (SHEET 2 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
5	No. 05 breaker on 1ABC 480-V, 1E bus, train A NC	Provide continuity and protection to motor starter, item 6	A, B	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	6
			C	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI; no loss of train A; train B also available	
6	No. 05 motor starter for item 7, NC	Provide continuity to fan motor	A, B	Inadvertent open	Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	7
			C	Fail to reclose	Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI; no loss of train A; train B also available	
7	1-1532-B7-001-M01, CBSF battery room exhaust fan and motor, NE train A	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	8
			C	Fail to restart and operate	Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI; no loss of train A; train B also available	
8	No. 11 breaker on 1ABC 480-V, 1E bus, train A NC	Provide continuity and protection to motor starter, item 9	A, B	Inadvertent open	MCC alarm Position indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started.	9
			C	Inadvertent open	MCC alarm Position indicating lights Flow alarm low	None; redundant fan automatically starts on SI; no loss of train A; train B also available	
9	No. 11 motor starter for item 10, NC	Provide continuity to HV12742, item 10	A, B	Inadvertent open	Position indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	10
			C	Fail to reclose	Position indicating lights Flow alarm low	None; redundant fan automatically starts on SI; no loss of train A; train B also available	

TABLE 9.4.5-2 (SHEET 3 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
10	HV12742 on-off damper, NO train A	Allow flow of air from item 7 fan to exhaust air shaft and prevent recirculation through item 7 fan	A, B	Inadvertent closed	Position indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	11
11	No. 06 breaker on 1ABC 480-V, 1E bus, train A NC	Provide continuity and protection to motor starter, item 12	A, B	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	12
			C	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
12	No. 06 motor starter for item 13, NO	Provide continuity to fan motor, item 13	A, B	Inadvertent closed	Motor indicating lights	None; blowing against closed damper; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	13
			C	Fail to close	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
13	1-1532-B7-003-M01, CBSF battery room exhaust fan and motor, train A, NE	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	14
			C	Fail to start and operate	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
14	No. 14 breaker on 1ABC 480-V, 1E bus, train A NC	Provide continuity and protection to motor starter, item 15	A, B	Inadvertent open	MCC alarm Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	15

TABLE 9.4.5-2 (SHEET 4 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
			C	Inadvertent open	MCC alarm Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
15	No. 14 motor starter for item 16, NO	Provide continuity to HV12748, item 16	A, B	Inadvertent closed	Position indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	16
			C	Fail to close	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
16	HV12748 on-off damper, NC train A	Allow flow of air from item 13 fan to exhaust air shaft and prevent recirculation through item 13 fan	A, B	Inadvertent open	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	17
			C	Fail to open	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train A	
17	HV12734 air-operated on-off damper, NC/fail closed (FC) train A	Remain closed to allow recirculation and open on smoke mode to allow outside air to air-conditioning unit	A, C	Inadvertent open	Position indicating lights	None; no loss of train A; outside air mix with recirculating air	18
			B	Fail to open	Position indicating lights Flow alarm low	None; loss of train A; train B available	
18	HV12731 air-operated on-off damper, NC train A	Remain closed to allow recirculation and open on smoke mode to allow flow of air to smoke exhaust fan system	A, C	Inadvertent open	Position indicating lights	None; loss of train A; train B available	19
			B	Fail to open	Position indicating lights	None; loss of train A; train B available	

TABLE 9.4.5-2 (SHEET 5 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
19	HV12713A air-operated on-off damper, NO train A	Allow recirculation of cooling air and prevent recirculation on smoke mode	A, C	Inadvertent closed	Position indicating lights	None; loss of train A; train B available	20
			B	Fail to close	Position indicating lights	None; loss of train A; train B available	
20	HV12713B air-operated on-off damper, NO train A	Allow recirculation of cooling air and prevent recirculation in smoke mode	A, C	Inadvertent closed	Position indicating lights	None; loss of train A; train B available	21
			B	Fail to close	Position indicating lights	None; loss of train A; train B available	
21	Air supply to train A and B air-operated valves	Provide motive power to air-operated valves	A, C	Loss of air supply	Position indicating lights as-is	None; valves remain as-is	22
			B	Loss of air supply	Position indicating lights	Valves go from smoke mode to recirculation mode with gradual smoke removal	
22	No. 29 breaker on 1BBC 480-V, 1E bus, train B NC	Provide continuity and protection to motor starter, item 23	A, B	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of train B; train A available	23
			C	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of train B; train A available	
23	No. 29 motor starter for item 24, NC	Provide continuity to fan motor	A, B	Inadvertent open	Motor indicating lights Flow alarm low	None; loss of train B; train A available	24
			C	Fail to reclose	Motor indicating lights Flow alarm low	None; loss of train B; train A available	
24	1-1532-A7-002-M01 CBSF electrical equipment air-conditioning unit fan and motor, NE train B	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; loss of train B; train A available	25

TABLE 9.4.5-2 (SHEET 6 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
			C	Fail to restart and operate	Motor indicating lights Flow alarm low	None; loss of train B; train A available	
25	HV12721 air-operated on-off damper, NO train B	Allow recirculation of cooling air and prevent recirculation in smoke mode	A, C	Inadvertent closed	Position indicating lights Flow alarm low	None; loss of train B; train A available	26
			B	Fail to close	Position indicating lights	None; no loss of train B; train A available	
26	No. 05 breaker on 1BBC 480-V, 1E bus, train B NC	Provide continuity and protection to motor starter, item 27	A, B	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	27
			C	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI	
27	No. 05 motor starter for item 28, NC	Provide continuity to fan motor, item 28	A, B	Inadvertent open	Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	28
			C	Fail to reclose	Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI	
28	1-1532-B7-002-M01, CBSF battery room exhaust fan and motor, NE train B	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	29
			C	Fail to restart and operate	Motor indicating lights Flow alarm low	None; redundant fan automatically starts on SI	

TABLE 9.4.5-2 (SHEET 7 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
29	No. 11 breaker on 1BBC 480-V, 1E bus, train B NC	Provide continuity and protection to motor starter, item 30	A, B	Inadvertent open	MCC alarm Position indicating lights Flow alarm low	None; redundant room exhaust fan can be manually started	30
			C	Inadvertent open	MCC alarm Position indicating lights Flow alarm low	None; redundant fan automatically starts on SI	
30	No. 11 motor starter for item 31, NC	Provide continuity HV12727, item 31	A, B	Inadvertent open	Position indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	31
			C	Fail to reclose	Position indicating lights Flow alarm low	None; redundant fan automatically starts on SI	
31	HV12727 on-off damper, NO train B	Allow flow of air from item 28 fan to exhaust air shaft and prevent recirculation through item 28 fan	A, B	Inadvertent closed	Position indicating lights Flow alarm low	None; redundant battery room exhaust fan can be manually started	32
32	No. 06 breaker on 1BBC 480-V, 1E bus, train B NC	Provide continuity and protection to motor starter, item 33	A, B	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	33
			C	Inadvertent open	MCC alarm Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
33	No. 06 motor starter for item 34, NO	Provide continuity to fan motor, item 34	A, B	Inadvertent closed	Motor indicating lights Flow alarm low	None; blowing against closed damper; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	34

TABLE 9.4.5-2 (SHEET 8 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
			C	Fail to close	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
34	1-1532-B7-004-M01, CBSF battery room exhaust fan and motor, NE train B	Provide motive power to circulate cooling air	A, B	Fail to operate	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	35
			C	Fail to restart and operate	Motor indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
35	No. 14 breaker on 1BBC 480-V, 1E bus, train B NC	Provide continuity and protection to motor starter, item 36	A, B	Inadvertent open	MCC alarm Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	36
			C	Inadvertent open	MCC alarm Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
36	No. 14 motor starter for item 37, NO	Provide continuity to HV12749, item 37	A, B	Inadvertent closed	Position indicating lights Flow alarm low	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	37
			C	Fail to close	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
37	HV12749 motor-operated on-off damper, NC train B	Allow flow of air from item 34 fan to exhaust air shaft and prevent recirculation through item 34 fan	A, B	Inadvertent open	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	38

TABLE 9.4.5-2 (SHEET 9 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
			C	Fail to open	Position indicating lights	None; loss of standby exhaust fan; normal exhaust fan available; no loss of train B	
38	HV12719[(b)] air-operated on-off damper, NC train B	Remain close to allow recirculation and open on smoke mode to allow outside air to air-conditioning unit	A, C	Inadvertent open	Position indicating lights	None; no loss of train B; outside air mix with recirculating air	39
			B	Fail to open	Position indicating lights Flow alarm low	None; loss of train B; train A available	
39	HV12716 air-operated on-off damper, NC train B	Remain closed to allow recirculation and open on smoke mode to allow flow of air to smoke exhaust fan system	A, C	Inadvertent open	Position indicating lights	None; loss of train B; train A available	40
			B	Fail to open	Position indicating lights	None; loss of train B; train A available	
40	HV12753A air-operated on-off damper, NO train B	Allow recirculation of cooling air and prevent recirculation in smoke mode	A, C	Inadvertent closed	Position indicating lights	None; loss of train B; train A available	41
			B	Fail to close	Position indicating lights	None; loss of train B; train A available	
41	HV12753B air-operated on-off damper, NO train B	Allow recirculation of cooling air and prevent recirculation in smoke mode	A, C	Inadvertent closed	Position indicating lights	None; loss of train B; train A available	42
			B	Fail to close	Position indicating lights	None; loss of train B; train A available	
42	Fan, fan shaft bearing, filter valves: 1-1532-A7-001-000 1-1532-B7-001-000 1-1532-B7-003-000	Provide circulation, filtration, and control of air	A, C	Mechanical failure	Flow alarm low Temperature alarm high Pressure differential alarm high	None; loss of train A; train B available	43

TABLE 9.4.5-2 (SHEET 10 OF 10)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
43	Fan, fan shaft, bearing, filter valves: 1-1532-A7-002-000 1-1532-B7-002-000 1-1532-B7-004-000	Provide circulation, filtration, and control of air	A, C	Mechanical failure	Flow alarm low Temperature alarm high Pressure differential alarm high	None; loss of train B; train A available	44
44	Cooling coil for air handling unit: 1-1532-A7-001-000	Provide cooling	A, C	Cooling coil leakage	Waterflow alarm low Temperature alarm high	None; loss of train A; train B available	45
45	Cooling coil for air handling unit: 1-1532-A7-002-000	Provide cooling	A, C	Cooling coil leakage	Waterflow alarm low Temperature alarm high	None; loss of train A; train B available	46
46	Single outside air intake	Provide outside air for ventilation	A	Breach of common intake	None	System will operate on 100-percent recirculation. Area will be subjected to negative pressure effected by the operation of the battery room exhaust fans. Outside air for ventilation will be by inleakage created by the building differential pressure.	

a. A - Normal operation mode: train A and train B air-conditioning (recirculating), one of two battery room exhaust fans operating; B - Smoke removal: manual valve actuation upon a smoke alarm from at least one of the rooms; C - SI: all loads required for SI conditions are started automatically by the SI signal, subject to ESF load sequencing.

b. Unit 1 air operator removed and dampers left full open for air balancing.

TABLE 9.4.6-1

DESIGN DATA FOR MAJOR COMPONENTS OF CONTAINMENT NORMAL, AUXILIARY, AND LOWER LEVEL HEAT REMOVAL SYSTEMS

Containment Coolers	
Normal operation	
Quantity	8 (4 per train)
Airflow rate (ft^3/min)	110,000 per 2 fan pair
Total cooling load (Btu/h)	2.6×10^6
Sensible cooling (Btu/h)	2.2×10^6
Waterflow rate (maximum) (gal/min)	700
Service water entering temperature (°F)	95
Service water exit temperature (°F)	102.4
LOCA	
Quantity	8 (4 per train)
Airflow rate (ft^3/min)	52,000 per 2 fan pair
Total cooling load (Btu/h)	56.3×10^6
Sensible cooling load (Btu/h)	770,000
Waterflow rate (maximum) (gal/min)	700
Service water entering temperature (°F)	95
Service water exit temperature (°F)	257
Auxiliary Containment Air Coolers	
Quantity	2
Airflow rate (ft^3/min)	183,000
Total cooling load (Btu/h)	4.6×10^6
Sensible cooling (Btu/h)	3.7×10^6
Waterflow rate (maximum) (gal/min)	1400
Service water entering temperature (°F)	95
Service water exit temperature (°F)	102
Lower Level Air Circulating System	
Quantity	9 (total)
Airflow rate (ft^3/min)	18,360/14,280/1450

TABLE 9.4.6-2

DESIGN DATA FOR MAJOR COMPONENTS OF CONTAINMENT PURGE AND PREACCESS FILTER SYSTEMS

<u>Containment Purge</u>	
Supply	
Normal	
Quantity	1
Airflow rate (ft^3/min)	15,000
Static pressure (in. WG)	5.0
Motor (hp)	20
Minipurge	
Quantity	1
Airflow rate (ft^3/min)	3700
Static pressure (in. WG)	4.4
Motor (hp)	7.5
Exhaust	
Normal	
Quantity	1
Airflow rate (ft^3/min)	15,000
Static pressure (in. WG)	13.2
Motor (hp)	60
Minipurge	
Quantity	1
Airflow rate (ft^3/min)	5000
Static pressure	6.7
Motor (hp)	10
<u>Preaccess Filter System</u>	
Quantity	2
Airflow rate (ft^3/min)	30,000
Static pressure (in. WG)	2
Motor (hp)	125

TABLE 9.4.6-3

DESIGN DATA FOR MAJOR COMPONENTS OF REACTOR CAVITY, REACTOR SUPPORT, AND CRDM COOLING SYSTEMS

Reactor Cavity Cooling System	
Quantity	2
Airflow rate (ft^3/min)	25,000
Total cooling load (Btu/h)	4.9×10^5
Sensible cooling (Btu/h)	4.7×10^5
Waterflow rate (maximum) (gal/min)	220
Service water entering temperature (°F)	95
Service water exit temperature (°F)	100
Reactor Support Cooling System	
Quantity	2
Airflow rate (ft^3/min)	5600
Direct drive	Vertical
CRDM Cooling System	
Quantity	4
Airflow rate (ft/min)	20,000
Pressure (in. H_20)	8
Design CRDM heat loss (x 10^6 Btu/h)	2.6
Horsepower	40
Type	Centrifugal

TABLE 9.4.6-4 (SHEET 1 OF 4)

COMPARISON OF MINIPURGE SYSTEM WITH BRANCH TECHNICAL POSITION CSB6-4

Branch Technical Position	VEGP Position
1. The online purge system should be designed in accordance with the following criteria:	
a. General Design Criterion 54 requires that the reliability and performance capabilities of containment isolation valves reflect the importance to safety of isolating the systems penetrating the containment boundary. Therefore, the performance and reliability of the purge system isolation valves should be consistent with the operability assurance program outlined in Branch Technical Position MEB-2, Pump and Valve Operability Assurance Program. (Also see Standard Review Plan Section 3.10.) The design basis for the valves and actuators should include the buildup of containment pressure for the LOCA break spectrum, and the supply exhaust lines flow as a function of time up to and during valve closure.	Conforms. See section 3.10.
b. The number of supply and exhaust lines that may be used should be limited to one supply line and one exhaust line to improve the reliability of the isolation function as required by General Design Criterion 54, and to facilitate compliance with the requirements of Appendix K to 10 CFR 50 regarding the containment pressure used in the evaluation of the emergency core cooling system (ECCS) effectiveness and 10 CFR 100 regarding offsite radiological consequences.	Conforms. The system employs two lines; one for the supply system and one for the exhaust system.

TABLE 9.4.6-4 (SHEET 2 OF 4)

Branch Technical Position	VEGP Position
c. The size of the lines should not exceed about 8 in. in diameter, unless detailed justification for larger line sizes is provided, to improve the reliability and performance capability of the isolation and containment functions as required by General Design Criterion 54 and to facilitate compliance with the requirements of Appendix K to 10 CFR 50 regarding the containment pressure used in evaluating the ECCS effectiveness and 10 CFR 100 regarding the offsite radiological consequences.	The minipurge containment isolation valves are 14-in.-diameter butterfly valves. A minipurge flowrate of 5000 ft^3/min is required to maintain in plant containment doses, based on the assumptions and source terms of Regulatory Guide1.112 within the MPC limit during occupation. At a flowrate of 5000 ft^3/min, 8-in.-diameter valves and system result in prohibitive velocities and pressure drops.
d. As required by General Design Criterion 54, the containment isolation provisions for the purge system lines should meet the standards appropriate to ESF; i.e., quality, redundancy, testability, and other appropriate criteria, to reflect the importance to safety of isolating these lines. General Design Criterion 56 establishes explicit requirements for isolating these lines. General Design Criterion 56 establishes explicit requirements for isolation barriers in purge system lines.	Conforms. The containment isolation provision for the purge system lines are designed to ASME Section III, Class 2, and Seismic Category 1 requirements. The inboard and outboard isolation valves (redundant valves) are supplied with Category 1E power from bus A and bus B, respectively. The operators for the minipurge valves are of an air/spring design, fail close upon loss of air or power, and are testable from the control room.
e. To improve the reliability of the isolation function, which is addressed in General Design Criterion 54, instrumentation and control systems provided to isolate the purge system lines should be independent and actuated by diverse parameters; e.g., containment pressure, safety injection actuation, and containment radiation level. Furthermore, if energy is required to close the valves, at least two diverse sources of energy shall be provided, either of which can affect the isolation function.	Conforms. The containment purge system is automatically isolated by the containment ventilation signal. This signal is generated by any signal resulting from a safety injection actuation, containment pressure signal, or containment high radiation level signal. The valves are supplied with two diverse sources of energy, buses A and B of the Class 1E electric power system. However, the valves fail to a closed position upon loss of air pressure or electric power.

TABLE 9.4.6-4 (SHEET 3 OF 4)

Branch Technical Position	VEGP Position
f. Purge system isolation valve closure times, including instrumentation delays, should not exceed 5 s, to facilitate compliance with 10 CFR 100 regarding offsite radiological consequences.	Conforms. The maximum closure time for the containment minipurge isolation valves is 5 s.
g. Provisions should be made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.	Conforms. Debris screens are provided on both the inlet and outlet of the minipurge ducting inside the containment. The debris screens are designed for a differential pressure of 60 psi. (See paragraph 9.4.6.2.2.D.)
2. The purge system should not be relied upon for temperature and humidity control within the containment.	Conforms. The purge system is not used for temperature and humidity control within the containment. The containment air coolers perform this function as discussed in paragraph 9.4.6.2.3.A.
3. Provisions should be made to minimize the need for purging of the containment by providing containment atmosphere cleanup within the containment.	Conforms. The minipurge system is designed to purge the containment during normal operation to allow access to containment for maintenance and inspection with personnel exposures kept to as low as reasonably achievable levels. The concentration of fission products in containment is reduced by charcoal filter units provided in the containment.
4. Provisions should be made for testing the availability of the isolation function and the leakage rate of the isolation valves during reactor operation.	Conforms. Provisions are made to meet the type C leak test requirements of 10 CFR 50, Appendix J, for isolation valve leak testing. The frequency of testing is given in the Technical Specifications.
5. The following analyses should be performed to justify the containment purge system design:	

TABLE 9.4.6-4 (SHEET 4 OF 4)

Branch Technical Position	VEGP Position
a. An analysis of the radiological consequences of a LOCA. The analysis should be done for a spectrum of break sizes, and the instrumentation and setpoints that will actuate the purge valves closed should be identified. The source term used in the radiological calculations should be based on a calculation under the terms of Appendix K to determine the extent of fuel failure and the concomitant release of fission products and the fission product activity in the primary coolant. A preexisting iodine spike should be considered in determining primary coolant activity. The volume of containment in which fission products are mixed should be justified, and the fission products from the above sources should be assumed to be released through the open purge valves during the maximum interval required for valve closure. The radiological consequences should be within 10 CFR 100 guideline values.	Conforms. See chapter 15.
b. An analysis which demonstrates the acceptability of the provisions made to protect structures and safety-related equipment; e.g., fans, filters, and ductwork, located beyond the purge system isolation valves against loss of function from the environment created by the escaping air and steam.	Conforms. The purge system has no safety-related fans, filters, or ductwork beyond the isolation valves.
c. An analysis of the reduction in the containment pressure resulting from the partial loss of containment atmosphere during the accident for ECCS backpressure determination.	Conforms. (See paragraph 6.2.1.5)
d. The maximum allowable leak rate of the purge isolation valves should be specified on a case-by-case basis giving appropriate consideration to valve size, maximum allowable leakage rate for the containment (as defined in Appendix J to 10 CFR 50), and where appropriate, the maximum allowable bypass leakage fraction for dual containments.	Conforms. (See Technical Specifications.)

TABLE 9.4.7-1

DIESEL GENERATOR BUILDING VENTILATION
SYSTEM COMPONENT DATA
(PER TRAIN)

Non-ESF Normal Exhaust Fans	
Quantity	1
Airflow (ft^3/min)	50,500
Static pressure (in. WG)	0.9
Motor (hp)	25
ESF Supply Fans	
Quantity	2
Airflow (ft^3/min)	75,000
Static pressure (in. WG)	1.7
Motor (hp)	75
Unit Heaters	
Quantity	10
Airflow (ft^3/min)	1250
Heating capacity (Btu/h)	34,130
Non-ESF Fuel Oil Day Tank Room Exhaust Fan	
Quantity	1
Airflow (ft^3/min)	500
Static pressure (in. WG)	0.5
Motor (hp)	0.25

TABLE 9.4.7-2 (SHEET 1 OF 3)

DIESEL GENERATOR BUILDING VENTILATION SYSTEM
FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
1	No. 12 breaker on 1AB05, 480-V, 1E bus, train A normally open (NO)	Provide continuity and protection to ESF ventilation fan motor, item 2	A	Fail to close	Switchgear alarm Motor indicating lights Damper indicating lights	None; loss of train A; train B available
2	1-1566-B7-001-M01, ESF ventilation fan motor, normally deenergized (ND) train A	Provide motive power to ventilate diesel generator room	A	Fail to start and operate	Fan motor lights Damper indicating lights	None; loss of train A; train B available
3	Shutoff damper on item 2, normally closed (NC) HV-12050	Prevents short circuiting of air during single fan operation	A	Fail to open	Temperature alarm high Damper indicating lights	None; loss of train A; train B available
4	No. 13 breaker on 1AB05, 480-V, 1E bus, train A NO	Provide continuity and protection to ESF ventilation fan motor, item 5	A	Fail to close	Switchgear alarm Motor indicating lights Damper indicating lights	None; loss of train A; train B available
5	1-1566-B7-003-M01, ESF ventilation fan motor, ND	Provide motive power to ventilate diesel generator	A	Fail to start and operate	Fan motor lights Damper indicating lights	None; loss of train A; train B available
6	Shutoff damper on item 5, normally closed (NC) HV-12051	Prevents short circuiting of air during single fan operation	A	Fail to open	Temperature alarm high Damper indicating lights	None; loss of train A; train B available
7	Pneumatic (outside air) open-close louver, (NO-FO) upper level TV-12094 A-D	Control flow; and prevent outside air from entering (fan not operating)	A	Inadvertent closed	Temperature alarm high Position indicator light	None; loss of train A; train B available

TABLE 9.4.7-2 (SHEET 2 OF 3)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
8	Pneumatic (outside air) open-close damper/louver (NO-FO) lower level TV-12096 & 12096A TV-12097 & 12097A TV-12086 & 12086A	Control flow; and prevent outside air from entering (fan not operating)	A	Inadvertent closed	Temperature alarm high Position indicator light	None; loss of train A; train B available
9	No 12 breaker on 1BB07, train B	Provide continuity and protection to ESF ventilation fan motor, item 10	A	Fail to close	Switchgear alarm Motor indicating lights Damper indicating lights	None; loss of train B; train A available
10	1-1566-B7-002-M01, train B, ESF ventilation fan motor, ND	Provide motive power to ventilate diesel generator room	A	Fail to start and operate	Fan motor lights Damper indicating lights	None; loss of train B; train A available
11	Shutoff damper for item 10, NC HV-12053	Prevent backflow/short circuiting of air during single fan operation	A	Fail to open	Temperature alarm high Damper indicating lights	None; loss of train B; train A available
12	No. 13 breaker on 1BB07, train B	Provide continuity and protection to ESF ventilation fan motor, item 13	A	Fail to close	Switchgear alarm Motor indicating lights Damper indicating lights	None; loss of train B; train A available
13	1-1566-B7-004-M01, train B, ESF ventilation fan motor, ND	Provide motive power to ventilate diesel generator	A	Fail to start and operate	Fan motor lights Damper indicating lights	None; loss of train B; train A available
14	Shutoff damper on item 13, normally closed, (NC) HV-12054	Prevent backflow/short circuiting of air during single fan operation	A	Fail to open	Temperature alarm high Damper indicating lights	None; loss of train B; train A available
15	Pneumatic (outside air) open-close damper/louver (NO-FO), upper level	Control flow and prevent outside air from entering (fan not operating)	A	Inadvertent closed	Temperature alarm high Position indicator light	None; loss of train B; train A available
16	Pneumatic (outside air) open-close damper/louver (NO-FO) lower level TV-12098 & 12098A TV-12099 & 12099A TV-12085 & 12085A	Control flow and prevent outside air from entering (fan not operating)	A	Inadvertent closed	Temperature alarm high Position indicator light	None; loss of train B; train A available

TABLE 9.4.7-2 (SHEET 3 OF 3)

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability
17	Supply fan: 1-1566-B7-001-000 1-1566-B7-003-000	Provide outside air for diesel generator heat removal	A	Mechanical failure	Temperature alarm high	None; loss of train A; train B available
18	Supply fan: 1-1566-B7-002-000 1-1566-B7-004-000	Provide outside air for diesel generator heat removal	A	Mechanical failure	Temperature alarm high	None; loss of train B; train A available

a. A - Normal (Diesel Testing) or loss of offsite power and/or safety injection: active components automatically controlled by temperature setpoint.

TABLE 9.4.8-1

AUXILIARY FEEDWATER PUMPHOUSE HVAC
SYSTEM COMPONENT DATA
(PER UNIT)

ESF Supply Fans	
Quantity	2
Airflow (ft^3/min)	8400
Static pressure (in. WG)	1
Motor (hp)	5
Non-ESF Supply Fans	
Quantity	1
Airflow (ft^3/min)	15,000/ minimum
Static pressure (in. WG)	0.5
Motor (hp)	7.5
Non-ESF Unit Heaters (Motor-Operated Auxiliary Feedwater Pump Rooms)	
Quantity	2
Airflow (ft^3/min)	500
Heating capacity (Btu/h)	17,100
Non-ESF Unit Heaters (Turbine-Driven Auxiliary Feedwater Pump Rooms)	
Quantity	2
Airflow (ft^3/min)	1250
Heating capacity (Btu/h)	51,300

TABLE 9.4.8-2 (SHEET 1 OF 2)

AUXILIARY FEEDWATER PUMPHOUSE HVAC SYSTEM
FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
1	No. 9 breaker on 1BBF, 480-V, 1E bus, train B, normally closed (NC)	Provides continuity and protection to fan motor, item 3	A	Inadvertent opening	MCC alarm	None; loss of train B; train A available	2
2	No. 9 motor starter on 1BBF, 480-V, 1E bus, train B, normally open (NO)	Provides continuity and overload protection, item 3	A	Fails to close	Motor indicating lights	None; loss of train B; train A available	3
3	1-1593-B7-002-M01, supply fan and motor, normally deenergized (ND) train B	Provides motive power to circulate outside air	A	Fails to start and operate	Motor indicating light Flow alarm low Temperature alarm high	None; loss of train B; train A available	4
4	No. 8 breaker on 1BBF, 480-V, 1E bus, train B, NC	Provides continuity and protection to HV 12005, item G	A	Inadvertent opening	MCC alarm Position indicating lights	None; loss of train B; train A available	5
5	No. 8 motor starter on 1BBF, 480-V, 1E bus, train B, NO	Provides continuity and protection to HV 12005, item 6	A	Fails to close	MCC alarm Position indicating lights	None; loss of train B; train A available	6
6	HV 12005, ac motor-operated, open-closed louver	Enable outside intake air to fan, item 3	A	Fails to open	Position indicating light	None; loss of train B; train A available	7
7	Pressure relief damper, train B	Provides air outlet from train B room	A	Fails to open	Temperature alarm high	None; loss of train B, train A available	8
8	No. 9 breaker on 1ABF 480-V, 1E bus, NC, train A, NO	Provides continuity and protection to fan motor, item 10	A	Inadvertent opening	MCC alarm	None; loss of train A; train B available	9
9	No. 9 motor starter on 1ABF, 480-V, 1E bus, train A, NO	Provides continuity and protection to fan motor, item 10	A	Fails to close	Motor indicating lights	None; loss of train A; train B available	10

TABLE 9.4.8-2 (SHEET 2 OF 2)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
10	1-1593-B7-001-000supply fan and motor, ND, train A	Provides circulation of air	A	Fails to start and operate	Motor indicating lights	None; loss of train A; train B available	11
11	No. 18 breaker on 1ABF, 480-V, 1E bus, NC train A	Provide continuity and protection to HV 12006, item 13	A	Inadvertent opening	MCC alarm Position indicating lights	None; loss of train A; train B available	12
12	No. 18 motor starter on 1ABF, 480-V, 1E Bus, NO train A	Provide continuity and overload protection to HV 12006, item 6	A	Fails to close	MCC alarm Position indicating lights	None; loss of train A; train B available	13
13	HV 12006, ac motor operated, open-closed louver, train A, NC	Enable outside intake air to fan, item 12	A	Fails to open	Position indicating light	None; loss of train A; train B available	14
14	Pressure relief damper, train A	Provides air outlet from train A room	A	Fails to open	Temperature alarm high	None; loss of train A; train B available	15
15	HV 12010, air operated, open-closed louver, NC/fail open	Enable outside intake air for natural ventilation when turbine-driven pump is operating	B	Fails to open	Position Indicating light	None; Loss of train C; trains A or B available	16
16	Fan and damper 1-1593-B7-001-000	Provide circulation of air	A	Mechanical failure	Flow alarm low Temperature alarm high	None; loss of train A; train B available	17
17	Fan and damper 1-1593-B7-002-000	Provide circulation of air	A	Mechanical failure	Flow alarm low Temperature alarm high	None; loss of train B; train A available	
18	HV-12010A, air-operated, open-closed damper, NC/fail open	Enable room air to exhaust for natural ventilation when turbine-driven pump is operating	B	Fails to open	Position indicating light	None; loss of train C; trains A or B available	

a. A - For normal and accident, the active component automatically controlled by temperature setpoint. Auxiliary feedwater trains A and B operating; B - The active component automatically controlled by turbine-driven pump initiation.

TABLE 9.4.9-1

EQUIPMENT BUILDING VENTILATION SYSTEM COMPONENT DATA

Ventilating Fan	
Area 2F1	
Quantity	1
Type	Power roof vent
Capacity (ft^3/min)	1300
Static pressure (in. WG)	0.5
Motor (hp)	1
Area 301	
Quantity	1
Type	Power roof vent
Capacity (ft^3/min)	8900
Static pressure (in. WG)	0.5
Motor (hp)	5
Tendon Gallery Supply Fan	
Quantity	1
Type	Vane axial
Capacity (ft^3/min)	5000
Static pressure (in WG)	1
Motor (hp)	3

TABLE 9.4.9-2

ELECTRICAL TUNNEL VENTILATION SYSTEM
COMPONENT DATA
(PER UNIT)

ESF Fans (Diesel Power Cable Tunnels)	
Quantity (each)	2
Airflow (ft^3/min)	3400
Static pressure (in. WG)	2.6
Motor (hp)	3
ESF Fans (NSCW Tower Cable Tunnels)	
Quantity (each)	2
Airflow (ft^3/min)	3000
Static pressure (in. WG)	2.3
Motor (hp)	3
ESF Fan (Turbine Building and Auxiliary Building Train A Tunnel)	
Quantity (each)	1
Airflow (ft^3/min)	15,400
Static pressure (in. WG)	2
Motor (hp)	10
Non-ESF Fan (Turbine Building Chase to Control Building Tunnel)	
Quantity (each)	1
Airflow (ft^3/min)	635
Static pressure (in. WG)	1
Motor (hp)	1

TABLE 9.4.9-3 (SHEET 1 OF 4)

ELECTRICAL TUNNEL VENTILATION SYSTEM
SINGLE FAILURE ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
1	No. 32 breaker on 1ABB, 480-V, 1E MCC, train A, normally closed (NC)	Provide continuity and protection for fan motor, item 3	C,B	Inadvertent open	MCC alarm-control room Fan motor lights Temperature alarm high-control room	None; loss of train A; train B available	2
2	No. 32 motor starter, item 3, train A, NC	Provide continuity and overload protection to fan motor, item 3	C,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available	3
3	1-1540-B7-005-M01, turbine bldg and auxiliary bldg, train A, tunnel supply fan and motor, normally energized (NE)	Provide motive power to circulate cool air	C,B	Fail to operate	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available[b]	4
4	No. 20 breaker on 1ABB, 480 V, 1E MCC, train A NC	Provide continuity and protection for fan motor, item 3	A,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available	5
5	No. 20 motor starter, item 6, train A	Provide continuity and overload protection to fan motor, item 3	A,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available	6
6	1-1540-B7-003-M01, NSCW tower cable tunnel exhaust fan and motor, NE, train A	Provide motive power to exhaust tunnel	A,B	Fail to operate	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available	7

TABLE 9.4.9-3 (SHEET 2 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[(a)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
7	No. 20 breaker, on 1BBB, 480-V, 1E MCC, train B, NC	Provide continuity and protection for fan motor, item 3	A,B	Inadvertent open	MCC alarm-control room Fan motor lights Temperature alarm high-control room	None; loss of train B; train A available	8
8	No. 20 motor starter, item 9, train B, NC	Provide continuity and overload protection to fan motor, item 3	A,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train B; train A available	9
9	1-1540-B7-004-M01, NSCW tower cable tunnel, exhaust fan and motor, NE, train A	Provide motive power to exhaust tunnel	A,B	Fail to operate	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train B; train A available	10
10	No. 16 breaker on 1ABF, 480-V, 1E MCC, train A, NC	Provide continuity and protection for fan motor, item 3	A,B	Inadvertent open	MCC alarm-control room Fan motor lights Temperature alarm high-control room	None; loss of train A; train B available	11
11	No. 16 motor starter, item 12, train A, NC	Provide continuity and overload protection to fan motor, item 3	A,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train A; train B available	12
12	1-1540-B7-001-M01, diesel power cable, NE, train A	Provide motive power to exhaust tunnel	A,B	Fail to operate	Fan motor lights Temperature alarm high-control room	None; loss of train A; train B available	13

TABLE 9.4.9-3 (SHEET 3 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
					MCC alarm-control room		
13	No. 16 breaker on 1BBF, 480-V, 1E MCC, train B, NC	Provide continuity and protection for fan motor, item 15	A,B	Inadvertent open	MCC alarm-control room Fan motor lights Temperature alarm high-control room	None; loss of train B; train A available	14
14	No. 16 motor starter, item 15, train B, NC	Provide continuity and overload protection to fan motor, item 15	A,B	Inadvertent open	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train B; train A available	15
15	1-1540-B7-002-M01, diesel power cable, NE, train B	Provide motive power to exhaust tunnel	A,B	Fail to operate	Fan motor lights Temperature alarm high-control room MCC alarm-control room	None; loss of train B; train A available	16
16	Fan, fan shaft bearing etc.: 1-1540-B7-001-000 1-1540-B7-003-000 1-1540-B7-005-000	Provide circulation of air	A,C	Mechanical failure	Motor indicating light	None; loss of train A; train B available[c]	17
17	Fan, fan shaft bearing etc.: 1-1540-B7-002-000 1-1540-B7-004-000	Provide circulation of air	A	Mechanical failure	Motor indicating light	None; loss of train B; train A available	18
18	NSCW tower cable, tunnel filter: 1-1540-F7-001-000 1-1540-F7-003-000 1-1540-F7-005-000	Filters the outside supply air	A,C	Plugging of filter (increase in static pressure)	Temperature alarm high-control room	None; loss of train A; train B available[d]	19

TABLE 9.4.9-3 (SHEET 4 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode[a]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	Go to Item No.
19	NSCW tower cable, tunnel filter: 1-1540-F7-002-000 1-1540-F7-004-000	Filters the outside supply air	A	Plugging of filter (increase in static pressure)	Temperature alarm high-control room	None; loss of train B; train A available	20

a. A - Normal mode; active components automatically controlled by temperature setpoint; B - Loss of offsite power mode (with or without SIS). C - Normal mode; active components controlled manually after receipt of alarm in the control room. Applicable to fan 1-1540-B7-005-000 and 2-1540-B7-005-000.

b. Loss of train A tunnel ventilation fan motor, train B tunnel is available. Train B tunnel is naturally ventilated and does not have powered ventilation fan motor.

c. Loss of train A tunnel ventilation fan 1-1540-B7-005-000, train B tunnel is available. Train B tunnel is naturally ventilated and does not have powered ventilation fan.

d. Loss of train A tunnel ventilation filter 1-1540-F7-005-000, train B tunnel is available. Train B tunnel is naturally ventilated and does not have powered ventilation fan and filter.

TABLE 9.4.9-4

PIPING RESTRAINT AND MSIV VENTILATION SYSTEMS
COMPONENT DATA
(PER UNIT)

Non-ESF Fans (Piping Restraints, Auxiliary Building, and Control Building Area)	
Quantity (each)	8
Airflow (ft^3/min)	6000
Static pressure (in. WG)	1.1
Motor (hp)	3
Non-ESF Fan (Main Steam Line Restraint)	
Quantity (each)	1
Airflow (ft^3/min)	18,000
Static pressure (in. WG)	1.1
Motor (hp)	30
Non-ESF Air Handling Units (Control and Auxiliary Building MSIV Ventilation)	
Quantity (each)	4
Airflow (ft^3/min)	16,000
Static pressure (in. WG)	5
Motor (hp)	25
Heater capacity (kW)	160

9.5 OTHER AUXILIARY SYSTEMS

9.5.1 FIRE PROTECTION PROGRAM

The Southern Nuclear Operating Company (SNC) VEGP fire protection program is based on Nuclear Regulatory Commission (NRC) guidelines, the Nuclear Mutual Limited (NML) property loss prevention standards for nuclear generating stations, and related industry standards. Branch Technical Position CMEB 9.5-1 has been used as a guideline for the VEGP fire protection program.

The purpose of the fire protection program is to prevent significant fires and ensure the performance of the design functions of safe plant shutdown and to consistently maintain the plant in a manner that will not contribute to an increase in the probability of radioactive releases to the environment.

The VEGP fire protection program consists of design features, system characteristics, personnel, equipment, and procedures to provide defense-in-depth protection of equipment and public health and safety. The program is implemented through the following:

- Plant system and facility design.
- Fire prevention.
- Fire detection.
- Annunciation.
- Confinement.
- Extinguishment.
- Administrative controls.
- Fire brigade organization.
- Inspection and maintenance.
- Training.
- Quality assurance.
- Testing.

Subsection 9.5.1 has two appendixes, 9A and 9B. Appendix 9A provides the details of the defense-in-depth provided in the plant on an area by area basis. Safe shutdown capability is addressed in each case based on current engineering information.

Electrical cable is routed as described in paragraph 8.3.1.4. The basis for appendix 9A is given in item H under paragraph 9.5.1.3, Safety Evaluation.

Appendix 9B is an itemized review of Section C of the NRC Branch Technical Position CMEB 9.5-1 versus the defense-in-depth provided on VEGP.

9.5.1.1 Design Basis

9.5.1.1.1 Construction and Occupancy of Fire Areas

The fire protection program covers all plant areas, including areas containing safety-related systems, structures, and components important to safe shutdown, and is designed to limit fire damage.

Separate fire areas for each division of safe shutdown systems reduce the possibility of fire-related damage to redundant safe shutdown equipment and cables. The fire areas are established to separate redundant safety divisions and to isolate safe shutdown systems from fire hazards in nonsafe shutdown areas to the extent possible. Where feasible, fire barrier separation is used to limit the spread of fires between components within the same safety division. Where redundant systems cannot be separated by fire barriers, as in the containment and the control room, other measures are employed to limit fire-caused loss of function of safe shutdown systems. These measures include limitation of the amount of combustible materials, utilization of fire resistive construction, automatic fire detection, and manual hose stations or portable hand extinguishers. Further, ventilation and exhaust systems are designed to prevent the spread of smoke and toxic gases to other fire areas. Emergency areas, personnel access, and escape routes from each fire area are maintained safe by fire barriers.

Fire areas, in which fire could affect, directly or indirectly, safe shutdown-related structures, systems, or components, are evaluated in appendix 9A. Table 9.5.1-1 provides a listing of the components required to achieve both hot and cold shutdown, in the event of a fire, on a system by system basis. For each component, table 9.5.1-1 identifies its safe shutdown train association and its physical location within the plant by fire area and fire zone.

9.5.1.1.2 Defense-in-Depth

The defense-in-depth concept is used in VEGP to achieve the desired degree of fire safety. This concept was applied to the fire protection program to achieve an adequate balance in:

A. Prevention of fire initiation through the control, separation, and limiting sources of ignition.

B. Prompt detection of fires or incipient fire conditions in areas containing safe shutdown equipment or in areas of high combustible loading which may expose safe shutdown equipment.

C. Effective suppression of fires to limit consequent damage and to reduce exposure to safe shutdown equipment.

D. Confinement of fires to their areas of initiation by provision of fire barriers and spatial separations.

E. Separation of redundant safe shutdown-related equipment to maintain safe plant shutdown capability under postulated fire conditions.

9.5.1.1.3 Program Objectives

The primary objective of the VEGP fire protection program is to minimize both the probability and the consequences of postulated fires. Nevertheless, some fires can be expected to occur.

Therefore, regardless of fire prevention measures incorporated in the plant design and operation, adequate means for prompt detection and effective control and suppression of fire have been provided.

For those plant systems necessary to achieve and maintain safe plant shutdown, with or without offsite power, particular emphasis was given to the provision of both passive fire prevention and damage limitation design features and active fire protection equipment and systems having appropriate capability and adequate capacity.

Design concepts used in the fire protection program provide assurance that a fire will not cause the loss of function of safe shutdown systems, although limited loss of redundancy within one system may occur.

Plant areas are protected as required based on the hazards present in the areas. For hazardous areas, primary fire protection capability is provided by automatic fire detection and extinguishing systems in conjunction with separational fire barriers. Since total reliance is not placed on a single fire extinguishing system, appropriate backup fire extinguishing capability is provided through the plant to limit the extent of fire damage. (Refer to appendix 9A for the fire hazards analysis.)

Hose stations, portable fire extinguishers, personnel protective equipment, and air breathing equipment are provided for use by properly trained personnel. Personnel access to areas is provided to permit effective manual use of fire extinguishing equipment on area fires.

Fire hazards analyses and evaluations of postulated fire effects used to determine adequacy of fire protection in maintaining the capability of the plant to safely shut down the reactor and to minimize radioactive releases to the environment are provided in appendix 9A.

9.5.1.1.4 Quality Assurance

Applicable quality assurance controls are applied to the activities involved in the design, procurement, installation, testing, and maintenance of the fire protection system components (as identified in table 3.2.2-1).

These controls ensure that the fire protection system components satisfy the objectives of the fire protection program. The implementation of the quality assurance program is performed by individuals not directly performing the work.

The quality assurance program for fire protection components conforms to the requirements of CMEB 9.5-1 and includes the following program elements:

- Design and procurement document control.
- Instructions, procedures, and drawings.
- Control of purchased material, equipment, and services.
- Inspection.
- Test and test control.
- Inspection, test, and operating status.
- Nonconforming items.
- Corrective action.
- Records.

- Audits.

9.5.1.1.5 Fire Suppression System Damage

The evaluation of the consequences of a crack in a moderate-energy line in the fire extinguishing system has been performed to demonstrate conformance with the guidelines of Branch Technical Position MEB 3-1.

9.5.1.1.6 Applicable Fire Protection Codes, Standards, and Guidelines

Applicable industry codes, standards, and guidelines were used for guidance in the design and installation of plant fire protection systems. The National Fire Protection Association (NFPA) codes are written in a general way to fit basic city and industrial occupancies and do not always address the unusual arrangements in nuclear power plants, so there will be some exceptions with respect to both installation and testing where necessary. A listing of exceptions to the NFPA codes is contained in table 9.5.1-9.

The guidelines of Branch Technical Position CMEB 9.5-1 have been used in establishing the VEGP fire protection program. Appendix 9B provides a point-by-point comparison of VEGP conformance with the guidelines of CMEB 9.5.1.

9.5.1.2 <u>Systems Description</u>

The systems description of the total fire protection for the plant, given in this section, encompasses:

A. Active system components generally recognized as fire protection systems, which include fire detection, suppression, and control systems and equipment.

B. Passive system components, usually identified as fire prevention, which provide fire prevention, confinement, and damage limitation features in the design of the plant structures and systems.

Recognized standards and guidelines call for the inclusion of both active and passive fire protection in the overall plant design.

9.5.1.2.1 Fire Protection (Passive Systems)

Fire prevention is achieved in the design of the plant through the provision of:

A. Features that reduce the incidence of fires and limit the extent and damage from fires, such as plant arrangement, building and structural design (including fire barriers, construction material, drainage, and penetration seals), ventilation systems, lighting, and communications systems.

B. Control features of other plant systems to minimize the effects of fire.

C. Precaution and design features considered for the adequate protection of identified special hazards.

9.5.1.2.1.1 Plant Layout. The involvement of safe shutdown equipment in fires which may occur in the plant is minimized by separation of components of safe shutdown systems from fire hazards. Separation and protection provide the degree of isolation required to minimize the effects of the fires postulated in the fire hazards analysis. Examples of separation, isolation, and protection of equipment containing significant quantities of combustible materials are discussed in the fire hazards analysis (appendix 9A).

Safe shutdown systems are isolated from fire hazards through the use of physical barriers, spatial separation, noncombustible fire retardant or fire resistive coverings applied to fire exposed surfaces, provision of fire suppression systems for damage limitation considered in the design of plant structures, or combinations of the above.

Systems required for safe plant shutdown are physically separated from each other to the extent that redundant trains are not exposed to a common fire hazard. In areas where adequate spatial separation could not be provided, protection against damage from a common fire hazard is achieved by the provision in the plant design of fire retardant coatings, barriers, fire detection and suppression systems, manual extinguishing system, or a combination of these as stated in appendix 9A.

To verify the effectiveness of separation and isolation of critical equipment components, appendix 9A identifies and locates, throughout the plant, safe shutdown-related systems and associated fire hazards and evaluates the effects of the postulated fires on the ability to obtain safe plant shutdown. Should future plant design changes occur, appendix 9A will be reviewed and updated as necessary.

Fire hazards presented by flammable or combustible liquids and gases are reduced by separation, confinement, and system design features. Structural steel members supporting any fire barrier are protected to the same hourly rating as the fire barrier. The NFPA 30 Flammable and Combustible Liquids Code has been used as a guideline for the plant's storage and use of flammable and combustible liquids. Exceptions to NFPA 30 are detailed in table 9.5.1-9. Specific standard requirements (NML) are satisfied where compatible with other design requirements, except as stated in appendix 9B.

Bulk storage of compressed or cryogenic gases is not permitted within the structures housing safety-related equipment. Bulk flammable gases are stored outdoors or in separate detached buildings and are not exposed to safety-related equipment, systems, or structures. Combustible gases in cylinders for use in laboratories are stored in the control building. Small amounts of combustible gases in cylinders are provided in areas such as the turbine building. The containers are secured to structures or vehicle racks. The turbine-generator lubricating oil system is located in the turbine building. To prevent a possible fire in the turbine building from spreading, for rapid fire control, and to reduce damage to the equipment involved, suppression systems were provided as part of the plant design. A fire in this area will not impair operability of safety-related equipment and will not prevent safe shutdown capability.

The reactor coolant pump lube oil collection system within the containment building collects and drains all potential pressurized and unpressurized leakages to a tank and sump, both of which are vented. This system is protected by a detection system. The system is seismically restrained. (Refer to appendix 9A.)

The use of dry-type transformers within safety-related structures reduces the separation needed for isolation of this equipment. Oil-filled transformers are located in the switchyard. They are separated from safety-related structures by more than a 50-ft distance. Should an oil spill occur, the oil from these outdoor transformers is collected by a dike and a sump.

Electrical cables for redundant safety division trains A and B are routed in individual cable spreading rooms which are separated by 3-h fire barriers. Further defense-in-depth against

fires is achieved by providing automatic suppression systems for the special hazard presented by these heavy cable concentrations.

Within a fire area where redundant safe shutdown cables and equipment could be exposed to a common fire hazard, one of the following means will be employed to obtain separation:

A. Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-h rating.

B. Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 ft with no intervening combustible fire hazards. In addition, fire detectors and an automatic fire suppression system will be provided or justification for not providing these features will be presented in the fire hazards analysis.

C. Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1-h rating. In addition, fire detectors and an automatic fire suppression system will be provided or justification for not providing these features will be presented in the fire hazards analysis.

D. Separation of cables and equipment and associated circuits of redundant trains by a noncombustible radiant energy shield. (This means of achieving separation is employed inside the containment building only.)

When separation of safe shutdown trains cannot be provided by employing one of the aforementioned means, alternative shutdown capability is provided which is independent (cables and equipment) of the fire area under consideration.

For charcoal filter assemblies, an integral deluge system is provided which may be connected to the fire water system if required. The control room operator will be alerted to any charcoal heating by a high-adsorber temperature instrumentation alarm. In the event of fire in the adsorbers, the fire may be controlled by closing the isolation dampers to the pressure-tight filter cabinet, thus restricting the oxygen supply. Further means of protection of safety-related equipment located adjacent to the charcoal filters is provided by manual fire suppression systems over the charcoal filter housing for limitation of the extent of damage from possible fires. (Operator action is required to connect the water supply by installation of a spool piece or by interchanging a spectical blind flange and to open a normally closed isolation valve which prevents inadvertent operation of the charcoal filter internal fire suppression system. Installation of the spool piece or interchanging a spectical blind flange is not required to establish water flow into the charcoal filter units located inside containment.)

For Unit 2 charcoal filter systems (except inside containment), a manually connected fire hose is provided to supply water to the charcoal filter units.

9.5.1.2.1.2 Barriers and Access. Fire areas are isolated from each other by floors, walls, and ceilings having 3-h fire resistance ratings (except as noted in "Deviations and Justifications," under individual fire areas in appendix 9A.) Exterior building walls, roofs, and basements are of heavy concrete construction but need not have a fire rating. Combustible hazards will not be stored outside above grade exterior walls or on building roofs. Stairwells are encased in concrete shafts having a 2-h fire rating and are not part of any fire area. As such, when a stairwell forms the boundary between two fire areas, it represents an equivalent 4-h-rated boundary (i.e., two 2-h-rated barriers). Other exceptions are detailed in appendixes 9A and 9B. The fire area boundaries are described in appendix 9A.

Door assemblies through fire barriers have fire ratings commensurate with those required of the fire barrier and are of certified fire resistive construction guaranteed by their manufacturer.

Exceptions are detailed in appendixes 9A and 9B. These doors are either self-closing or automatic closing types or are normally secured closed. Key doors, the status of which are required for security purposes, are supervised, and door position is indicated on the security panel, unauthorized opening being alarmed. Other doors which are not supervised are maintained normally secured closed. Self-closing operability of the doors is monitored through administrative procedures. There are door openings that are required to be designed for pressure loads, bullet resistance, and the combined requirement of pressure and bullet resistance. These doors are specially designed to meet the VEGP criteria and therefore never generically tested, as are typically fire-rated hollow metal doors. Each door has been fabricated to listed UL label procedures for a UL 3-h rating and the NFPA 80 and 252 standards. The construction of each door is certified by a certificate of fire label construction by the manufacturer. The manufacturer cannot affix a label to these doors and frames because they are of a special design for VEGP and have not been subjected to an actual physical UL fire test. In each case the thickness of the metal used to construct the door frame, door skin, stiffeners, and strike and butt reinforcements exceeds the thickness of metal used in standard fire-rated doors and frames. Security doors in 3-h-rated fire area boundaries that do not fall into the categories mentioned above are labeled Class A fire doors.

Penetration sealing systems used for piping penetrations through fire barriers provide both necessary piping flexibility and containment of smoke and flames. These may utilize noncombustible piping, boots, sleeves, and sealants in accepted combinations. Cable, cable trays, conduits, and piping penetrations at fire barriers are sealed to give the same hourly rating as that of the fire barrier.

Penetration openings through fire area boundary barriers for ventilation systems will be protected by fire dampers having a rating equivalent to that required of the barrier. Fire dampers are closed automatically by a fusible link. To reopen a tripped fire damper requires manually resetting to open position and replacement of the fusible link. (See NFPA 90A, Air Conditioning and Ventilating Systems.) Exceptions are detailed in appendixes 9A and 9B. Table 9.5.1-9 lists exceptions to NFPA codes. Flexible air duct coupling in ventilation and filter systems will be noncombustible.

In all cases, as detailed in appendix 9A, a means of access and egress is provided for each fire area, suitably marked and emergency lighted, to permit escape of occupants and entry of fire response and operations personnel.

Plant elevators and life-safety stairwells (except in the turbine building) are encased in concrete shafts having 2-h-fire ratings as required by the NFPA Life Safety Code and are provided with at least Class B self-closing fire doors. Fire exit routes are clearly marked. Administrative procedures will govern operation of elevators during fire emergencies.

Walls and structural materials are noncombustible. Other interior finish materials, including thermal insulation and radiation shielding are noncombustible or have a flame spread, smoke, and fuel contribution of 25 or less as defined in American Society of Testing Materials (ASTM) E-84, Surface Burning Characteristics of Building Materials. Soundproofing, including duct sound traps, is of mineral wool with a flame spread rating of less than 25.

Suspended ceilings and their supports are of fire resistant construction. Concealed spaces will be devoid of combustibles to the extent practicable. Electrical wiring to lighting fixtures and to heating, ventilating, and air-conditioning systems in these spaces is enclosed in conduit to minimize the combustible loading.

9.5.1.2.1.3 Limitation of Fire Effects. Plant design includes features to control the products of combustion from a fire and the discharge of water fire suppression systems.

To facilitate firefighting, smoke and heat may be exhausted to the outside through ducts in such areas as the containment, control, auxiliary, and fuel handling buildings. Contained in those areas is the potential for dense concentration of smoke. The smoke exhaust system can be manually operated for smoke removal to the outside. If the fire dampers have not tripped closed, the normal building exhaust ventilation systems can also be utilized for smoke removal from the various plant fire areas in addition to their normal design function. The control room is provided with its own independent smoke removal fan. The normal building exhaust systems can serve a combination of fire areas, building floors, and in some cases the entire building. Exclusion of their power cable from fire areas also served by the same exhaust system is not physically possible to accomplish in most cases. However, fire damage to such cable has been minimized to the extent practical by limiting the number of fire areas through which the cable must pass. It should be noted that the cable has been routed through areas that are equipped with early warning detection features and prompt response by the fire brigade will catch the fire in its incipient stage before it can spread to any significant degree.

Portable electric smoke removal fans, provided to facilitate firefighting, are used to direct smoke to areas that are served by functioning portions of the exhaust system. These fans are designed specifically for smoke removal and operate on normal ac power. In the event normal ac power is not available, portable gasoline-powered generators are provided. Ventilation openings through fire barriers which are not provided with ductwork on either side are provided with automatic fusible link closing and manual reopening fire dampers.

The fresh air supply intakes serving safe shutdown equipment or systems are physically separated from exhaust air outlets to minimize the possibility of exhausted air being drawn into the supply intakes and contaminating the intake air with the products of combustion.

Stairwells are designed to minimize smoke infiltration during a fire by providing a minimum of 1-1/2-h rated (Class B) fire doors as listed in appendix 9A.

Floor drains are installed in or near areas containing sprinkler or standpipe and hose station systems. A flooding analysis has verified that the drainage from each fire area is adequate.

Safe shutdown equipment in sprinklered areas is mounted on pads and is protected with covers, shields, or watertight enclosures. Concrete floors surrounding the pads are sloped to floor drains at low points.

Areas with equipment containing significant amounts of combustible liquids have containment curbing to preclude inadvertent flows to surrounding areas and drainage systems.

Fire protection water discharged in areas having the potential for radioactive contamination is drained through dedicated systems and is collected, sampled, and analyzed. If radioactivity levels preclude discharge directly to the environment, the liquids are routed to the liquid radwaste system for suitable treatment prior to disposal.

9.5.1.2.1.4 Fire Protection of Cables and Circuitry. Safe shutdown cable trays and circuits are isolated or protected from the effects of fire through the use of physical isolation, spatial separation, noncombustible covering, fire protection through provision of suppression systems, or any combination of these methods to ensure the integrity of essential electric circuitry needed during the fire for safe shutdown of the plant.

With the exception of short runs of flexible nonmetallic conduit, wiring runs outside of cable trays are enclosed in metallic conduit to reduce the exposure of the cable to ignition.

Several approaches are used to limit the hazard presented by combustible cable insulation. Electrical cable construction, as a minimum, meets the Institute of Electrical and Electronics Engineers (IEEE) 383-1974 flame test, except in a limited number of places, as outlined in

appendix 9B. Additional fire protection for concentration of cables is provided as required. Cable insulating materials which do not create hazardous concentrations of corrosive or toxic gas when overheated or when exposed to flames are used to the extent practicable, as detailed in appendix 9B.

Cable tray construction materials are noncombustible. Cable trays and conduit are used for cables only; miscellaneous storage is not permitted in cable trays, raceways, trenches, or culverts. Piping for flammable or combustible liquids or gases is not permitted in areas of heavy cable concentrations. Interior transformers are of the dry type.

Cable and cable tray penetrations of fire barriers (vertical and horizontal) are sealed (fire stops) to give protection at least equivalent to that required for the fire barriers.

Fire protection for areas containing cable trays is achieved in the design of the plant through a combination of the following (detailed in appendix 9A):

A. For early warning of fire conditions in the cables, smoke detectors are provided for all safe shutdown cable tray runs throughout the plant. Line-type detectors are provided in safety-related cable trays inside containment and those cable trays containing pressurizer heater cables inside containment.

B. For control and minimization of fire effects, either in case of significant cable fire loading within the same safety train or for congested runs of cable trays, automatic suppression systems located above the trays and manual backup capabilities are provided.

   The automatic sprinkler systems consist of ceiling sprinklers supplemented by cable tray protection according to NFPA-15 guidance.

   For Unit 2, with the exception of the cable spreading rooms and on a case-by-case basis for Unit 1, the automatic sprinkler systems consist of ceiling sprinklers. The automatic sprinklers in the cable spreading rooms consist of ceiling sprinklers supplemented by cable tray protection utilizing the guidance of NFPA-15.

Electrical cables for redundant safety divisions (train A, C and train B, D) are routed in individual cable spreading rooms separately for each unit and are separated by 3-h fire barriers.

For detailed descriptions of fire protection features provided for various areas containing safe shutdown equipment and cables, refer to appendix 9A.

Further discussion of cable routing is provided in paragraph 8.3.1.4.

9.5.1.2.2 Fire Protection (Active Systems)

The active fire protection systems include the following:

A. Water supply and distribution system including the fire pumps, yard, and interior distribution piping.

B. Automatic and manual suppression systems.

C. Fire detection system covering the detection of fire, automatic suppression systems actuation, fire protection equipment, supervision, and signaling.

D. Manual fire response equipment such as portable fire extinguishers, hose stations, breathing equipment, protective clothing, emergency use of the plant communication equipment, and fire protection lighting.

E. An independent Seismic Category 1 dry standpipe system with a water supply from the Seismic Category 1 nuclear service cooling water system is provided only for post-safe shutdown earthquake (post-SSE) firefighting in safety-related areas.

Where practical, fire detectors are supplied and located in accordance with NFPA 72E. Where it is physically impossible to do this, the detector locations will be evaluated and accepted by a registered professional fire protection engineer.

Overall design of the plant fire protection system has been guided by several criteria. The system design features minimize or preclude inadvertent operation that could cause hazardous or unsafe plant conditions. In plant areas more than one means of fire control is provided to avoid total reliance on any single system, automatic or manual. The fire protection systems provided in the plant have been selected based on the nature of the hazards expected, the anticipated rapidity of spread, and the anticipated eventual magnitude of the fire. Plant operation, inspection, testing, and maintenance requirements have also been considered. The fire protection systems are shown in drawings 1X4DB173, 1X4DB174-1, 1X4DB174-2, 1X4DB174-3, 1X4DB174-4, 1X4DB174-5, 1X4DB174-6, 2X4DB173, 2X4DB174-2, 2X4DB174-3, 2X4DB174-4, 2X4DB174-5, 2X4DB174-6, CX4DB173-1, CX4DB173-2, CX4DB173-3, CX4DB173-4, CX4DB173-5, and CX4DB173-6. Component data for major fire protection water supply and distribution system equipment are provided in table 9.5.1-2.

9.5.1.2.2.1 Electric Motor-Driven Fire Protection Water Pump. The horizontal centrifugal pump is rated at 2500 gal/min and is provided as the primary fire pump. This motor-driven pump is provided with a relief valve set slightly below the shutoff pressure, permitting circulation of sufficient water to prevent the pump from overheating when operating with no discharge flow. An alarm signal is given continuously when the pump is running. This pump may be started manually from a local control board or remotely from the control room. The pump can be stopped only by local manual control. Other alarm signals are given under low system header pressure (independent of pump automatic start switch) and ac control power failure. The power supply for the electric motor-driven pump is 4.16 kV.

To run fire water storage performance tests, the pump discharge can be routed back to the fire water storage tank (through a normally locked closed valve) via a flow element.

9.5.1.2.2.2 Diesel Engine-Driven Fire Water Pumps. Two horizontal centrifugal pumps rated at 2500 gal/min each are provided. Each pump has a pressure switch for automatic starting. An alarm signal is given continuously in the control room when either pump is running. The pumps can also be started manually from a local control board or remotely from the control room. The pumps can be stopped only by local manual control. The pumps are equipped with a discharge tee and a main relief valve capable of passing 2500-gal/min flow without developing excessive pressure. These relief valves discharge through a flanged, enclosed, visual cone back to the fire water storage tank. Each relief valve is set at the shutoff head of the pump. As with the electric motor-driven fire water pump, the discharge can be routed back to the tank for test purposes. Operation and control of the diesel engine-driven fire water pumps is independent of the station ac power.

Each diesel engine is provided with its own battery for starting and all emergency controls are operated from this battery. The jacket water is cooled through a heat exchanger with water from the pump discharge. The engine is protected by an overspeed governor that trips the engine at 20 percent above the rated operating speed of 2100 rpm. The diesel engine is kept warm through a thermostatically controlled electric preheater. A complete fuel system, including a day tank sufficient for 8-h full load, is provided.

9.5.1.2.2.3 Fire Water Jockey Pumps. The fire protection water system is kept continuously full and pressurized by one-of-two jockey pumps to conserve the on-off use of the fire protection water pumps.

In reference to NFPA No. 20, remote alarms and indications; e.g., pump running and loss of power, are provided in the control room. Exceptions are detailed in appendix 9B.

Operating failure of the jockey pumps is detected by a decrease in system pressure without a fire alarm and by an electric motor-driven, fire pump-started alarm. Failure of the yard main due to leaks or rupture is detected by an increased frequency of electric motor-driven fire pump operation without a fire alarm, caused by the loss of pressure in the fire protection water supply.

9.5.1.2.2.4 Underground Loop System.

A. The fire protection water main consists primarily of a closed 12-in. underground loop encompassing both Units 1 and 2 and the buildings in the protected area. The underground piping throughout the yard areas is cement mortar-lined ductile-iron, Class 150.

B. The loop contains a number of post indicator valves, allowing areas to be sectionalized to isolate any lines that are either impaired or under repairs. The post indicator valves are cast iron and are designed to isolate flow bidirectionally.

C. Fire hydrants are of the cast iron dry barrel type with mechanical joints. Each hydrant has two 2 1/2-in. hose connections and one 4-in. pumper connection. The hydrants are installed at approximately 250 to 300 ft intervals along the yard main. Key valves are installed ahead of each hydrant to permit isolation of yard hydrants from the fire main for maintenance or repair without isolating the water supply to automatic or manual suppression systems serving areas containing safety-related/safe shutdown equipment.

D. The water supply to the fire protection system comes from the onsite plant makeup water well system. The plant makeup water well system has the capacity to supply water to the fire protection system at a flowrate of at least 650 gal/min, which is sufficient to fill one of the 300,000-gal fire water storage tanks within 8 h. Each of the two storage tanks will supply 2500 gal/min over a period of 2 h without makeup water being supplied in the interim. The two tanks are connected through normally closed valves. Water level in each tank is controlled by a level controller and control valve located in the water supply line to each tank, and each tank is provided with a level indicator.

   The fire protection water tanks are mainly used for fire protection, except for supplying alternate cooling water to the turbine plant cooling water pumps' bearings and other emergency purposes per NEI document 06-12. The pump suction piping is arranged such that any fire pump can take suction from either or both tanks. These tanks are separated such that a failure of one tank or its piping will not result in failure of the other tank.

9.5.1.2.2.5 Fire Extinguishers. Fire extinguishers provided throughout the plant are UL listed and/or FM approved. Extinguishers are mounted in readily accessible locations using NFPA 10 as a guidance. Exceptions to NFPA 10 are detailed in table 9.5.1-9.

The types of extinguishers selected are based on the nature of the fire postulated for the area, in accordance with NFPA 10, and on the unique characteristics of the fire suppression agent

affecting its proper application to the fire. Considerations include quantity required in relation to the size of the anticipated fire, cleanup after use, and thermal shock or corrosive effects of the agent or its fire decomposition products.

9.5.1.2.2.6 Wet Standpipe and Hose System. Wet standpipe and hose systems are installed inside buildings throughout the plant to supply hose stations suitable for safe effective use on identified hazards and involved equipment. Sufficient hose stations are provided in each area so that all portions of the plant can be reached by effective hose streams from at least one hose station.

The guidelines of NFPA 14, Class 2, were followed in the design of standpipe and hose systems. Exceptions to NFPA 14 are detailed in table 9.5.1-9. Individual standpipes are minimum 4-in. diameter for multiple hose connections with 2 1/2-in. diameter for single hose connections. Hose stations are equipped with 100 ft of 1 1/2-in. Angus fire hose and adjustable spray nozzles, approved for use on energized electrical equipment and cabling and stored on racks or in cabinets. Standpipe hose connections are provided in power block buildings on all floors at approximately 100-ft spacing.

The standpipe system is designed and sized to provide, to the most remote hose station, the flowrate and pressure required for effective hose streams. Sectional shutoff valves provided for standpipes serving hose stations in safe shutdown areas are located outside the safe shutdown areas to permit access during a fire.

9.5.1.2.2.7 Seismic Dry Standpipe System. An independent seismic dry standpipe and hose system is installed in the containment, auxiliary, control, and diesel generator buildings and is designed to be operable, if needed, for manual fire control in areas required for safe plant shutdown following an SSE. These portions of the standpipe system are analyzed for SSE loading and are seismically supported to ensure system pressure integrity. The piping and valves for these standpipes are designed to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Class 3. The post-SSE standpipe hose station header is supplied from the nuclear service cooling water system. Following an SSE, water supply for the post-SSE portion of the standpipe system can be obtained by operator manual actuation of valves to connect the Seismic Category 1 nuclear service cooling water system to the post-SSE hose standpipe header.

9.5.1.2.2.8 Wet Sprinklers. Wet sprinkler system operation is initiated on rise in ambient temperature to the melting point of fusible links on sealed sprinkler heads, thus permitting the heads to open. Flow of water through alarm check valves energizes local alarms. Actuation of the fire detection device initiates a local alarm and registers the alarm condition on an audible-visual annunciator in the control room. Once initiated, wet sprinkler system operation is terminated by manually shutting a local valve at the alarm check valve.

9.5.1.2.2.9 Automatic Preaction Sprinklers. Preaction sprinkler system operation is initiated by an electric fire detection device and the melting of a fusible link. The fire detection sensor detects fire and releases a tripping device to open the preaction valve, thus supplying water under pressure to fill and pressurize the system. Actuation of the fire detection device also initiates a local alarm and registers the alarm condition on the audible-visual annunciator in the control room independent of waterflow into the system. Preaction sprinkler system heads open upon a rise of ambient temperature to the melting point of fusible links on sealed sprinkler heads; thus, fire extinguishing flow through the spray heads is established. Once initiated, system operation is terminated by manually shutting a local valve at the preaction valve.

Inadvertent manual or automatic operation of the preaction valve, due to release failure, is detected by a system actuated alarm. The impact of inadvertent operation of suppression systems is minimized through the following design features:

- All suppression systems in safety-related areas are either Halon or preaction sprinkler systems.
- The header piping and supports, up to and including sprinkler system isolation valves and all sprinkler system piping supports in proximity of safety-related equipment, are designed for SSE loads.
- Redundant safe shutdown equipment is located in separate fire areas to the extent practical.
- Sprinkler heads are passive components, and only one head is expected to fail at any one time.
- Drip-proof, totally enclosed, or weather-protected type II motors are installed on safety-related pumps.
- Safety-related electrical cable design allows water spray on cables in tray without electrical cable faulting.

Where the safe shutdown analysis takes credit for distance separation between redundant safe shutdown components in the same fire area, the existence and orientation of intervening structural components are reviewed in consideration of the possibility for damage during manual firefighting activities (i.e., fire hose stream damage).

Failure of one detector to sense fire results in no adverse effect, since, in general, alternate detector(s) remain functional to sense the fire and release the system. In the event of a pipe break, no adverse effect results, since the system is dry within.

9.5.1.2.2.10 Water Spray Deluge. Water spray system operation is initiated by an electric fire detection device. This sensor detects a fire and releases a tripping device to open the deluge valve, thus supplying water under pressure to the open spray heads. Actuation of the fire detection device also initiates a local alarm and registers the alarm condition on an audible-visual annunciator in the control room independent of waterflow in the system.

Manual release of the deluge valve tripping device also initiates local and remote alarms. System operation is terminated by manually shutting a local valve at the deluge valve.

9.5.1.2.2.11 Halon 1301. Halon 1301 system operation is initiated by an electric fire detection device except for the TSC Halon Suppression System which can only be manually actuated.

In room protection, the fire detection device initiates (via the Halon system control panel) the shutting of all associated dampers, energizes an early warning system, and, after a 30-s time delay, trips the release valve assembly in the control head of the pilot storage cylinder to discharge the total capacity of the agent storage cylinders. Two separate storage tanks, with individual cylinder valves provide for two separate discharges in any protected area. An independent early warning alarm system is provided which alarms locally as well as remotely on an annunciator in the control room. Alarms are also provided in the control room for Halon discharge and Halon system malfunctions.

9.5.1.2.2.12 Manually Operated Equipment. Appropriate portable extinguishers can be carried to the vicinity of Class A, B, or C fires. Since other portable extinguishers are available in the vicinity, failure of any unit has no adverse effects. Wet standpipes supplying fire hose stations through manually operated hose valves are available for manual control of fires. Approved types of nozzles are used in areas of potential electrical fires.

9.5.1.2.2.13 Manually Operated Sprinkler Systems. Manual water-spray system operation is initiated by manually opening a local valve. Actuation of the valve or water flow in a system initiates a local alarm condition and an audible-visual annunciator in the control room. System operation is terminated by manually shutting a local valve.

9.5.1.2.2.14 Self-Contained Breathing Equipment. Breathing equipment is provided as required for protection against smoke inhalation by personnel required to be in plant areas to control fires or to continue vital plant operations. Self-contained breathing apparatus, using full-face positive pressure masks, approved by the National Institute for Occupational Safety and Health, with a minimum capacity of 1/2 h, are provided for fire brigade and control room personnel.

At least two extra air bottles are located onsite for each self-contained breathing unit, used by fire brigade and control room personnel, with an onsite 6-h supply of reserve air and refilling manifolds for recharging all air bottles. The 6-h reserve supply is provided from storage cylinders or from an approved breathing air compressor.

9.5.1.2.2.15 Protective Clothing. Protective clothing will be provided to members of the plant fire brigade or other designated personnel and is located in accessible locations for use of fire response personnel. Instruction in the use of protective clothing and assignment to personnel is a part of the overall fire response procedures developed by plant operating groups.

9.5.1.2.2.16 Emergency Lighting. Refer to paragraph 9.5.3.2.3.C.

9.5.1.2.2.17 Emergency Communications. The emergency communication system is described in subsection 9.5.2.

9.5.1.2.3 System Operation

9.5.1.2.3.1 Fire Detection.

A. The fire detection system is available during all modes of normal operation, including startup, hot and cold shutdowns, and refueling, to detect combustion, to send actuation signals to appropriate fire suppression systems, and to alert the Control Room (Primary Location) with the Clearance and Tagging (C&T) area being available as a backup location. (See figure 9.5.1-1.)

B. Power to the detection system is provided by an uninterruptible power supply (UPS) which is common to both units. This UPS is supplied from inverters, each of which has two sources of power. The primary source of power to these inverters is backed up by a non-Class 1E diesel generator. The secondary source of power to these inverters is a two-h battery system with battery chargers which are powered from the Class 1E power distribution system (Class 1E diesel

generators) of each unit (Unit 1 only until Unit 2 is operational). The fire detection panels located in the river intake structure are provided with power backed up by a 24-h battery system in lieu of being powered from a UPS.

C. Local display cabinets that are used to provide more detailed detection within large fire zones are powered from respective smoke detector circuits. Large fire zones, containing several closed rooms, use local display panels that indicate which specific room is in an alarm state. Local display cabinets are typically located near the local zone indicating panel containing their fire zone.

D. The fire detection system detects smoke, heat, or flames during normal plant operating modes. The fire detectors supply power to associated local display cabinets. They also send fire alarm signals over their initiating circuits to the local zone indicating panel. The local zone indicating panel sounds a local audible fire alarm, sends a fire alarm signal to the Control Room (Primary Location) with the remote workstation location in the C&T area being available as a backup via the fire alarm signaling system, and if applicable, sends an actuation fire signal to the automatic fire suppression system.

E. The fire detection system is monitored for loss of power or trouble. Trouble within the fire detection system is monitored locally and in the Control Room (Primary Location) with the remote workstation located in the C&T (Backup Location) area serving as a backup.

F. The fire alarm signaling system receives the fire alarm and trouble signals, multiplexes them, and transmits this information to the control room central fire alarm personal computer (PC) workstation (Primary Location) with the remote workstation located in the C&T (Backup Location) area serving as the backup. This system is powered from normal power sources and is provided with 24-h battery backup.

G. Fire detection signals from two separate detectors are required before an actuation signal is sent to automatic Halon 1301 suppression systems.

H. Designated heating, ventilation, and air-conditioning (HVAC) units with heat sensors for charcoal filter bed fires send fire signals to the control room HVAC panel.

I. While fire detection systems are provided for all areas with safe shutdown equipment or areas that provide a fire hazard to this equipment, the system is not limited to these areas.

9.5.1.2.3.2 Fire Detectors. Smoke detection systems are provided in areas to detect smoke and products of combustion at an early stage of a fire. Smoke detectors are provided on an area basis using NFPA 72E as guidance. Exceptions to NFPA 72E are detailed in table 9.5.1-9. Class A circuitry (normally 4 wire) is provided as shown in figure 9.5.1-1 with legs of the detection loop separated to the extent practicable except at the last detector in the circuit and at panel connection points. Detectors are equipped with an integral signal lamp to indicate alarm condition.

Detector devices are readily replaceable for periodic testing and maintenance. Wiring and connections for each detection device are supervised from the local zone indicating panel.

Detection devices are so located within an area to minimize delayed detection or loss of sensitivity due to air current or to obstructions such as ductwork, piping, cable trays, conduit runs, ceiling or roof beams, equipment, and floor openings.

Circuitry between detection devices and local panels and between the local panels and the central fire alarm PC workstation are capable of transmitting fire and system trouble alarms following any single break in the circuit. For Unit 1, where detectors in a room are wired in parallel for the purpose of initiating local display cabinet alarms, a trouble signal will not be generated if a detector is removed from its baseplate or in the case of a single negative wire open-circuited (the trouble signal will be generated on Unit 2). However, adjacent detectors sensing the fire would still produce a fire alarm signal in the Control Room (Primary Location) with the remote workstation located in the C&T area serving as the backup are, at the local zone indicating panel and at the local display cabinet. If all detectors that are wired in a parallel circuit are removed, a trouble alarm will be initiated. The conductors wired between detectors in rooms with local display cabinets are typically contained within the same four-conductor ALS cable. If this cable were accidentally cut or broken, all conductors would probably be cut and a trouble alarm would be produced. Accidental disabling of only the negative wire is highly unlikely.

Infrared flame detectors respond directly to the infrared radiation emanating from a flickering flame sustained for at least 3 s in areas where fire develops rapidly with a minimum or absent incipient stage. Smoke detectors respond directly to visible smoke concentrations of not less than 0.6 percent per foot of light obscuration caused by smoke for at least 5 s in those areas where fire potential exists.

Thermal detection systems are provided in selected areas to detect heat. Thermal detectors are of a rate compensated or rate anticipated/fixed temperature type. Each thermal detector has a minimum temperature setting of 30°F above environmental conditions for the location in which it is used. Sensitivity of detectors is not field adjustable. Thermal detectors react to a high temperature or rapid rise in ambient temperature and provide alarm service as well as release service for certain automatic systems as discussed above.

Thermal detectors (other than continuous line type) interfaced with a fire suppression system automatically reset themselves after an alarm condition dissipates. Any electrical circuit associated with the preaction sprinkler system is reset manually from the local suppression indicating panel. Loss of supervisory current actuates sprinkler control valves allowing waterflow into the sprinkler distribution piping.

Most detectors require no replacements after a fire alarm to restore them to normal operation. The type of continuous line type detectors used at VEGP will require reworking after alarms are detected.

Thermal detectors have the same operating voltage as ionization detectors. They are continually supervised by the local zone indicating panel. Detectors are not adversely affected by short-term high radioactivity exposures.

9.5.1.2.4 Miscellaneous Areas

Miscellaneous areas such as plant administrative offices, shops, warehouses, radwaste processing facility, and electric steam boilers, and packaged electrical/electronics control compartment (PEECC) which housed the main turbine control system for Unit 1, are located so that a fire or effects of a fire, including smoke, do not adversely affect any safety-related systems or equipment, since most will be located in separate, detached buildings. Fire protection consisting of sprinklers, standpipe, hose stations, and portable extinguishers are provided as dictated by the fire loadings present in these areas:

A. The record storage facility is located in the service building, separate from main plant structures, and does not present a fire exposure to any safety-related

equipment. Fire protection for the record storage facility consists of an automatic Halon 1301 system, providing a 5-percent minimum concentration. An automatic ionization detection system is installed for early warning of a smoke condition, automatic closure of dampers and fire doors, and automatic release of the agent.

B. The administrative building fire protection consists of a sprinkler system, portable extinguishers, and standpipe hoselines.

C. The auxiliary fuel oil tank is located above ground, away from safe shutdown buildings, and is surrounded by dikes. The auxiliary fuel oil tank will be utilized as described in paragraph 9.5.4.2.2.

D. When necessary, storage of ion exchange resins in areas containing safety-related systems will be in accordance with CMEB 9.5-1 requirements of paragraph C.2.b (Administrative Controls). Portable extinguishers and standpipe hoselines are provided for these areas, in addition to the preaction system. Selected storage areas are adequately drained and curbed as necessary.

E. Materials that collect and contain radioactivity such as spent ion exchange resins, charcoal filters, etc., are stored in metal containers located in areas which do not expose safety-related systems or equipment.

F. Bulk hazardous chemical storage is maintained in an area that does not house or expose areas containing safety-related systems. Portable fire extinguishers are provided. Hoselines are provided for those chemicals which will not react with water.

G. The PEECC (Unit 1 only) is located on Level 3 of the turbine building and is equipped with an automatic fire detection and suppression system. The suppression system utilizes a potassium based aerosol which is non-harmful to plant personnel at design application rates. The PEECC is connected to the plant fire detection system and paging system.

Precautions are taken in the use and storage of flammable construction items such as paint and solvents. Special precautions are utilized in conjunction with cutting and welding operations. Housekeeping is applied to prevent accumulation of trash or other combustible materials in accordance with ASME NQA-1-1994, as described in the SNC Quality Assurance Topical Report (QATR). A periodic inspection program to promote fire prevention is conducted by appropriate senior plant management.

9.5.1.3 Safety Evaluation

A. Noncombustible construction is employed throughout all buildings to minimize fire potential. Interior wall and structural components, thermal insulation materials, radiation shielding, and soundproofing materials are fire resistant. Interior finishes are fire resistant and are listed by UL or FM for flame spread, smoke, and fuel contribution of 25 or less in their use configuration in accordance with ASTM E-84, Surface Burning Characteristics of Building Materials. The use of plastic materials is minimized. Halongenated plastics such as polyvinyl chloride and neoprene are used only when substitute noncombustible materials are not available.

Employment of heat and flame resistant construction materials throughout all buildings reduces the potential for fire, particularly in areas that contain or may expose safety equipment or that rely on manual fire protection.

B. Electrical cables are installed with permanently colored exteriors for channel identification and separation. Insulation for electrical conductors is designed to be resistant to moisture, radiation, continuous conductor operating temperatures of 90°C and 130°C emergency overload temperatures, and a short circuit temperature of 250°C.

Power, control, instrumentation, and communications cable is flame-retardant in accordance with IEEE 383-1974. Exceptions are detailed in appendix 9B. Fire protection for cable systems is further described in subsection 8.3.3.

C. Thermal antisweat insulation, with ASTM E-84 ratings of 25 for flame spread, 50 for fuel contributed, and 50 for smoke generated, is provided for service and cooling water piping. The auxiliary feedwater pump turbine is covered with an insulated, removable galvanized steel shell.

Insulation with UL ratings of 25 or less for flame spread, fuel contributed and smoke generated, is provided for ductwork above the ceiling of the control room.

D. Fire suppression or extinguishing agents which result in corrosive products upon pyrolysis are not employed to protect essential circuitry.

Redundant engineered safety features (ESF) components are physically remote and are separated by fire barriers.

In the unlikely event that the fire protection system does not function, fire barriers prevent the spread of fire to other areas. Safe shutdown is attained and maintained, during or after such an improbable fire in an ESF area, by the use of the redundant components of the necessary safe shutdown-related systems. Thus, fire in an ESF area will not prevent a safe shutdown.

E. The components (and supporting structures) of the fire protection system, the collapse of which could result in loss of a required function of plant structures, systems, or components important to safety are analytically checked to determine that they will not collapse when subjected to seismic accelerations of the design basis earthquake.

Portions of the Unit 2 fire protection systems are modeled and subjected to seismic testing rather than checked analytically to show they will not collapse when subjected to seismic accelerations of the design basis earthquake. Where testing methods are employed on the Unit 2 fire protection systems, they will utilize NFPA-13 hanger and sway bracing designs. This hanger arrangement complies with the seismic Category 2 over 1 requirements of FSAR subsection 3.7.B.

F. Wet pipe sprinkler systems are not installed in ESF rooms so that inadvertent operation or failure would not impair safety systems. Preaction sprinkler systems are installed to mitigate these failures.

The firefighting water piping running from the source serving the preaction sprinkler systems is filled and pressurized with water up to a shut control valve, located outside the room to be protected. The pipe is dry between the shut control valve and the spray or sprinkler heads. Thus, flooding within the area to be protected due to piping failure induced by seismic events, explosions,

pressure, or missiles is precluded. Moreover, additional protection is realized in that the fire protection piping is analytically checked, as discussed above, and is protected from missile and explosion debris by the barriers that protect equipment within the area from missile damage. Inadvertent manual operation of a preaction sprinkler valve is detected by a system trouble alarm. No adverse effects result since there is no flow as the sprinkler heads remain sealed.

Since the fire protection system water supply and control valves are located outside of the area which they are intended to protect, the valves are unimpaired and continually accessible for manual operation regardless of the conditions inside the area protected.

The plant fire protection equipment located in areas containing safety-related equipment is provided with components that have been selected to minimize risks of inadvertent operation.

As an additional precaution, drip-proof motors are installed on safety-related pumps to minimize the possibility of damage should firefighting operations be initiated.

The fire protection system header penetrating the containment is provided with containment isolation valves. The fire protection system header downstream of the containment isolation valve is normally dry. A fire detection system from within the containment initiates a local alarm outside the containment and registers an alarm condition on the fire alarm PC workstation in the Control Room (Primary Location) with the remote workstation located in the C&T area serving as a backup. The fire protection system containment isolation valves can be remote-manually opened by the operator in the control room to allow waterflow into the containment building standpipe.

G. A water supply is provided for fire protection during both the construction period of two units and when one is operating and the other is still under construction in a quantity and pressure sufficient to control and extinguish fires. Use of open flames and welding or cutting equipment is supervised. Fire retardant and flame resistant treated construction materials are employed wherever possible. Continuous watchman service is provided when appropriate. A private fire brigade, consisting of plant personnel who are identified, trained, and equipped to cope effectively, is provided when one unit is in operation.

H. Appendix 9A presents the following information for the plant on a fire area basis as follows:

1. Description of the fire area physical location.
2. Reference to the drawing number depicting the fire area.
3. Description of the fire area with respect to function and definition of the fire zones included within the fire area.
4. Description of the fire rating for the fire area boundaries.
5. Description of the fire rating for the fire area boundary access openings (doors, hatches, etc.)
6. Description of the fire rating for the fire area boundary penetration seals.
7. Description of the fire rating for the fire area boundary fire dampers.
8. Description of the safe shutdown equipment in the fire area.

9. Description of the larger safety-related equipment in the area.
10. Description of the larger nonsafety-related equipment in the fire area.
11. Description of the combustible loadings by fire zone within the fire area.
12. Description of the safe shutdown considerations for the fire area.
13. Description of the type of fire detection by fire zone within the fire area.
14. Description of the fire suppression by fire zone within the fire area.
15. Description of the existence of radioactive materials within the fire area.
16. Description of ventilation for smoke removal purposes within the fire area.
17. Description of the drainage considerations for the fire area.
18. Description of the emergency lighting considerations for the fire area.
19. Description of any deviation from the safe shutdown separation requirements of CMEB 9.5-1 specific for the fire area.

The fire hazards analysis shows that safe shutdown of the plant is not jeopardized.

Appendix 9B provides comparison of the VEGP fire protection system and NRC Branch Technical Position CMEB 9.5-1, indicating that the VEGP fire protection system design is in substantial conformance with the requirements of CMEB 9.5-1.

The assumptions for appendix 9A are as follows:

A. Design Basis Fires

There are a large variety of fires reflecting variations in burn rate and extent of combustion that can occur in any given compartment. Design basis fires are those that are considered to cause the most damage or those that may develop in local areas assuming no manual, automatic, or other firefighting action has been initiated, and the fire has achieved flashover and has reached its peak burning rate.

B. Combustible Loadings

The amount of combustibles in the fire zones is composed primarily of electrical insulation, lubricating oil, charcoal filter media, and miscellaneous plastic and paper products. The actual quantities are not exactly known but have been conservatively estimated.

Combustible loadings are presented by fire zones which represent variable concentrations of combustible hazards within a fire area. Fire zone identification of combustible loading is a conservative and realistic approach to estimating the hazards associated with the combustible contents of a nuclear power plant. Fire zones are subdivisions of a fire area which, while not necessarily bounded by rated fire barriers, are isolated from each other within a fire area by structural features which represent an impediment to fire propagation.

Everything in the plant is considered combustible unless it will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat except for the following considerations:

- Surface coatings (such as paint) on noncombustible structural bases are not considered, unless the coating thickness exceeds 1/8-in.
- Cable insulation inside a closed metal housing (such as a conduit or termination box) is not considered.
- Oil and grease in closed metal sumps with a volume of less than 5 gal is not considered. (A closed sump is defined as being sealed such that neither liquid nor vapor will escape from it at ordinary temperatures.)
- Oil and grease exposed or in nonmetal containers is not considered, unless the total volume in a room exceeds 1 pint.

C. Transient Fire Loads and Exposure Fires

The total combustible loading includes both in-situ and postulated transient combustible loads. The transient combustible load is dependent upon the type and quantity of the in situ load in each fire zone and is determined as follows:

- In each fire zone, a transient combustible load of either 50 lb of ordinary combustibles (approximately 400,000 Btu) or 2-1/2 gal of flammable liquid (approximately 400,000 Btu) is postulated,

and, when applicable, either

- Where the predominant combustibles are consumable items, the replacement of combustibles (minimum 400,000 Btu) is considered in calculating the total transient combustible load. For example, a lube oil or charcoal filter replacement may introduce a quantity of transient oil or charcoal equal to that of the in-situ load into the fire zone,

or

- Where cable tray and conduit routings are the predominant combustible, an average 300 ft of replacement cable (approximately 400,000 Btu) is considered in calculating the total transient combustible load.

D. Safe Shutdown Capability

The safe shutdown design basis for purposes of this analysis is the cold shutdown operational mode with or without the availability of offsite power. If a fire within the plant poses a threat to safe plant operations, the reactor will be taken to a hot shutdown condition.

An extended hot shutdown condition prior to achieving a cold shutdown in order to perform repairs or temporary routings, if required, is a stable, safe condition. The following additional assumptions are made:

1. Loss of offsite power is assumed for 72 h. Failure of either of the onsite standby power supplies is not assumed unless it is caused as a direct consequence of a fire.
2. Single failure of components not exposed to a postulated fire hazard is not considered.
3. A design basis accident or phenomena occurring simultaneously with a fire hazard is not assumed.

E. Fire Event Safe Shutdown Evaluation Methodology

1. Define safe shutdown functions (See table 9.5.1-3)

2. Define systems/equipment necessary to accomplish functions. (See table 9.5.1-1).
3. Define equipment locations in plant by fire zone/area. (See table 9.5.1-1).
4. Define cables required to make equipment operate.
5. Define cable locations in plant by fire zone/area.
6. List circuits/components for each fire area.
7. Evaluate separation by fire area.
   a. One train of equipment/cables free of fire damage.
      - Separated by 3-h fire barriers.
      - Separated by 1-h fire barrier with fire detection and automatic suppression and with no intervening combustible materials.
      - Separated by 20 horizontal ft with fire detection and automatic suppression.
      - Separated by nonconbustible radiant energy shield (inside containment only).
   b. Equipment/cables required for cold shutdown capable of being repaired so as to achieve safe shutdown within 72 h.
   c. Where separation per above cannot be achieved use alternative shutdown capability (main control room).
8. Evaluate associated circuits
   a. Common power source.
   b. Common enclosure.
   c. Spurious actuation.
9. Control room fire alternate shutdown evaluation
   a. Transfer of control capability. (See table (9.5.1-1.)
   b. Isolation of indication signals. (See table 9.5.1-1.)
   c. Impact of hot shorts, open circuits, shorts-to-ground prior to transfer of control.

F. Areas and Components Containing Radioactive Materials

Areas and components of the plant which contain radioactive material that could be released to the exclusion area or beyond should a fire occur are also included in the fire hazards analysis. These areas are categorized as follows:

1. Areas designated for storage of radioactive material. (See table 9.5.1-6.)
2. Components designed to retain and collect radioactivity. (See table 9.5.1-7.)
3. Major process collection points in radioactive waste management systems. (See table 9.5.1-8.)

G. Fire-Resistance Requirements for Safety-Related Category 1 Structures

1. Exterior walls--unrated noncombustible construction (includes basemat and above grade and below grade exterior walls).
2. Interior bearing walls--3-h fire-resistive construction.
3. Interior nonbearing walls--3-h fire-resistive where required for safety systems separation. All other walls to be noncombustible.
4. Principal structural supporting members of single story buildings--2-h fire-resistive construction.
5. Principal structural supporting members of multistory buildings--3-h fire-resistive construction.
6. Secondary structural floor supporting members--2-h fire-resistive construction.
7. Secondary structural roof supporting members--1 1/2-h fire-resistive construction.
8. Interior stair and elevator enclosure walls outside containment--2-h fire-resistive construction.

9.5.1.4 <u>Inspection and Testing Requirements</u>

Construction and initial acceptance period operational integrity of the fire protection system is ensured by:

A. Inspection of fire protection system components and equipment according to design specifications and procurement documentation.

B. Installation of the fire protection system according to accepted industry practice.

C. Inspection of the installed fire protection system against design-specified standards or criteria.

D. Testing of the fire protection systems against design performance criteria. These systems are subjected to preoperational and startup tests.

As an integral part of the fire protection system design, features were included to facilitate inspection and testing of fire protection systems. For example, the fire pumps are provided with flow meters; the automatic sprinkler, water spray, or deluge system control valves are fitted with flow-test connections and pressure gauges; and detector relays and panels and fire pump controllers are equipped with test circuit connections. After installation, acceptance tests are performed with guidance from NFPA standards.

Operational integrity of the fire protection system provided as part of the plant design will continue to be ensured through the implementation of detailed procedures for periodic inspection and testing. These procedures are based on the guidance given in applicable NFPA standards and regulatory guidelines. Findings of these inspections and tests as well as the progress of indicated corrective actions will be documented, if required.

Each fire pump is subjected to factory hydrostatic test of 250 psi for 5 min and accepted after installation and field testing to 150 percent of rated capacity per NFPA 20 which exceeds the requirements of the Hydraulic Institute. Underground piping is hydrostatically tested at a pressure of 200 psig, with a leakage of 2 qt/h/100 joints. Wet standpipe, wet sprinkler, and spray system piping is hydrostatically tested at a pressure of 200 psig with no visible leakage.

Alarm valves, deluge valves, strainers, and all components are tested for operative condition, and drainage facilities for each system are tested by opening drain valves with the control valve wide open. After hydrostatic testing of piping, the Halon 1301 system is tested by full system discharges to verify operation of all release mechanisms and attainment of specified test agent concentrations in the area or enclosure protected.

Fire protection inspection and testing activities are credited as license renewal aging management program activities as described in subsection 19.2.9, “Fire Protection Program.” Fuel oil sampling and control activities for the fire pump diesels are also credited as license renewal aging management program activities as described in subsection 19.2.7, “Diesel Fuel Oil Program.”

9.5.1.5 Personnel Qualification and Training

9.5.1.5.1 Fire Protection Procedures

The VEGP fire protection program is managed and implemented through the use of fire protection procedures as outlined below. Fire protection procedures are part of the VEGP plant procedure manual and are classified as follows:

- Administrative procedures.
- System operating procedures.
- Surveillance procedures.
- Firefighting procedures.

9.5.1.5.2 Fire Brigade Training

See paragraph 13.2.2.3.

9.5.1.5.3 Fire Brigade

The VEGP will have an organized fire brigade to respond to fire emergencies on a 24-h basis. The fire brigade shall be self-sufficient with appropriate equipment to attempt to extinguish or control postulated fires within the plant site.

The fire brigade will be based on a team concept and shall be organized into fire teams (one per shift) consisting of five team members each. Each fire team will have a designated fire team captain who will be in control of firefighting activities at the fire scene. The remaining four team members will be the designated rescue/firefighting team. In the event that the fire team captain is not present, the first brigade member to arrive on the scene will assume the responsibilities of the fire team captain until his arrival.

For each shift, the fire team captain and at least two of the other four members of the fire team will be personnel with sufficient training or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capabilities. Responsibilities of the fire team captain are described in the appropriate plant procedure. The remaining two members of the fire team will be from the operations department and/or other departments. These fire team requirements conform to the guidelines of CMEB 9.5.1, section

C.3. These fire team manning requirements will be met without impacting the minimum onshift operating staff requirements as described in the VEGP Technical Specifications, 10 CFR 50.54, and the Technical Requirements Manual, as applicable. This means that sufficient staffing will exist to man a five-man fire brigade separate from the three-man remote shutdown team per unit (11).

The responsibilities for the members of the fire team are described in the appropriate plant procedures.

9.5.1.5.4 Responsibilities

The following are the responsibilities of the VEGP fire protection organization as related to the fire protection program.

A. Vice President-Vogtle

The vice president-Vogtle has ultimate responsibility for the overall fire protection program at VEGP, including periodic assessment of the effectiveness of the VEGP fire protection program. He is also responsible for developing and maintaining agreements with offsite fire departments.

B. Maintenance Director

The maintenance director is responsible for surveillance tests and inspections assigned to maintenance. The maintenance director is also responsible for overall material condition of the fire protection systems, features, and facilities.

C. Fire Protection Engineer

The fire protection engineer is responsible for ensuring the effective implementation of the fire protection program. Areas of responsibility include administration, implementation, and documentation of the fire protection program.

D. Engineering Director

The engineering director has overall responsibility for administration of the VEGP fire protection program. The engineering director shall ensure that the required procedures for implementation of the fire protection program are current and in effect.

E. Operations Director

The operations director is responsible for surveillance tests and inspections assigned to operations.

F. Plant Training Manager

The training manager is responsible for implementing the fire training program. He shall ensure that all training is properly scheduled, conducted, and documented.

G. Security Manager

The security manager is responsible for development and implementation of security procedures which describe the methods for gaining emergency access to security controlled areas by fire brigade members, admission of offsite firefighters, traffic and spectator control, and post-fire security.

H. Health Physics Manager

The health physics manager is responsible for development and implementation of health physics procedures which describe the actions of health physics personnel during a fire emergency which may involve radiologically controlled areas or materials.

I. Shift Manager

The shift manager has overall responsibility for plant safety in the event of a fire emergency. He will coordinate with and provide assistance to the fire team captain, as needed.

J. Fire Team Captain

Responsibilities of the fire team captain include:

1. Ensuring that the onshift fire brigade members respond to a fire emergency with the appropriate equipment.
2. Ensuring communications with the control room to keep the shift supervisor informed of the status of the fire and firefighting efforts.
3. Identifying the need for additional assistance.
4. Ensuring that plant safety-related features are considered in the firefighting efforts.

K. Fire Brigade Members

The fire brigade members are responsible for responding to a fire emergency with appropriate equipment and attempting, under the direction of the fire team captain, to control or extinguish the fire. They are also responsible for attending scheduled training classes and exercises.

9.5.1.5.5 Personnel Qualifications

A. The person responsible for implementation and development of the fire protection program is qualified by training and experience for such work. He will have, within his organization or as a consultant, a fire protection engineer who has met the eligibility requirements to be a member of the Society of Fire Protection Engineers.

B. Fire brigade personnel are qualified for brigade activities by attending the ongoing fire training program which includes both classroom and physical firefighting exercises. Brigade members also undergo an annual physical examination conducted as part of GPC's health evaluation program.

C. The personnel responsible for performing maintenance and testing of fire protection systems are qualified by training and experience for such work.

D. The person responsible for training fire brigade personnel is qualified by training and experience for such work.

E. Fire protection staff members will be trained in the subject areas listed below:

1. Design and maintenance of fire detection, suppression, and extinguishing systems.
2. Fire prevention techniques and procedures.

3. Plant fire protection administrative procedures and controls.

This training may be conducted by an outside consultant with proven experience in nuclear power plant fire protection training. Since fire protection staff members may not be members of the plant fire brigade, training for them will not include courses in manual firefighting techniques of training. Training will not be required for qualified fire protection staff personnel.

9.5.1.6 Standard Review Plan Evaluation

The VEGP is not fully in conformance with Branch Technical Position CMEB 9.5-1.

The VEGP conforms to Branch Technical Position CMEB 9.5-1 or provides an acceptable alternative. See appendix 9B for a point by point comparison of the VEGP with CMEB 9.5-1.

9.5.2 COMMUNICATION SYSTEMS

9.5.2.1 Design Bases

The communication system is designed to provide effective intraplant communications and effective plant-to-offsite communications during normal, transient, fire, and accident conditions, including loss of offsite power. The communication system consists of the following subsystems:

A. Telephone/page system.

B. Private automatic branch exchange (PABX) system.

C. Sound-powered system.

These communication systems are independent of one another; therefore, a failure in one system does not degrade performance of the other systems. Communication systems are nonsafety related and serve no safety function.

9.5.2.2 System Description

9.5.2.2.1 Telephone/Page System

The telephone/page system consists of handsets, amplifiers, loudspeakers, siren tone generators, tone receiver assemblies, flashing beacons, volume control devices, page extensions, a centralized test and distribution cabinet, and associated equipment designed to provide convenient, effective operational service to the plant. The system consists of one paging line (with four zones: Unit 1, Unit 2, outside areas, and the administration building) and five party lines. All lines are independent of one another with no crosstalk or interference. One party line is designed for communication between all zones at all times. Communication is established by selecting the same clear party line at each desired station using the party line selector switch provided with each unit and then talking into the handset. Intrazone announcements are made by pushing the paging button and speaking into the handset microphone at the handset station. Interzone announcements are made by first merging the

required zones and then pushing the paging button and speaking into the handset microphone at the handset station. Remote zone merging control units are provided at the Unit 1 control room, the Unit 2 control room, the central alarm security station, the secondary security alarm station, and the captain's office in the PESB.

The following is a description of the power supply to the telephone/page system:

A. The primary source of power is from a 25-kVA, 120-V-ac inverter.

B. The normal supply to the inverter is from a common normal 480-V-ac motor control center that is backed by a non-Class 1E (security) diesel generator.

C. The backup supply to the inverter is from the 125-V-dc technical support center battery. This battery is sized for 1 h of operation after loss of power to the battery chargers. One of the battery chargers for this battery receives backup power from a non-Class 1E security diesel generator or a non-class 1E FLEX diesel generator should normal power be lost.

D. During testing or maintenance, the telephone/page system will receive power from a normal 120-V-ac source.

A multi-tone siren tone generator is provided to annunciate alarms using the telephone page system amplifiers and speakers. Alarm initiation and tone selection capability are provided in the Unit 1 control room.

Volume control adjustment knobs are provided with each amplifier. For high ambient noise areas, a volume control bypass relay is provided with each amplifier that will bypass the volume controls upon initiation of an alarm by the siren tone generator. This will ensure full volume for all alarms. Additionally, tone receiver assemblies may be used to activate a flashing beacon which will visually signal the initiation of alarms by the siren tone generator. In the control room and technical support center, volume control devices will be used to control the volume level of the page speakers in these areas. This will ensure clear, intelligible signals that are adjustable to meet the variable ambient noise levels experienced in these two areas. All zones are automatically merged during an alarm condition.

Within Unit 1, Unit 2, and outside area zones, subcircuits are provided which break the zone into several sections. Each subcircuit can be disconnected from the rest of the system at a central location should a disabling failure occur.

9.5.2.2.2 PABX System

The PABX system provides communications at all times between all stations, with capability for transferring calls and providing conference calls between three or more stations.

A portion of the PABX, specifically in the control rooms and TSC area, has additional capability. The telephones in these areas are programmable. Buttons on the phone can be dedicated to specific telephone numbers.

The PABX system also interfaces with the following communication systems:

A. Hotline to Georgia Power Company general office production department.

B. Commercial telephone system lines.

Hotline service is provided via Georgia Power Company-owned microwave. These circuits are dedicated channels that provide direct communications between the control room and the Georgia Control Center.

Commercial telephone lines are provided by AT&T, Inc. Telephone lines are provided from the Waynesboro central office and from the Augusta central office so that access onto and offsite is available from two separate wire centers. All telephone lines do not terminate at the PABX. There are private lines from Waynesboro and Augusta that bypass the switch and ring directly at a telephone set. These numbers are located in the control room, each emergency response facility, security, safety, and at specific management offices located throughout the site. The commercial lines that terminate at the switch are programmed to reserve part of the lines for outgoing calls only. Others are programmed for incoming only so that some lines will always be available onto and offsite. PABX telephone party lines may be used to provide additional PABX telephone coverage. Each telephone party line installed will assume the same extension as a nearby existing telephone. The number of new telephone party lines assigned to an existing telephone extension can vary depending upon the size of the particular coverage area and the intended use of the telephone extension and its associated party line(s).

Power to the PABX is provided from a battery/inverter system sized to supply power for a minimum of 1.5 h after a loss of power.

9.5.2.2.3 Sound-Powered System

Three unitized systems are provided as follows:

A. A loop sound-powered system is provided for refueling.

B. A loop sound-powered system is provided for maintaining a cold shutdown condition following a control room evacuation.

C. A multiloop system is provided throughout the plant for startup and maintenance testing.

The sound-powered system requires no external power supply for operation.

9.5.2.2.4 Emergency Response Facility Communications

The emergency response facility communications system is discussed in subsection 9.5.10.

9.5.2.2.5 Security Communications

The security system communication network is discussed in section 13.6.

9.5.2.2.6 System Operation Communication Stations

Table 9.5.2-1 lists the communication stations provided for use while achieving and maintaining safe shutdown.

The control room and shutdown panels are designed and instrumented to bring the plant to a safe shutdown condition, assuming a single failure of safety-related equipment, without relying on communications equipment. Various communication stations are provided throughout the plant. Drawings 1X3DG031, 1X3DG032, 1X3DG033, 1X3DG001, 1X3DG043 sheet 1, 1X3DG043 sheet 2, 1X3DG004, 1X3DG040, 1X3DG041, 1X3DG042, 1X3DG045, and 1X3DG002 schematically depict the various communication networks.

The Beranek noise criteria (NC) curves are used in specifying noise levels for continuously occupied areas.[1] The control room and technical support center have a rating of NC-40. Special noise reduction provisions for communications are not necessary for these areas.

Safety-related mechanical equipment and switchgear rooms in the control building are expected to have a maximum noise level of 95 dBA. The auxiliary feedwater pumphouse is expected to have a maximum noise level of 99 dBA. Operation of the diesel generators is expected to generate noise levels up to 110 dBA. These and other areas of the plant will be subjected to noise surveys during plant startup to determine actual noise levels. Based on these surveys, noise reduction provisions, such as acoustical booths, tone receiver assemblies, flashing beacons and PABX telephone handsets with "push-to-talk" mute buttons, will be provided to ensure effective communications.

9.5.2.3 Inspection and Testing Requirements

Communication systems of the types described above are conventional and have a history of successful operation at existing plants. Most of these systems are in routine use, and this will ensure their availability. Those systems not frequently used, but required during emergency situations, will be tested at periodic intervals to ensure operability when required.

9.5.2.4 Reference

1. Beranek, Leo L., Noise Reduction, McGraw Hill Book Co., 1960.

9.5.3 LIGHTING SYSTEMS

The plant lighting systems include normal, essential, and emergency lighting designed to provide adequate lighting during normal operation and accident conditions, including the effects of a loss of offsite power.

9.5.3.1 Design Bases

9.5.3.1.1 Safety Design Bases

The lighting system (with the exception of isolating transformers) is nonsafety related and therefore serves no safety function.

9.5.3.1.2 Power Generation Design Bases

Adequate lighting systems are provided in areas used during normal, shutdown, and emergency operations, including the appropriate access or exit routes. Lighting intensities are designed to the levels recommended by the Illuminating Engineering Society. The use of high-pressure sodium, fluorescent, and mercury vapor lamps is restricted. Approved high-pressure sodium lamps, designed for underwater use only, are suitable for use in the fuel transfer canals and spent fuel storage areas. Approved metal halide high intensity discharge lamps, designed for

use on the SFCBC, are suitable for use above the new fuel storage area, spent fuel loading pit, and transfer canal. However, unapproved lamps are not used in the following major areas:

- Containment. Temporary use of fluorescent and high-pressure sodium lamps is permitted during refueling outages/plant shutdowns during Modes 5 and 6 only. Usage during these times is administratively controlled.
- Above the fuel transfer canal.
- Above the new and spent fuel storage areas.
- The alternate radwaste building (only mercury vapor is restricted).
- The radwaste processing facility (only mercury vapor is restricted).

Incandescent lighting is used in these areas except as noted in the radwaste building.

Approved LED (Lighting Emitting Diode) lights may be used in all areas.

9.5.3.2 <u>System Description</u>

The plant lighting systems are illustrated schematically in drawings 1X3DG020, 2X3DG030, and 1X3DG021.

9.5.3.2.1 Normal Lighting System

The normal lighting system is supplied power from two sources:

A. Two double-ended 480/277-V-ac lighting load centers furnished for each unit.

B. Lighting panels fed from non-Class 1E motor control centers through 480-208Y/120-V dry-type transformers.

9.5.3.2.2 Essential Lighting System

The essential lighting system is used in conjunction with the normal lighting system, especially in main walkways and stairs, Class 1E equipment, and switchgear rooms. The essential lighting system is supplied power from non-Class 1E motor control centers backed by the emergency diesel generators. Power to these motor control centers is provided as indicated in paragraph 8.3.1.1.3.F.

9.5.3.2.3 Emergency Lighting System

The emergency lighting system is defined as the system that is provided power from either Class 1E 480-V buses or from self-contained battery pack units, as indicated below. The emergency lighting system has adequate lighting to achieve safe shutdown upon loss of offsite power and loss of one emergency diesel generator (DG) as indicated below (See table 9.5.3-2.)

The emergency lighting system is divided as follows:

A. Main Control Board Emergency Lighting

The main control board shall be illuminated by 120-V-ac fluorescent fixtures with 90-min rated, self-contained battery and charger units, supplied through qualified

480/120-V-ac isolation devices, constant voltage regulating transformers (one per train). The transformer primary side is connected to the 480-V-ac Class 1E bus. The transformer secondary side is connected to a 120-V-ac non-Class 1E Seismic Category 1 distribution panel. The Class 1E busses feeding these transformers are backed by their respective emergency DGs. The transformers are automatically connected to the output of the DGs under loss-of-offsite power and accident conditions. In the event that one DG is lost, a minimum lighting level of 25 foot-candles (fc) can [a] be maintained by the ceiling fixtures that are powered from the other DG. The cables and components required to power the ceiling fixtures are located such that at least one set of lights (channel A or B oriented power supply) will be available except during a fire which would require a main control room evacuation. Additionally, in the event of station blackout (SBO), SBO transfer switches exist so operators can power control room lighting from the opposite unit's DG backed lighting distribution panels or from a vital train D instrumentation panel in its own unit. Associated cable, raceway, SBO transfer switches, and fixtures are supported using Seismic Category 1 mounting. The routing of the cables that provide power to the control room ceiling light fixtures, has been determined to meet the separation requirements of Branch Technical Position CMEB 9.5-1. On this basis, VEGP utilizes this power supply design in lieu of the requirement of CMEB 9.5-1 to provide self-contained 8-h battery-backed lighting fixtures. See section 9B for additional details and justification.

B. Safe Shutdown Panels Emergency Lighting

Emergency lighting for the remote shutdown panels, diesel generator panels, and auxiliary feedwater pumphouse panels are powered from 480-V-ac Class 1E motor control centers through qualified 480/120-V-ac isolation devices (regulating transformers). The transformer secondary side is connected to a 120-V-ac non-Class 1E Seismic Category 1 bus. Associated cable, raceway, and fixtures are supported using Seismic Category 1 mounting. In addition, sealed beam fixtures are provided to illuminate the panels and the access route between the main control room and the shutdown panel rooms and all areas required for safe shutdown operations. Sealed beam fixtures are 8-h rated with integral battery and charger units. The sealed beam fixtures are powered from the normal and/or essential lighting system except for the fixtures in the diesel generator panel room, remote shutdown panel rooms, and the auxiliary feedwater pumphouse panel room, which are powered from the ac emergency lighting system.

In areas other than the main control board area, emergency lighting is provided by 8-h sealed beam lighting fixtures which provide the following minimum[a] illumination levels:

Min. fc	Location
10	Remote shutdown panels
	Diesel generator panels
	Auxiliary feedwater panels

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[a] The above lighting levels are approximate and may vary. Lighting levels lower than those shown were verified as being acceptable for the task at hand by operating personnel.

0.5 to 3	Access routes from the main control room to the remote shutdown panels and routes within the control building from the main control room to the auxiliary feedwater pumphouse and to the diesel generator building.

No credit is taken for the outdoor lighting system. Portable dc units will be used.

Power to the sealed beam modular units used for access to the shutdown rooms from the control room will be from their self-contained battery and charger unit (power pack unit) which is rated for 8-h minimum operation upon loss of power to the essential lighting system. Power to the sealed beam modular units in the auxiliary feedwater pumphouse and in the diesel generator building will be from their self-contained battery and charger unit (power pack unit) which is rated for 8-h minimum operation upon loss of power to the associated emergency lighting system. The power pack unit is identical to the unit which was seismically tested by the supplier, and is, therefore equivalent to Seismic Category 1.

The emergency lighting system components, including raceways and lighting fixtures, have been mounted to Seismic Category 1 requirements; the distribution panel boards are seismically qualified.

C. Fire Protection Lighting

Sealed beam fixtures are provided in all plant areas to supply sufficient illumination for safe ingress and egress of personnel following a loss of normal and/or essential lighting. The fixtures have self-contained battery and charger units powered from the normal lighting system. The fixtures are 8-h rated, with the exception of the fixtures in the turbine building and outside areas, where they are minimum 1 1/2-h rated. Fixtures which only provide for life safety and are not required for safe shutdown or to support station blackout (SBO) are 1 ½-h rated (minimum). Refer to paragraph 8.4.1.1.2.G for SBO emergency lighting requirements.

9.5.3.2.4 Exit Lighting System

Plant exit lighting shall generally consist of 1.5-h battery-backed fixtures, which are provided ac power or Tritium exit/directional light that will not be installed in a radiologically controlled area (containment/auxiliary building). Nonbattery-backed exit fixtures are provided in the Unit 1 auxiliary building (levels A, B, C, and D) and in areas where high-pressure sodium, fluorescent, and mercury vapor lamps are restricted as described in paragraph 9.5.3.1.2; these lamps are not used in the following major areas:

- Containment.
- Above the fuel transfer canal.
- Above the new and spent fuel storage areas.
- The alternate radwaste building (only mercury vapor is restricted). The alternate radwaste building does contain fluorescent 1.5 h battery-backed exit fixtures.
- The radwaste processing facility (only mercury vapor is restricted). The radwaste processing facility does contain fluorescent 1.5 h battery-backed exit fixtures.

Nonbattery-backed exit fixtures are provided power from the essential lighting system.

9.5.3.3 <u>Failure Analysis</u>

The only areas that require lighting for safe shutdown are the control room and shutdown panel rooms and ingress/egress routes to and from these locations.

A. Those portions of the lighting system that service the main control room, shutdown panel rooms, diesel generator panels, and auxiliary feedwater panels are designed and constructed so that a safe shutdown earthquake will not cause any structural failure that could reduce the function of any post-safe shutdown earthquake item to an unacceptable level or could result in an incapacitating injury to occupants in these areas.

B. The emergency lighting system is designed to provide necessary lighting at all times during shutdown or emergency. In the event of a loss of offsite power, the emergency lighting will be maintained through the use of self-contained batteries and/or from Class 1E power sources as outlined in paragraph 9.5.3.2.3.

C. Functional operability of the lighting systems is not a requirement during or after a design basis event.

A failure mode and effects analysis for the emergency and essential lighting systems is shown in table 9.5.3-1.

9.5.3.4 <u>Test and Inspections</u>

The ac lighting circuits are normally energized and require no periodic testing. The battery-backed lighting is inspected and tested periodically to ensure the operability of the components in the system.

9.5.4 EMERGENCY DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

This subsection discusses the mechanical features of the diesel generator fuel oil system. The standby power system is discussed in section 8.3.

9.5.4.1 <u>Design Bases</u>

Each diesel generator and its supporting systems are located within separate compartments to provide protection from high- and moderate-energy line breaks, flooding, missiles, and other proximity hazards.

Protection of the diesel generator fuel oil system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection from dynamic effects associated with the postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11. Fire protection is discussed in subsection 9.5.1. Conformance with Regulatory Guide 1.137 is discussed in section 1.9.

9.5.4.1.1 Safety Design Bases

A. The diesel generator fuel oil systems provide onsite storage and delivery of fuel oil for 7 days of operation of the safety-related loads as required under accident conditions, assuming the loss of all offsite power sources and an additional amount for periodic testing of the onsite power sources.

B. The diesel generator fuel oil system is designed so that a single failure of any active component cannot affect the ability of the system to store and deliver fuel oil.

C. The diesel generator fuel oil system is designed to remain functional after a safe shutdown earthquake.

D. The diesel generator fuel oil system is protected from the effects of low temperatures.

9.5.4.1.2 Power Generation Design Basis

The diesel generator fuel oil system serves no power generation function.

9.5.4.1.3 Codes and Standards

The diesel generator fuel system is designed to American National Standards Institute (ANSI) Standard N195-1976. The components are designed to the codes and standards listed in table 3.2.2-1. The diesel generator fuel oil system is designed and constructed in accordance with Quality Group C requirements of Regulatory Guide 1.26 and Seismic Category 1 of Regulatory Guide 1.29.

9.5.4.2 System Description

The diesel generator fuel oil system is shown schematically in drawings 1X4DB170-1, 1X4DB170-2, 2X4DB170-1 and 2X4DB170-2. The system consists of four independent fuel storage and transfer trains, i.e., one train per diesel generator and two trains per nuclear unit. Each train consists of a fuel oil storage tank, two fuel transfer pumps, fuel supply and fuel return piping, a day tank, and the associated valves, fittings, and instrumentation. Characteristics of the system components are provided in table 9.5.4-1.

9.5.4.2.1 Component Description

9.5.4.2.1.1 Diesel Generator Fuel Storage Tanks. The four fuel storage tanks for the diesel generators are located underground. Each has a capacity of 80,000 gal. Fittings are provided on each tank for level instrumentation, ventilation, sampling and water removal, and sounding. Two 24-in. flanged openings provide for mounting transfer pumps. In addition, each tank is equipped with a sump and a connection leading to a manway. Above each tank there is a concrete vault, with the roof above plant grade. This vault houses the instruments, pumps, and the manway. Material corrosion of the buried tanks is prevented by a protective coating.

The design of the diesel fuel oil storage system allows replenishment of fuel without interrupting operation of the diesel generator. The design of the system also prevents turbulence of the sediment in the bottom of the storage tank from degrading overall fuel quality to an unacceptable level. This is accomplished by cross-connecting the storage tanks for the diesel fuel oil at the transfer pump discharge piping. Should continuous operation of the generator for more than 5.2 days be required, it will be necessary to transfer fuel from one underground storage tank to the operating generator's day tank, assuming that the minimum required volume of 68,000 gal of diesel fuel is initially in the operating storage tank. For extended continuous operation of the generator, it will be necessary to refill the diesel fuel oil storage tank. Prior to filling the storage tank, the diesel fuel system is aligned to supply the diesel engine from the full storage tank by opening the locked closed valve that cross-connects the diesel fuel transfer pump discharge piping. The empty tank is then isolated by closing the respective discharge valves for the diesel fuel transfer pump. After the tank has been filled and any sediment has been allowed to settle, the original fuel oil tank is ready to supply fuel again, if needed, by opening the fuel transfer pump discharge valves on the original tank and by closing the cross-connect valve. Further precautions taken to prevent detrimental effects of sediment on diesel performance include basket strainers in the diesel fuel oil piping, a duplex fuel oil strainer, and a duplex fuel oil filter on each engine.

The tanks are not provided with cathodic protection; therefore, a liberal corrosion allowance of 1/8 in. has been provided[a]. The tanks are installed in accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910 Subpart H, Hazardous Materials, Section 1910.106. The tanks are located just under ground level at 220 ft above sea level. Since the water table is at 165 ft above sea level, ground water seepage is not a problem. Each tank has a sump and a sampling line from which water and condensation can be removed.

9.5.4.2.1.2 Diesel Generator Fuel Oil Transfer Pumps. The fuel oil transfer pumps are of the submerged, vertical-centrifugal type. Each pump has a capacity of 25 gal/min, (approximately 3 times the consumption rate of the associated diesel generator). The pump motor and the discharge head are mounted on a plate, fitted with a gasket, and bolted to the pump support flange at the top of the tank. A pump house encloses the transfer pumps and associated piping above the storage tank. There is no fixed fire protection water system inside the pump house; therefore, spurious actuation of a fire protection system cannot occur. The pump is located in the sump near the bottom of the tank with the pump bearings always immersed in the pumped fluid.

9.5.4.2.1.3 Diesel Generator Fuel Oil Day Tanks. The diesel generator fuel oil day tanks are sized to provide approximately 2 h of operation for their associated diesel engine at the maximum operating load without resupply from a diesel generator fuel oil storage tank. The tanks are located within the diesel generator building, as shown in drawings 1X4DE327 and 1X4DE330. The day tanks are located in the corners of the diesel generator rooms and are completely separated from the remainder of the diesel generator rooms by 3-h rated fire barriers. The day tanks are elevated to ensure a slight positive pressure exists at the suction of the engine-mounted fuel pumps. The day tanks are apart from any sources of ignition or high-temperature surfaces. The fuel oil piping is run in a piping trench from the tank to the engine. The fuel oil piping on the engine is located away from hot surfaces. Tank fittings provide for water removal, recirculation, and instrumentation. The fuel oil day tank is vented to atmosphere with a 3-in. line which has a flame arrestor at the end. The vent line and the flame arrestor are

[a] Corrosion of the diesel fuel oil storage tanks was evaluated as a time-limited aging analysis (TLAA) for license renewal in accordance with 10 CFR Part 54. The results of this evaluation are provided in paragraph 19.4.6.2.

missile protected. Since venting is to the outside atmosphere, there will not be any buildup of combustible gases.

9.5.4.2.1.4 Piping and Tank Surfaces. The exterior surfaces of the fuel oil storage tanks are coated with coal epoxy for corrosion protection of the tank surface. The tank interiors are protected by an inorganic zinc coating for corrosion protection. Portions of the diesel fuel oil piping between the fuel oil storage tanks and the day tanks are buried, with the remainder being located in Seismic Category 1 structures and piping trenches inside the diesel generator buildings.

9.5.4.2.2 System Operation

The fuel oil storage tanks for the diesel generators are replenished from trucks (or other mobile suppliers) as required to maintain a 7-day supply. Each storage tank is equipped with a 4-in. vent line that runs to the diesel generator fuel oil storage tank valve house located between the train A and train B transfer pumphouses that cover the center of each of the underground fuel storage tanks. A flame arrester is provided for each vent line and is located inside the valve house. From the flame arrester, the vent line is split into two separate lines: one line is terminated above the valve house roof with a 180° bend at the end; and the other is terminated outside the valve house wall with a 90° bend. The roofs of the transfer pumphouse and the valve house are approximately 3 ft 6 in. and 13 ft 6 in., respectively, above grade el 218 ft 6 in. These elevations are above the maximum flood level based on the probable maximum precipitation. The 4-in. tank fill line runs to the valve house and is extended just to the outside of the valve house wall. Each fill line incorporates a normally closed valve, which is located inside the valve house, and a screwed filler cap at the end to preclude the entrance of water. The fill line is approximately 48 in. above grade for Unit 1 and 12 in. above grade for Unit 2. The vent point is approximately 6 ft higher than the storage tank fill opening. Each fill line has a strainer located downstream of the isolation valve to prevent entrance of deleterious solid material into the tank. A water removal port is located above the tank sump.

Each transfer pump takes suction from a diesel generator fuel oil storage tank and discharges fuel oil to a diesel generator fuel oil day tank. Each pump is capable of supplying its diesel generator installation and, simultaneously, increasing the inventory in the fuel oil day tank. A fuel oil transfer pump is automatically started and stopped by a day tank level switch. The second pump is turned on automatically in the event of low discharge pressure from the lead pump or day tank low-low level. Any overflow is returned to the storage tank via the recirculation line. (The capacity of the recirculation line exceeds that of the transfer pump.) The day tanks are installed to provide a positive suction head to the engine-driven fuel oil pumps. The filter in the day tank discharge line is monitored by measuring differential pressures across the filter and by providing a high differential pressure alarm in the control room and locally. There is a pump discharge interconnection, with locked closed valves, between fuel trains of the same generating unit, as well as an interconnection with locked-closed valves between Unit 1 and Unit 2.

In the event the diesel fuel oil degrades during storage or is to be pumped out of the diesel fuel oil storage tank for inspection, it can be transferred from the diesel fuel oil storage tanks by using the transfer pumps and piping, which are interconnected with locked closed valves, to the plant's auxiliary fuel oil tank or to a fuel oil tanker truck. Biocides and other fuel additives are introduced to the tanked fuel oil to prevent deterioration of the oil, accumulation of sludge in the storage tanks, and the growth of algae and fungi. In the event that a fuel oil storage tank must be drained to the point that the combined capacity is not sufficient for 7 days of operation, the

required capacity can be supplied from either the other unit's storage tanks, Plant Wilson, or from other alternate onsite means.

SNC has contract oil suppliers with terminals in North Augusta, South Carolina; Macon, Georgia; and Savannah, Georgia. Additional fuel oil can be delivered to VEGP within 24 h, if necessary, from several sources. Also, it should be noted that Georgia Power's combustion turbine plant located adjacent to VEGP Units 1 and 2 could be a source of emergency No. 2 fuel oil if necessary. Three tanks at the combustion turbine plant have a combined capacity of over 9 million gal. The amount of fuel varies depending on expected generation required from the combustion turbines. Trucks will primarily be used to deliver fuel oil resupply to the site and to transfer fuel oil from Plant Wilson under normal conditions.

A secondary method of delivering fuel oil would be by means of the Savannah River. Delivery of the fuel oil to VEGP under extremely unfavorable environmental conditions will be included in plant procedures.

9.5.4.3 Safety Evaluation

A. The total amount of fuel oil maintained in the underground diesel generators' fuel oil storage tank systems is sufficient for 7 days of operation of the safety-related loads as required for a design basis accident. Within this period, the operator can arrange for additional fuel to be delivered to the plant site by truck, rail, barge, etc. There is complete physical redundancy of active components in the diesel generator fuel oil system. An independent fuel supply train consisting of a fuel storage tank, a day tank, transfer pumps, piping, and valves is provided for each diesel generator. Two transfer pumps are provided for each fuel supply train so that any pump can be removed for repair without affecting the redundancy of the fuel oil supply system. Each pump is powered from the bus on which the diesel generator it serves is connected. Failure of a pump or a diesel generator would not affect the operability of any component in another train.

B. The results of a failure modes and effects analysis are given in table 9.5.4-2. Each diesel generator and its supporting systems are completely enclosed in separate compartments. Any high- or moderate-energy line failures occurring in one diesel generator compartment would not affect the redundant diesel. Thus, the effect of line breaks is no more severe than a single failure in a diesel system. Details of the criteria for protection from high- and moderate-energy line breaks are given in section 3.6.

C. The diesel generator fuel oil system is designed in accordance with Seismic Category 1 and Quality Group C requirements as specified in section 3.2.

D. Maintenance of the fuel oil above the cloud point is achieved by enclosing the equipment in heated buildings, burial below the frostline, or heat tracing.

9.5.4.4 Tests and Inspections

The diesel generator fuel oil system receives a nil ductility transition (NDT) examination in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Class 3 incident to routine construction tests and inspections. The diesel generator fuel oil system operability is demonstrated during regularly scheduled tests of the diesel generator. Fuel reserve for testing is supplied by sizing the storage tanks to contain

fuel in excess of the volume required for 7 days of operation of the safety-related loads as required under accident conditions. Samples of diesel fuel are analyzed periodically to ensure that the fuel quality requirements of the Technical Specifications are satisfied. The Diesel Fuel Oil Program describes the activities credited as part of the license renewal aging management program. See subsection 19.2.7.

9.5.4.5 Instrumentation Applications

The transfer pumps can be operated from the control room. Unit 2, train B has transfer control switches to allow local automatic operation of fuel oil transfer pumps 2-2403-P4-003 and 2-2403-P4-004 in case of a control room fire. The transfer control switches are located on MCC 2BBF. Alarms and indications of tank levels and transfer pump status are displayed in the control room. A secondary means of tank level determination is provided by dipsticks or sounding ports. Day tank level switches start and stop the fuel oil transfer pumps and the tank level transmitter activates a day tank high or low level alarm. The fuel oil storage tank transfer pumps are automatically started when the level in the day tank decreases to approximately 858 gal. The day tank low level alarm annunciates when the level decreases to approximately 762 gal. The fuel oil storage tank transfer pumps are automatically stopped when the day tank level has increased to approximately 1198 gal. Low level in the fuel oil storage tank is alarmed when the level decreases to a nominal value of 68,000 gal plus instrument tolerance. Table 9.5.4-3 provides indicating and alarm devices associated with the fuel oil system.

9.5.5 DIESEL GENERATOR COOLING WATER SYSTEM

This subsection discusses the mechanical features of the diesel generator cooling water system. Each diesel engine employed has an independent cooling water system.

9.5.5.1 Design Bases

Each diesel generator and its supporting systems are located within separate compartments to provide protection from high- and moderate-energy line breaks, flooding, missiles, or other proximity hazards.

Protection of the diesel generator cooling water system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against dynamic effects associated with postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.5.5.1.1 Safety Design Basis

A. The diesel generator cooling water system is capable of removing sufficient heat to permit continuous operation of the diesel engine at maximum load.

B. The diesel generator cooling water system is designed to remain functional during and after a safe shutdown earthquake.

C. The diesel generator cooling water system is designed so that a single failure of any active component, assuming a loss of offsite power, cannot result in a complete loss of the standby power source function.

D. In normal standby status, the diesel generator cooling water system is maintained in a warmed condition to promote starting.

E. Active components of the diesel generator cooling water system can be tested during plant operation in accordance with 10 CFR 50, General Design Criteria 44, 45, and 46.

9.5.5.1.2 Codes and Standards

The diesel generator cooling water system is designed to the codes and standards listed in table 3.2.2-1.

9.5.5.2 System Description

The diesel generator cooling water system is shown schematically in drawings 1X4DB170-1, 1X4DB170-2, 2X4DB170-1 and 2X4DB170-2. Each diesel engine has an independent cooling water system. Major components of each system include aftercoolers (combustion air coolers), a lube oil cooler, a jacket water cooler, a jacket water pump, a jacket water standpipe (surge tank), an electric immersion heater, and a keep-warm circulating pump. Design parameters for the major components are provided in table 9.5.5-1. The system is designed so that cooling water chemistry requirements are compatible with the materials of the system's various components.

9.5.5.2.1 Component Description

9.5.5.2.1.1 Jacket Water Pump. Each jacket water pump is a single-stage centrifugal type. The pump is gear driven by the engine and has been designed by the engine manufacturer to be compatible with the requirements of the diesel engine. The jacket water pump circulates the jacket water through the diesel generator coolant loop during periods of diesel operation to remove heat from the engine.

9.5.5.2.1.2 Jacket Water Cooler. The jacket water cooler for the diesel generator is a shell and tube heat exchanger that provides the means for removing heat from the diesel generator coolant loop during periods of diesel operation. The jacket water flows through the shell side, and the water from the nuclear service cooling water system flows through the tube side.

9.5.5.2.1.3 Thermostatic Valve. A three-way thermostatic valve is installed in the diesel generator coolant loop at the inlet to the jacket water cooler. This valve provides the capability to bypass the jacket water around the cooler. For jacket water temperatures below 152°F, all jacket waterflow bypasses the jacket water cooler. For temperatures above approximately 152°F, a portion of the jacket water flow passes through the jacket water cooler.

9.5.5.2.1.4 Aftercoolers. The aftercooler is an air-to-water heat exchanger. After the jacket water exits the jacket water cooler, a portion of the water is diverted to the aftercoolers. There are two aftercoolers per engine. The jacket water flows through the finned tubes of the

aftercooler, and the combustion air passes over the finned tubes. The aftercooler cools the combustion air after it has passed through the turbocharger.

9.5.5.2.1.5 Lube Oil Cooler. The diesel generator lube oil cooler is a shell and tube heat exchanger that provides the means of removing heat from the engine lube oil. The lube oil flows through the shell side and the jacket water passes through the tube side.

9.5.5.2.1.6 Jacket Water Standpipe. The jacket water standpipe (surge tank) is connected to the diesel generator coolant loop to allow for coolant volumetric changes due to temperature variations, to provide makeup water, and to absorb pump pressure variations. The standpipe has a working capacity of approximately 600 gal and is fitted with level instrumentation, vent, and makeup and drain connections. Makeup to the standpipe can be manually initiated from the non-Seismic Category 1 demineralized water system.

9.5.5.2.1.7 Jacket Water Keep-Warm System. The jacket water keep-warm system consists of a 3-hp, motor-driven, centrifugal, keep-warm circulating pump and a 75-kW immersion heater. The immersion heater is thermostatically controlled to maintain the jacket water between 145°F and 165°F. The circulation pump runs continuously when the engine is idle and automatically stops when the engine is started.

9.5.5.2.2 System Operation

When the diesel generator is not in operation, the unit is maintained at a temperature to ensure quick starting and fast loading. The keep-warm circulating pump operates continuously to maintain the engine at this temperature by circulating warmed water through the engine water jackets. A thermostat on the heater maintains the temperature of the circulating water between 145°F and 165°F. The keep-warm circulating pump and heater are automatically deenergized when the diesel engine is started.

The diesel generator cooling water system provides a sufficient heat sink to permit the diesel engine to start and operate for 3 min without flow from the nuclear service cooling water system through the diesel generator jacket water cooler. This margin is provided since the electric-driven nuclear service cooling water system pumps do not activate until after the diesel generator is in operation.

The diesel generator cooling water is treated in accordance with plant chemistry procedures as appropriate to maintain the compatibility of the water chemistry and the system materials and to preclude long-term corrosion and organic fouling. The diesel generator cooling water system can be vented to ensure that all spaces are filled with cooling water.

During operation of the diesel engine, temperature regulation of the jacket water is accomplished through action of the automatic three-way thermostatic valve that modulates coolant flow between the diesel generator jacket water cooler and its associated bypass line. In this manner, the engine jacket water is maintained at the proper temperature for maximum engine efficiency.

Active components in the diesel generator cooling water system include the jacket water pump, the keep-warm circulating pump, the engine jacket water pump discharge check valve, and the three-way thermostatic valve. Failure of the engine-driven jacket water pump, indicated by a low jacket water pressure alarm, requires shutdown of its diesel generator; the other redundant train of engineered safety features equipment continues to be powered by its associated diesel

generator. Failure of the keep-warm pump or the heater while the diesel engine is in standby status would be indicated by the water jacket low-temperature alarm at 135°F; this annunciation would prompt operators to replace the failed unit or start the engine to prevent low temperatures in the diesel generator cooling water system. The pump or the heater may be replaced readily, and the large mass of the diesel engine retains heat for lengthy periods. Moreover, reduction to room temperature does not seriously lengthen the time required to start the engine. The diesel generator room heating and ventilating system maintains the room air temperature at a minimum of 50°F. The three-way thermostatic valve is designed to fail in the position directing maximum shell-side coolant flow to the diesel generator heat exchanger to provide maximum cooling. Should the three-way valve become stuck in some other position, some portion of the diesel generator cooling water flow would be bypassed around the heat exchanger. If sufficient flow is bypassed, the engine temperature begins to increase; high-temperature alarms indicate the malfunction. If a high jacket water temperature condition cannot be remedied, the diesel generator may be manually tripped by the operators. In this case, the other redundant train of engineered safety features equipment continues to be powered by its associated diesel generator. During testing (normal starts only), an automatic diesel engine trip upon high jacket water temperature will be automatically enabled.

The diesel generator can operate for several days at no load without adverse effects. The diesel manufacturer has performed a factory idle endurance test on one of their model DSRV-16-4 engines. The engine was operated for 7 full 24-h days on no load at synchronous speed and then loaded to 4000 kW, which is 57 percent of VEGP's full design load (7000 kW), at the end of the 7-day period. The engine was able to accept the 4000-kW load within 1 s with a voltage and frequency dip of 2.6 and 3.8 percent, respectively. This test step load exceeds any step load applied in the VEGP design, except for transformer energization. Transformer energization is of such a short duration (less than 0.5 s) that the diesel generator will not be affected by this load. See table 8.3.1-2 for the diesel generator loading profile.

Based on the performance of their model DSRV-16-4 engine (same model as VEGP engines) tested with a large load connected within a short time interval, the engine manufacturer has concluded that the specified VEGP environmental conditions will not affect the capability of their engines to carry the step loadings required for VEGP after 7 days operating with no load at synchronous speed.

To reduce the possibility of accumulation of combustion and lube oil products in the exhaust system at low loads, the engine can be operated at greater than 50-percent load for a 1-h period for each 24-h period of unloaded operation. Above the 30-percent load rating, the engine may be run continuously, as required.

9.5.5.3 Safety Evaluation

A. The diesel generator cooling water system components are sized to allow sufficient cooling of the engine to prevent overheating while operating at 110 percent of nameplate rating on days with the warmest expected air temperature.

B. The diesel generator cooling water system is designed to Seismic Category 1 requirements as defined in section 3.2. Systems, equipment, and components that are not Seismic Category 1 and whose failure could impair the functioning of the cooling water system are upgraded in design to meet the requirements of Seismic Category 1.

C. The cooling water subsystem for each generator is capable of supplying cooling water without augmentation from other sources. The cooling water pump is driven by its associated diesel engine. Because of these arrangements and the redundancy of emergency diesel generator design and installation, a failure of any single component of the diesel generator cooling water system cannot result in a complete loss of the emergency onsite power supply. A single failure in the cooling water system is assessed as a failure of the associated diesel generator; in such a circumstance, safe shutdown is attained and maintained by the redundancy of the standby diesel generator installation. Table 9.5.5-2 provides failure modes and effects analysis for the system.

D. The diesel generator cooling water system also contains a keep-warm subsystem that circulates water through the diesel engine cooling water jacket to promote the engine's starting capability. Failure of the system is annunciated by a jacket cooling water low-temperature alarm at 135°F. Operators are also alerted to potential cooling or freezing of the diesel cooling water by the low-temperature alarm for the diesel generator room; this alarm is sounded at 50°F.

E. The entire diesel generator system, including the cooling water system, may be tested during all normal modes of power plant operation. During these tests, jacket water pressures and temperatures are monitored to ensure that the heat exchangers, jacket water pump, and three-way thermostatic valve are functioning properly. In standby status, operability of the heater and electric circulating pump is evident by inspection. All components of the diesel generator cooling water system are available for inspection at all times. Detection and control of leakage is visual and manual.

9.5.5.4 Tests and Inspections

Actual testing of the diesel generator system is discussed in section 8.3. Visual inspections, pressure and leak testing in accordance with the governing American Society of Mechanical Engineers (ASME) code, and operational checks of the cooling system components are performed as the unit is installed. The diesel generator cooling water system is operationally checked during the periodic testing of the diesel generator system. The keep-warm system is operationally checked during diesel generator shutdown periods.

9.5.5.5 Instrumentation Applications

Indications of system temperatures and pressures are provided in the diesel generator room. High- and low-temperature, low jacket water pressure, and low standpipe level alarms are provided in the diesel generator room and the main control room.

There is an automatic low pressure jacket water trip sensor and high temperature jacket water trip sensor that is active in the nonemergency mode. Diesel generator instrumentation is further discussed in subsection 8.3.1.

9.5.6 DIESEL GENERATOR STARTING SYSTEM

This subsection discusses the mechanical features of the diesel generator starting system. Control and instrumentation for starting the diesel generator system are discussed in section 7.3. The standby power supply is discussed in detail in section 8.3.

9.5.6.1 Design Bases

Protection of the diesel generator starting system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against dynamic effects associated with postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.5.6.1.1 Safety Design Bases

A. The diesel generator starting system initiates an engine start such that within 9.5 s after receipt of the start signal, the diesel generator is operating at load speed and is ready to begin load sequencing. This time frame is less than that assumed in the accident analyses presented in chapter 15.

B. The diesel generator starting system is designed so that no single active failure, assuming a loss of off- site power, can result in a complete loss of the standby power source function.

C. Portions of the diesel generator starting system which are required to start the diesel upon receipt of an engineered safety features actuation signal are designed to remain functional after a safe shutdown earthquake.

D. Active components of the system can be tested during plant operation in accordance with 10 CFR 50, General Design Criterion 18.

9.5.6.1.2 Power Generation Design Bases

The diesel generator starting system has no power generation design basis.

9.5.6.1.3 Codes and Standards

Codes and standards applicable to the diesel generator starting system are listed in table 3.2.2-1.

9.5.6.2 System Description

The diesel generator starting system is shown schematically in drawings 1X4DB170-1, 1X4DB170-2, 2X4DB170-1 and 2X4DB170-2. Each diesel generator is equipped with two independent and redundant starting air systems. Each starting air system consists of one air compressor, aftercooler, air dryer, air receiver, compressor air intake filter, scale trap, piping, valves, and associated instrumentation. Design parameters for the major system components are summarized in table 9.5.6-1.

9.5.6.2.1 Component Description

9.5.6.2.1.1 Air Compressors. One motor-driven compressor is provided for each starting air system (two starting air systems per diesel generator set).

9.5.6.2.1.2 Air Dryers. Each starting air system is equipped with an air dryer to ensure that dry air is available for all starts.

9.5.6.2.1.3 Air Receivers. Each starting air system is equipped with one air receiver. Each air receiver is capable of providing starting air for five consecutive engine starts without compressor assistance. Provisions are made for blowdown of air receivers to eliminate any moisture that might accumulate.

9.5.6.2.1.4 Aftercoolers. Each starting air system is equipped with an aftercooler to cool the air after compression and to condense any moisture in the air to aid the air dryers in removing moisture. The aftercooler is installed between the compressor and the dryer.

9.5.6.2.1.5 Air Start Distributors. Each engine is equipped with two air start distributors, one per air start system. The air distributors time, or distribute, the starting air to each cylinder in relation to the power stroke of each piston.

9.5.6.2.1.6 Air Start Solenoid Valves. Each starting air system is equipped with two air start solenoid valves, connected in parallel, so that failure of one solenoid valve does not compromise the operability of the system.

The piping downstream of the receiver is provided with a drainline to remove any moisture which may accumulate. A Y-strainer is installed upstream of the parallel air start valves to prevent oil and particulate from fouling these valves. Periodic testing of the diesel confirms operability of these valves.

9.5.6.2.2 System Operation

The air receivers for each diesel engine are maintained at operating pressure by compressors. The compressors start when air receiver pressure drops to 225 psig and stop when pressure is increased to 240 psig. Two compressors are provided. Each compressor keeps one receiver pressurized. A check valve in the air receiver charging line ensures that a broken line from the compressor will not affect the receiver. The air dryers and aftercoolers ensure that the starting air is dry.

A cross-connect line, located upstream from each air receiver's inlet check valve, connects the two air receivers with a normally closed valve. The valves on the cross-connect and discharge piping can be aligned manually so that either air receiver can be recharged from either air compressor. The air dryers and aftercoolers ensure that the starting air is dry.

When the diesel generator set receives a start signal, all four solenoid valves are energized simultaneously, allowing starting air to flow to each cylinder, using air from both air start systems independently. Thus, if one air start system fails to operate, the second will start the diesel generator set without waiting for a second start attempt and without switching from the first air start system to the second. When a start signal is initiated, either manual or automatic,

the starting air valves (HV-9068 A/B and HV-9070 A/B for train A and HV-9069 A/B and HV-9071 A/B for train B) will all open, admitting air to both banks of cylinders on the engine. The starting air valves will open for 5 seconds and automatically close after the 5 seconds have elapsed. However, the 5-second time limit is bypassed on an emergency start signal. The air distributor for each bank will properly time the opening of the air valve in each cylinder head to admit air to the cylinder whose piston is in proper position for the starting effort. As soon as the engine has fired and is running on its own power, a speed switch cuts the electrical circuit to the starting air valves and causes the valves to close. The speed switch is set to cut off the electrical circuit to the starting air valves at an engine speed of approximately 200 rpm. Also, the air valve in each cylinder head cannot admit starting air to the cylinder if the cylinder has fired. This is due to the differential pressure between the starting air pressure and the pressure of combustion inside the cylinder. Normally, after two to three engine revolutions the engine will fire and no starting air will be used to rotate the engine, even though the engine has not reached a speed of 200 rpm. When receiver pressure drops to 150 psig, the automatic starting sequence is stopped, but manual start attempts may be made as long as both receivers are connected to their respective cylinder banks and until pressure drops to approximately 90 psig. Starting air pressure below 90 psig is not sufficient to turn the engine, and the receivers must be recharged at this point.

An in-line membrane-type dryer is provided upstream of the starting air receiver tank to remove water vapor from the compressed air before it reaches the receiver tank. Compressed air passes through a bundle of hollow membrane fibers. The water vapor is swept through the membrane walls and out of the dryer through the sweep ports. The dried air continues down the dryer tube and into the downstream piping.

9.5.6.3 Safety Evaluation

A. Compressed air for each diesel is stored in an individual storage and starting system. Each system holds sufficient air to start the diesel five times under a no-load condition without compressor assistance. The continuous availability of the air starting system keeps the diesel engine in constant readiness.

B. The solenoid air start valves are installed in parallel in each system. If one valve fails to operate, the parallel valve will supply starting air. A failure of a compressor is indicated by an air receiver low-pressure alarm; this alarm prompts the operator to take corrective action. Each air receiver contains sufficient air when the low-pressure alarm occurs to start its associated diesel engine at least five times. The duration of each start is about 3 s or two to three engine revolutions. A single active failure in either air starting system does not compromise the ability of the standby power system to accomplish its function. Table 9.5.6-2 summarizes the failure modes and effects analysis for the starting air system.

C. The diesel engine starting system, except for the air compressors, aftercoolers, and air dryers, is designed in accordance with Seismic Category 1 requirements as specified in section 3.2.

D. The design of the system allows all active components of the system to be separately tested during plant power generation operation, as discussed in paragraph 9.5.6.4 below.

9.5.6.4 Tests and Inspections

The starting air compressors for each diesel engine are tested periodically to ensure continued operability. Compressor suction air filters are periodically checked for cleanliness. During the preoperational testing of the diesel generator, the entire compressed starting air system is operated to ensure 100-percent capability. Due to the redundancy of the starting air system, all testing can be performed without affecting normal plant operations or safety systems.

9.5.6.5 Instrumentation Applications

Each compressor and air receiver is furnished with instrumentation consisting of locally mounted pressure switches, pressure indicators, and overpressure protection devices. The pressure switches support the automatic control modes of compressor and receiver operation. Low starting air pressure of 215 psig and diesel start failure are annunciated locally and in the control room. Diesel generator instrumentation is further described in subsection 8.3.1.

9.5.7 DIESEL GENERATOR LUBRICATION SYSTEM

This subsection discusses the diesel generator lubrication system.

9.5.7.1 Design Bases

Protection of the diesel generator lubrication system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against the dynamic effects associated with postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.5.7.1.1 Safety Design Bases

A. The diesel generator lubrication system provides lubricating oil to all engine bearings during diesel generator operation and shutdown.

B. The system is designed to remain functional during and after a safe shutdown earthquake.

C. The diesel generator lubrication system is designed so that a single failure of any active component, assuming a loss of offsite power, cannot result in complete loss of the standby power source function.

D. In normal standby status, the diesel generator lubrication system is maintained in a warmed condition to promote starting and to prevent extreme lube oil viscosities.

E. The diesel generator lubrication system is capable of being tested during plant power generation in accordance with 10 CFR 50, Appendix A, General Design Criterion 18.

9.5.7.1.2 Power Generation Design Bases

The diesel generator lubrication system has no power generation design basis.

9.5.7.1.3 Codes and Standards

Codes and standards applicable to the diesel generator lubrication system are listed in table 3.2.2-1.

9.5.7.2 System Description

9.5.7.2.1 General Description

Each diesel generator is provided with an oil lubrication system. The system is shown schematically in drawings 1X4B170-1, 1X4DB170-2, 2X4DB170-1 and 2X4DB170-2. Major components of the system include one engine-driven pump, a lube oil collection sump, a full-flow filter, a lube oil cooler, lube oil strainers, an electric immersion heater, an electric motor-driven keep-warm circulating pump, and associated valves, piping, and instrumentation. Design parameters for major system components are provided in table 9.5.7-1.

9.5.7.2.2 System Operation

When the engine is operating, circulation is accomplished by an engine-driven, double-rotor, screw pump which draws oil from the sump (through a strainer located in the lube oil collection sump) and passes it through a full-flow 10-μm filter, a 80-μm duplex strainer, and a lube oil cooler before distribution to bearings. Oil returns to the sump by gravity drain. During this process, the lube oil cools internal components such as pistons by splashing against hot surfaces. All heat transferred to the lube oil is given up to the diesel generator cooling water system, which in turn gives its heat to the nuclear service cooling water system.

During standby periods, the lube oil is circulated through an immersion heater, a lube oil filter, a strainer, and then through the entire engine, excluding the rocker arms and turbochargers, by an electric motor-driven keep-warm pump. The turbochargers receive limited oil supply during standby through a drip system. Keeping the engine warm and lubricated in this way ensures quick starting. The keep-warm pump runs continuously during standby only and is rated for such use. Heating of the oil is automatically controlled by thermostats. Failure of the heating unit will not adversely affect the diesel generator system, since the unit may be readily replaced and the large mass of the diesel generator will retain heat for long periods. Moreover, reduction to room temperature will not seriously lengthen the time required to start the engine. (The diesel generator heating and ventilating system maintains the room air temperature at a minimum of 50°F.) Finally, failure of the warming unit will be indicated by the lube oil low-temperature alarm. This alarm will prompt operators to replace the failed unit or start the engine to prevent the extreme lube oil viscosities which accompany low lube oil temperatures.

During starting or operation of the diesel generator, failure of the lubrication system engine-driven pump results in unsatisfactorily low lube oil pressure. Receipt of a low lube oil pressure signal from the two-out-of-three trip logic system will shut down the diesel engine during either routine or design basis accident operation. (The low lube oil pressure shutdown signal is not bypassed or defeated during accident conditions.) Since each redundant load group is powered

by an associated diesel generator, a low lube oil pressure trip of one diesel generator does not result in a complete loss of the engineered safety features.

Loss of cooling to the lube oil cooler would cause a high lube oil temperature condition and alarm which would ultimately result in a high jacket water temperature and subsequent light and alarm. This will inform the operator to investigate both the jacket water temperature and lube oil temperature and, if necessary, manually trip the diesel. These trips will be automatically enabled during normal starts. The redundant diesel generator would continue to supply engineered safety features equipment associated with the redundant train.

Engine crankcase vacuum is provided by two crankcase ventilating fans which will keep the crankcase pressure at approximately minus 2 in. of water column. The crankcase ventilating fans are arranged to receive electrical power from a non-Class 1E electric source provided through the engine control panel. They are set to turn on automatically when the engine receives a start signal.

If non-Class 1E power will not be available after a seismic event, or some other cause, the fan motors will not run. However, the fans are a centrifugal type, installed with the fan positioned horizontally, so that the vent system is not closed off. Nonpower venting will be provided, as crankcase pressure and thermal forces will provide the motive force. The pressure in the engine crankcase will not rise to a level exceeding that which is equivalent to the height of the vapor column in the vent line to atmosphere. This will not be any greater than if the fan were not in the line; i.e., this does not create any greater problem than a vent line without a fan. If the fans do not operate, the only effect will be that the crankcase pressure will increase to a positive pressure level of 1/2 to 1 in. of water column. This will not affect the engine performance, with the exception that there will be some increase in visible oil leakage from the engine side covers, etc., due to the higher than atmospheric pressure (which is acceptable to the engine manufacturer).

The following are incorporated in the design of the crankcase venting system to prevent crankcase explosion and leakage of combustible gases into the diesel generator room:

A. Should crankcase pressure inexplicably rise above the pressure that will be experienced for nonpower venting, pressure-relieving side doors are provided on the engine crankcase which are set to open at approximately 1-1/2 psig. Also, a flame-arresting section is incorporated in each door to snuff out any flame when the door opens.

B. The 6-in crankcase vent line is piped to the outside of the diesel generator building. This line is designed to Seismic Category 1, ASME Section III, Class 3 requirements. The short portion of the line outside the diesel generator building is tornado missile protected.

Normal small quantities (10 to 20 gal) of lube oil makeup can be introduced by using a hose inserted in the dipstick tube or the 2-in. oil fill line. Large quantities of replacement oil can be introduced to the sump tank by means of a portable electric motor-driven pump from a tank truck by using a hose inserted in the 2-in. oil fill line.

9.5.7.3 <u>Safety Evaluation</u>

A. The engine-driven lube oil pump provides oil to the engine bearings during engine operation. Oil is kept at a constant pressure and temperature by use of regulating valves, recirculation lines, and a lube oil cooler. After engine

shutdown or during periods of standby status, the motor-driven keep-warm pump and heater keep the bearings lubricated and warm.

B. The diesel generator lubrication system is designed in accordance with Seismic Category 1 requirements as specified in section 3.2. System, equipment, and components which are not Seismic Category 1 and whose failure could impair the functioning of the lubrication system are upgraded in design to Seismic Category 1.

C. The lubricating oil supply to each diesel generator is sized to provide diesel generator lubrication. The lubrication subsystem for each generator is capable of supplying lube oil for an extended period without augmentation from other sources. The lube oil pump is driven by the diesel engine with which it is associated. Because of these arrangements and the redundancy of emergency diesel generator design and installation, a failure of any single active component of the diesel generator lubrication system cannot result in a complete loss of the standby power source. A single failure is assessed as a failure of the diesel generator with which it is associated; in such a circumstance, safe shutdown is attained and maintained by the appropriate redundant diesel generator installation. Table 9.5.7-2 provides a summary of the failure modes and effects analysis for the lubrication system.

D. The diesel generator lubrication system is provided with an electric motor-driven keep-warm pump and immersion heater unit which circulates 150°F lube oil through the engine. Extreme lube oil viscosities which accompany low lube oil temperatures are thus prevented, and quick starting of the diesel engine is ensured. Failure of the unit is annunciated by a lube oil low temperature alarm at 135°F. Diesel generator room low air temperature is annunciated at 50°F. Either alarm prompts operator investigation and remedial action.

E. All active components are capable of being tested during power generation operation to ensure proper functioning of the system, as discussed in paragraph 9.5.7.4.

9.5.7.4 Tests and Inspections

The diesel generator lubrication system is operationally tested during the startup and checkout of the diesel generator. Lube oil pressure and temperature are monitored to ensure operability of the engine-driven pump and the recirculation lines. Operation of the electric pump and heater is evidence of their operability. Inspection and testing of the system can be performed without disturbing normal plant operations. The diesel lube oil in the emergency diesel will be analyzed periodically for wear and failure parameters. The frequency for lube oil analysis will be monthly for the first 3 months of diesel operation and quarterly thereafter. The frequency of lube oil analysis will be increased if problems develop as indicated by analysis results or operational problems. The lube oil will have the following tests performed: kinematic viscosity, water content, and wear metal content. The emergency diesel generators are included in the scope of the Oil Analysis Program which is credited as an aging management program for license renewal (see subsection 19.2.16). The duplex strainers are valved for full flow through one side only. Strainers may be removed and inspected for the buildup of impurities on a periodic basis. The complete lubrication system is thoroughly flushed before initial startup to ensure that no foreign matter is in the system.

9.5.7.5 Instrumentation Applications

Instrumentation provided for the diesel generator lubrication system includes pressure and temperature switches, indicators, and automatic protection devices. The temperature and pressure switches support the automatic control modes of lubrication operation. Low lube oil pressure, low turbocharger oil pressure, high and low lube oil temperatures, and high diesel generator bearing temperatures are alarmed in the control room and in the diesel generator room. In addition, local indications associated with the lube oil system that are provided include oil temperature and pressure, turbocharger pressure, and lube oil filter differential pressure indication. A dipstick is provided to positively verify lube oil sump tank oil level. Low lube oil pressure during operation of the engine initiates a diesel generator trip. To prevent spurious trips, three pressure switches are provided and two-out-of-three logic is employed to initiate a diesel generator trip. The lube oil level in the lube oil sump tank will be sensed by two devices. One is a bubbler-type level instrument with the readout indicator located on the local engine control panel. The other device is a low-level displacer-type switch which will alarm the annunciator signal on the local engine control panel and the control room.

Setpoints for instrumentation associated with the diesel generator lubrication system are in accordance with the engine manufacturer's recommendations.

During surveillance testing, any alarm condition would be immediately verified by the operator utilizing instrumentation at the diesel generator location; confirmation at the local area would likely result in diesel generator shutdown, further investigation, and repairs. Diesel generator lube oil system instrumentation is also described in section 8.3. Diesel generator lubrication system indicating devices are listed in table 9.5.7-3.

9.5.8 DIESEL GENERATOR COMBUSTION AIR INTAKE AND EXHAUST SYSTEM

This subsection discusses the mechanical features of the diesel generator combustion air intake and exhaust system. The diesel generator building ventilation system is discussed in subsection 9.4.7. Each diesel generator and its supporting system are located within separate compartments to provide protection from high- and moderate-energy line breaks, flooding, missiles, and other proximity hazards.

9.5.8.1 Design Bases

Protection of the diesel generator combustion air intake and exhaust system from wind and tornado effects is discussed in section 3.3. Flood design is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against dynamic effects associated with postulated rupture of piping is discussed in section 3.6. Environmental design is discussed in section 3.11.

9.5.8.1.1 Safety Design Bases

A. The diesel generator combustion air intake and exhaust system is capable of supplying adequate combustion air and disposing of resultant exhaust products to permit continuous operation of both diesel generators for each unit at 110 percent of nameplate rating.

B. The diesel generator combustion air intake and exhaust system is designed to remain functional during and after a design basis earthquake.

C. The air intake and exhaust system is designed so that a single failure of any component, assuming a loss of offsite power, cannot result in complete loss of the standby power source.

D. The diesel generator combustion air intake and exhaust system is capable of being tested during plant operation in accordance with 10 CFR 50, General Design Criterion 18.

9.5.8.1.2 Power Generation Design Bases

The diesel generator combustion air intake and exhaust system has no power generation design basis.

9.5.8.2 System Description

9.5.8.2.1 General Description

Each diesel engine is provided with an air intake and exhaust system as shown in drawings 1X4DB170-1, 1X4DB170-2, 2X4DB170-1, and 2X4DB170-2. The major components of the system include an air intake filter-silencer, an exhaust silencer, and associated piping and flexible connections. Design parameters for the major system components are provided in table 9.5.8-1.

9.5.8.2.2 Component Description

Codes and standards applicable to the system are listed in tables 3.2.2-1 and 9.5.8-1. The VEGP safety class, seismic category, and principal design code for the various components are as shown in drawings 1X4DB170-1, 1X4DB170-2, 2X4DB170-1, and 2X4DB170-2.

9.5.8.2.2.1 Intake Air Filter. Oil bath-type air filters are used in the combustion air intake system. The filters are installed in the same room (on the second floor) as the engine they serve. Mist eliminator pads are installed within the filters to remove any oil mist from the filtered air. A rain shield is provided over the air inlet to each filter to minimize water carryover in the event the sprinkler system installed for diesel building fire protection is activated. Water carryover into the filter does not reduce the filter efficiency. The entrapped water tends to settle and can be drawn off.

9.5.8.2.2.2 Intake and Exhaust Silencers. Silencers are installed in the intake system to minimize the noise level within the diesel generator room. A silencer is installed in the exhaust system to reduce the noise emitted from the system.

9.5.8.2.2.3 Piping. The piping in the system is carbon steel. Expansion joints are strategically located to accommodate the thermal growth of the exhaust piping. The piping is of adequate size so that the total pressure drop when the engine is operating at 110 percent of continuous rating is within the diesel engine manufacturer's recommendations.

9.5.8.2.3 System Operation

There are no active components within the diesel generator combustion air intake and exhaust system.

Upon initiation of a diesel generator start signal, combustion air is drawn into the air intake filter and passes through the intake piping and silencer to the turbocharger then through the aftercooler to the engine intake manifolds. The combustion air intake filter, silencer, and the combustion air piping are sized to supply an adequate supply of air to the engine while operating at 110 percent of nameplate rating. After the exhaust gases pass through the turbocharger, the exhaust gas enters the exhaust pipe, passes through the exhaust silencer, and is then piped out of the building. The exhaust piping and silencer are sized to prevent excessive backpressure on the engine when operating at 110-percent nameplate rating.

9.5.8.3 Safety Evaluation

A. The diesel generator combustion air intake and exhaust system is capable of supplying an adequate quantity and quality of filtered combustion air to the engine and of disposing of the resultant exhaust gases without creating an excessive backpressure on the engine when the engine is operating at 110-percent nameplate rating.

The diesel generator buildings are not equipped with gaseous fire suppression systems nor are they located near the gas storage facilities. The carbon dioxide storage tank is located 260 ft away, the hydrogen storage facility is 600 ft away, and the nitrogen storage system is 600 ft away. Figure 6.4.2-2 shows the physical relationship of the diesel generator building to those plant features which could affect the system. These distances are adequate to ensure that an accidental release of these gases does not degrade diesel performance. Drawings 1X4DE327, 1X4DE330, 2X4DE327, and 2X4DE330 show the protection provided against precipitation and tornado missiles.

The combustion air intake filter for each diesel is located in a separate enclosure on the second floor of the diesel generator building and is protected against tornado missiles. The intake is located on the sidewall of the second floor of the diesel generator building, below the roof level. The engine exhaust discharges above the roof of the diesel generator building, and the portion of the exhaust pipe above the roof is protected by a guard structure against precipitation and tornado missiles as shown in drawing 1X4DE330 and 2X4DE330. The engine exhaust is located about 50 ft from the engine air intake, thereby minimizing the chances of the engine exhaust being drawn into the combustion air intake. Drawings 1X4DB327, 1X4DB330, 2X4DE327, and 2X4DE330 show the equipment layout within the diesel generator building.

B. The diesel generator combustion air intake and exhaust system is designed to Seismic Category 1 requirements as specified in section 3.2. Systems, equipment, and components which are not Seismic Category 1 and whose failure might impair the functioning of the combustion air intake and exhaust system are designed so that failure cannot impair the functioning of safety-related equipment.

C. The diesel generator combustion air intake and exhaust system contains no active components. A single failure is assessed as a failure of the diesel

generator with which the component is associated. In such a circumstance, safe shutdown is attained and maintained by the appropriate redundant diesel generator installation. Table 9.5.8-2 provides the failure modes and effects analysis for this system.

9.5.8.4 Tests and Inspections

Visual inspections, pressure and leak testing, and operational checks of the combustion air intake and exhaust system are performed as the system is installed. The diesel generator combustion air intake and exhaust system is operationally checked during the periodic testing of the diesel generator system.

9.5.8.5 Instrumentation Applications

The diesel generator combustion air intake and exhaust system is provided with instrumentation consisting of a combustion air pressure indicator and exhaust gas temperature indicators.

Thermocouples are used to sense exhaust gas temperature at each cylinder and the engine exhaust stack temperature. A digital temperature indicator with manual selector switch is located at the engine control panel for selecting either bank (right or left) of engine exhaust stack temperature and individual cylinder exhaust gas temperature readout. At 100-percent rated load the exhaust stack temperature will be approximately 850°F ±50°F.

Engine intake manifold air pressure, right bank and left bank, is measured by a pressure gauge located at the engine control panel. At 100-percent rated load the engine intake manifold air pressure will be approximately 50 in. Hg ± 5 in. Hg.

The combustion air intake and exhaust system has no interlocks or alarm instrumentation.

Testing of the diesel engine air intake and exhaust system instrumentation will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the engine manufacturer.

Additional discussion of diesel generator instrumentation is provided in subsection 8.3.1.

9.5.9 AUXILIARY STEAM SYSTEM

The auxiliary steam system is designed to provide the steam required for plant processing during plant startup, shutdown, and normal operation.

9.5.9.1 Design Bases

9.5.9.1.1 Safety Design Bases

The auxiliary steam system has no safety function.

9.5.9.1.2 Power Generation Design Basis

The auxiliary steam system is designed to supply the steam required by one unit for a cold start of the main steam system and turbine-generator.

9.5.9.2 System Description

9.5.9.2.1 General Description

The auxiliary steam system is shown schematically in drawings AX4DB195-2, AX4DB195-3, AX4DB195-4, and AX4DB195-5. The system consists of distribution headers. The auxiliary steam is distributed throughout the plant to the components listed in table 9.5.9-1.

9.5.9.2.2 Component Description

Codes and standards applicable to the auxiliary steam system are listed in table 3.2.2-1. The auxiliary steam system is designed and constructed in accordance with Quality Group D specifications.

A. Auxiliary Steam System

The design pressure of the steam system is 300 psig. The system is protected from overpressure by safety valves.

9.5.9.2.3 System Operation

When in operation, the auxiliary steam system provides the following services:

- Heating of the condensate during preoperational cleanup of the condensate and feedwater system.
- Assisting in the attaining and holding of required vacuum in the main condensers.
- Sealing the glands of the main turbine and feedwater pump drive turbines prior to the availability of main steam.
- Preoperational testing of the auxiliary feedwater pump turbine and steam generator feedwater pump turbines.
- Heating the cleaning solutions used for preoperational cleaning of piping and equipment.
- Steam blanketing of moisture separator reheaters during plant shutdown.
- Assisting in deaeration of the main condensate during cold cleanup operations.
- As an alternative, preheating of main steam lines and main turbine shell following an extended main steam isolation and prior to entrance of steam from steam generators.

Operational safety features are provided within the system for the protection of plant personnel and equipment. The auxiliary steam system does not interface directly with nuclear process systems.

9.5.9.3 Safety Evaluation

The auxiliary steam system has no safety function.

9.5.9.4 Tests and Inspections

Testing of the auxiliary steam system is performed prior to initial plant operation.

Components of the system are monitored during operation to ensure satisfactory performance.

Periodic operation of all equipment is utilized for additional inspection, checkout, and maintenance.

9.5.9.5 Instrumentation Applications

The auxiliary steam system is provided with the necessary controls and indicators for local or remote monitoring of the operation of the system.

9.5.10 EMERGENCY RESPONSE FACILITIES

This section has been deleted

(SEE EMERGENCY PLAN, SECTION H)

TABLE 9.5.1-1 (SHEET 1 OF 81)

FIRE EVENT SAFE SHUTDOWN SYSTEMS/COMPONENTS

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Reactor Coolant System							
[a]	Core exit temp - loop 3	B	B	Both	Yes	1CTB	140B
[a]	Core exit temp - loop 2	B	B	Both	Yes	1CTB	140B
1-1201-B6-001	Steam generator loop 1	A	N/A	Both	N/A	1CTB	140C
1-1201-B6-002	Steam generator loop 2	B	N/A	Both	N/A	1CTB	140C
1-1201-B6-003	Steam generator loop 3	B	N/A	Both	N/A	1CTB	140C
1-1201-B6-004	Steam generator loop 4	A	N/A	Both	N/A	1CTB	140C
1-1201-V6-001	Reactor vessel	A, B	N/A	Both	N/A	1CTB	140A
1-1201-V6-002	Pressurizer	A, B	N/A	Both	N/A	1CTB	140E
1-1201-V6-003	Pressurizer relief tank	A, B	N/A	Both	N/A	1CTB	140B
HV-8095A	Reactor head vent valve	A	A	Both	Yes	1CTB	140C
HV-8095B	Reactor head vent valve	B	B	Both	Yes	1CTB	140C
HV-8096A	Reactor head vent valve	A	A	Both	Yes	1CTB	140C
HV-8096B	Reactor head vent valve	B	B	Both	Yes	1CTB	140B
HV-0442A	Reactor head vent valve	A	A	Both	No (1)	1CTB	140C
HY-0442A	HV-0442A I/power converter	A	A	Both	No (1)	1CBLBT	61
HV-0442B	Reactor head vent valve	B	B	Both	Yes	1CTB	140B

a. Core exit temperatures thermocouples TE-10002, 10003, 10006, 10008 through 100012, 10014, 10016 through 10019, 10021, 10022, 10024 through 10026, 10028, 10034[b], 10036, 10037, 10040, 10050.

b. The input signal from this thermocouple has been disconnected from the PSMS cabinet to prevent it from being in the subcooling calculation.

TABLE 9.5.1-1 (SHEET 2 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Fire Zone
HY-0442B	HV-0442B I/Power converter	B	B	Both	Yes	1CBLBD	60
HV-8000A	Pressurizer PORV block valve (29)	A	A	Both	Yes	1CTB	140E
HV-8000B	Pressurizer PORV block valve (29)	B	B	Both	Yes	1CTB	140E
HV-8145	CVCS auxiliary spray valve	N/A	N/A (2)	Both	Yes	1CTB	140B
HY-8145	Auxiliary spray valve solenoid	N/A	N (2)	Both	Yes	1CTB	140B
LT-0459	Pressurizer level	A	1	Both	No	1CTB	140A
LT-0460	Pressurizer level	B	2	Both	Yes	1CTB	140B
PT-0403	RCS wide range pressure	B	B	Both	Yes	1CTB	140A
PT-0405	RCS wide range pressure	A	A	Both	No	1CTB	140B
PT-0408	RHR valve pressure interlock	A	3	Cold	No (3)	1ABLDG	26A
PT-0418	RHR valve pressure interlock	B	4	Cold	No (3)	1ABLDB	27
PT-0428	RHR valve pressure interlock	B	2	Cold	No (3)	1ABLDB	27
PT-0438	RHR valve pressure interlock	A	1	Cold	No (3)	1ABLDG	26A
PV-0455A	Pressurizer PORV (29)	A	A	Both	Yes	1CTB	140E
PV-0456A	Pressurizer PORV (29)	B	B	Both	Yes	1CTB	140E
RE-13135A	R.G. 1.97 neutron flux chamber	A	A	Both	No	1CTB	140A
RE-13135B	RG 1.97 Neutron flux chamber	B	B	Both	Yes	1CTB	140B
1-1602-P5-NFA	RG 1.97 neutron flux amplifier panel	A	A	Both	No	1CBLBT	61
1-1602-P5-NFB	RG 1.97 neutron flux amplifier panel	B	B	Both	Yes	1CBLBD	62
1-1602-P5-OIB	RG 1.97 neutron flux isolator panel	B	B	Both	Yes(40)	1CBLBD	62
TE-0413A	RCS T-hot wide range loop 1	A	1	Both	No	1CTB	140C

TABLE 9.5.1-1 (SHEET 3 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TE-0413B	RCS T-cold wide range loop 1	A (4)	2	Both	No	1CTB	140C
TE-0423B	RCS T-cold wide range loop 2	B (18)	2	Both	Yes	1CTB	140C
TE-0433B	RCS T-cold wide range loop 3	B (18)	2	Both	Yes	1CTB	140C
TE-0443A	RCS T-hot wide range loop 4	A	1	Both	No	1CTB	140C
TE-0443B	RCS T-cold wide range loop 4	A (4)	2	Both	No	1CTB	140C
PV-0455B	Pressurizer spray valve	N/A[a]	N (2)	N/A	Yes	1CTB	140E
PV-0455C	Pressurizer spray valve	N/A[a]	N (2)	N/A	Yes	1CTB	140E
PT-0455	Pressurizer pressure	N/A[a]	1	N/A	No (3)	1CTB	140B
PT-0456	Pressurizer pressure	N/A[a]	2	N/A	No (3)	1CTB	140B
PT-0457	Pressurizer pressure	N/A[a]	3	N/A	No	1CTB	140B
PT-0458	Pressurizer pressure	N/A[a]	4	N/A	No	1CTB	140B
PSV-8010A	Pressurizer code safety valve	A, B	N/A	HOT	N/A	1CTB	140E
PSV-8010B	Pressurizer code safety valve	A, B	N/A	HOT	N/A	1CTB	140E
PSV-8010C	Pressurizer code safety valve	A, B	N/A	HOT	N/A	1CTB	140E
PSE-10459	Pressurizer relief tank rupture disk	A, B	N/A	Both	N/A	1CTB	140A
PSE-10460	Pressurizer relief tank rupture disk	A, B	N/A	Both	N/A	1CTB	140A
CVCS							
1-1208-E6-001	Regenerative heat exchanger	A	N/A	Both	N/A	1CTB	140B
1-1208-P6-002	Charging pump "A"	A	A	Both	Yes	1ABLCD	20
1-1208-P6-003	Charging pump "B"	B	B	Both	Yes	1ABLCE	19
1-1208-P6-006	Boric acid transfer pump	A	A	Both	Yes	1ABLDJ	6

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 4 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Chemical and Volume Control System							
1-1208-P6-007	Boric acid transfer pump	B	B	Both	Yes	1ABLDG	3
1-1208-T4-003	Boric acid storage tank	A, B	N/A	Both	N/A	1ABLDG	3
1-1204-T4-001	Refueling water storage tank	A, B	N/A	Both	N/A	1NSPLAB	188
1-1204-V6-001	Boron injection tank (BIT)	A, B	N/A	Both	N/A	1ABLBB	171
FT-0121	Charging line flow	N/A (5)	N	HOT	No	1ABLDG	14D
FV-0121	Centrifugal charging pump flow control valve	N/A (5)	N/A (2)	HOT	No	1ABLDG	21
FY-0121A	FV-0121 I/P converter	N/A (5)	N (2)	HOT	No	1ABLDG	14D
HV-0123	Excess letdown heat exchanger discharge valve	N/A[a]	N/A (2)	N/A	No	1CTB	140A
HY-0123	Excess letdown heat exchanger discharge valve solenoid	N/A[a]	N (2)	N/A	No	1CTB	140A
HV-0190A	TRAIN "A" boration path valve	A	A	Both	No (6)	1ABLAD	39D
HY-0190A	HV-0190A I/power converter	A	A	Both	No (6)	1ABLDG	36
HV-0190B	TRAIN "B" boration path valve	B	B	Both	No (6)	1ABLCE	19
HY-0190B	HV-0190B I/power converter	B	B	Both	No (6)	1ABLDG	14C
HV-8103A	RCP 1 seal water inlet valve	N/A (5)	B	HOT	No	1ABLAD	39D
HV-8103B	RCP 2 seal water inlet valve	N/A (5)	B	HOT	No	1ABLAD	39D
HV-8103C	RCP 3 seal water inlet valve	N/A (5)	B	HOT	No	1FBLCA	132
HV-8103D	RCP 4 seal water inlet valve	N/A (5)	B	HOT	No	1FBLCA	132

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 5 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-8104	BAST to charging pump "A" valve	A	A	Both	Yes	1ABLDB	38
HV-8105	Train "A" charging path valve	A (7)	B	Both	Yes	1ABLAD	39D
HV-8110	Seal water heat exchanger valve	A, B (8)	A	Both	Yes	1ABLBA	34
HV-8111A	Train "A" miniflow valve	A	B	Both	Yes	1ABLCD	20
HV-8111B	Train "B" miniflow valve	B	B	Both	Yes	1ABLCE	19
HV-8116	Train "A" boration path valve	A	A	Both	Yes	1ABLAD	39D
HV-8146	Normal charging path valve	A	A	Both	Yes	1CTB	140A
HV-8153	Excess letdown isolation valve	N/A[a]	N/A (2)	N/A	No (24)	1CTB	140B
HY-8153	Excess letdown isolation valve solenoid	N/A[a]	N (2)	N/A	No (24)	1CTB	140B
HV-8154	Excess letdown isolation valve	N/A[a]	N/A (2)	N/A	No (24)	1CTB	140B
HY-8154	Excess letdown isolation valve solenoid	N/A[a]	N (2)	N/A	No (24)	1CTB	140B
LV-0460	RCS normal letdown isolation valve (9)	B	N/A (2)	Both	Yes	1CTB	140C
LY-0460	RCS normal letdown solenoid (9)	B	N (2)	Both	Yes	1CTB	140C
LV-0459	RCS normal letdown isolation valve (9)	A	N/A (2)	Both	Yes	1CTB	140C
LY-0459	RCS normal letdown solenoid (9)	A	N (2)	Both	Yes	1CTB	140C
HV-8438	Charging pump "B" to normal charging pump valve	B	B	Both	Yes	1ABLCE	19

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 6 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-8471A	Charging pump "A" suction valve	A	A	Both	Yes	1ABLCD	20
HV-8471B	Charging pump "B" suction valve	B	B	Both	Yes	1ABLCE	19
HV-8485A	BIT to charging pump valve	A	A	Both	Yes	1ABLCD	20
HV-8485B	Train "B" boration path valve	B	B	Both	Yes	1ABLCE	19
HV-8508A	Train "A" miniflow valve	A (10)	A	Both	No (11)	1ABLCD	20
HV-8508B	Train "A" miniflow valve	B (10)	B	Both	No (11)	1ABLCE	19
HV-8509A	Train "B" miniflow valve	B (10)	A	Both	No (11)	1ABLCE	19
HV-8509B	Train "B" miniflow valve	A (10)	B	Both	No (11)	1ABLCD	20
LT-0102	BAST level	A (12)	1	Both	No (13)	1ABLDG	3
LT-0104	BAST level	B (12)	4	Both	No (13)	1ABLDG	3
PI-10115	Boric acid transfer pump "A" suction pressure	A,B	N/A	Both	No	1ABLDJ	6
LI-0990C	RWST local level indicator	A,B	N/A	Both	No	1NSPLAB	188
LT-0990	RWST level	A	1	Both	No (14)	1NSPLAB	188
LT-0991	RWST level	B	2	Both	No (14)	1NSPLAB	188
LV-0112B	VCT isolation valve	A	A	Both	Yes	1ABLDB	38
LV-0112C	VCT isolation valve	B	B	Both	Yes	1ABLDB	38
LV-0112D	RWST to charging pump valve	A	A	Both	Yes	1ABLDG	14D
LV-0112E	RWST to charging pump valve	B	B	Both	Yes	1ABLDG	14C
HV-8801A	BIT discharge valve	A	A	Both	Yes	1ABLBB	39B
HV-8801B	BIT discharge valve	B	B	Both	Yes	1ABLBB	39B
HV-8803A	BIT inlet valve	A	N/A (36)	N/A	N/A	1ABLBB	171
HV-8803B	BIT inlet valve	B	N/A (36)	N/A	N/A	1ABLBB	171

TABLE 9.5.1-1 (SHEET 7 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Main Steam System (15) (20)							
HV-13005A	S/G 1 steam isolation bypass valve	A	N/A (2)	Both	No (16)	1ABLAE	45
HY-13005A	S/G 1 steam isolation bypass solenoid	A	A (2)	Both	No (16)	1ABLAE	45
HV-13005B	S/G 1 steam isolation bypass valve	B	N/A (2)	Both	No (16)	1ABLAE	45
HY-13005B	S/G 1 steam isolation bypass solenoid	B	B (2)	Both	No (16)	1ABLAE	45
HV-13006A	S/G 4 steam Isolation bypass valve	A	N/A (2)	Both	No (16)	1ABLAE	45
HY-13006A	S/G 4 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	1ABLAE	45
HV-13006B	S/G 4 steam isolation bypass valve	B	N/A (2)	Both	No (16)	1ABLAE	45
HY-13006B	S/G 4 steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	1ABLAE	45
HV-13007A	S/G 2 Steam isolation bypass valve	A	N/A (2)	Both	No (16)	1CBLAD	104
HY-13007A	S/G 2 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	1CBLAD	104
HV-13007B	S/G 2 steam isolation bypass valve	B	N/A (2)	Both	No (16)	1CBLAD	104
HY-13007B	S/G 2 Steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	1CBLAD	104
HV-13008A	S/G 3 steam isolation bypass valve	A	N/A (2)	Both	No (16)	1CBLAD	104
HY-13008A	S/G 3 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	1CBLAD	104

TABLE 9.5.1-1 (SHEET 8 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-13008B	S/G 3 steam isolation bypass valve	B	N/A (2)	Both	No (16)	1CBLAD	104
HY-13008B	S/G 3 Steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	1CBLAD	104
HV-3006A	S/G 1 main steam isolation valve	A	A	Both	No (16)	1ABLAE	45
HV-3006B	S/G 1 main steam isolation valve	B	B	Both	No (16)	1ABLAE	45
HV-3016A	S/G 2 main steam isolation valve	A	A	Both	No (16)	1CBLAD	104
HV-3016B	S/G 2 main steam isolation valve	B	B	Both	No (16)	1CBLAD	104
HV-3026A	S/G 3 main steam isolation valve	A	A	Both	No (16)	1CBLAD	104
HV-3026B	S/G 3 main steam isolation valve	B	B	Both	No (16)	1CBLAD	104
HV-3036A	S/G 4 main steam isolation valve	A	A	Both	No (16)	1ABLAE	45
HV-3036B	S/G 4 main steam isolation valve	B	B	Both	No (16)	1ABLAE	45
HV-15216A	S/G 1 blowdown isolation valve	B	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15216A	S/G 1 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	1CTB (17)	140A
HV-15216B	S/G 2 blowdown isolation valve	B	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15216B	S/G 2 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	1CTB (17)	140A
HV-15216C	S/G 3 blowdown isolation valve	B	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15216C	S/G 3 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	1CTB (17)	140A

TABLE 9.5.1-1 (SHEET 9 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-15216D	S/G 4 blowdown isolation valve	B	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15216D	S/G 4 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	1CTB (17)	140A
HV-15212A	S/G 1 blowdown isolation valve	A	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15212A	S/G 1 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	1CTB (17)	140A
HV-15212B	S/G 2 blowdown isolation valve	A	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15212B	S/G 2 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	1CTB (17)	140A
HV-15212C	S/G 3 blowdown isolation valve	A	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15212C	S/G 3 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	1CTB (17)	140A
HV-15212D	S/G 4 blowdown isolation valve	A	N/A (2)	Both	No (16)	1CTB (17)	140A
HY-15212D	S/G 4 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	1CTB (17)	140A
LT-0501	S/G 1 wide range level	A	1	Both	No	1CTB	140A
LT-0502	S/G 2 wide range level	B	2	Both	Yes	1CTB	140A
LT-0503	S/G 3 wide range level	B	2	Both	Yes	1CTB	140B
LT-0504	S/G 4 wide range level	A	3	Both	No	1CTB	140A
PT-0514	S/G 1 pressure	A	1	Both	No	1ABLAD	39D
PT-0525	S/G 2 pressure	B	2	Both	No (18)	1CBLAA	101
PT-0535	S/G 3 pressure	B	2	Both	No (18)	1CBLAI	93
PT-0544	S/G 4 pressure	A	1	Both	No	1ABLDG	48
PV-3000	S/G 1 atmospheric dump valve	A	A	Both	No (19)	1ABLAE	45

TABLE 9.5.1-1 (SHEET 10 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
PY-3000	Atm dump valve signal converter	A	A	Both	No (19)	1ABL2E	148
PT-3000	Atm dump valve pressure transmitter	A	A	Both	No (19)	1ABLAD	39D
PV-3010	S/G 2 atmospheric dump valve	B	B	Both	No (19)	1CBLAD	104
PY-3010	Atm dump valve signal converter	B	B	Both	No (19)	1CBLAS	100
PT-3010	Atm dump valve pressure transmitter	B	B	Both	No (19)	1CBLAA	101
PV-3020	S/G 3 atmospheric dump valve	B	B	Both	No (19)	1CBLAD	104
PY-3020	Atm dump valve signal converter	B	B	Both	No (19)	1CBLAS	100
PT-3020	Atm dump valve pressure transmitter	B	B	Both	No (19)	1CBLAT	102
PV-3030	S/G 4 atmospheric dump valve	A	A	Both	No (19)	1ABLAE	45
PY-3030	Atm dump valve signal converter	A	A	Both	No (19)	1ABL2E	148
PT-3030	Atm dump valve pressure transmitter	A	A	Both	No (19)	1ABLDG	48
HV-15196	S/G 1 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	1ABLAE	39A
HY-15196A	S/G 1 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	1ABLAE	39A
HY-15196B	S/G 1 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	1ABLAE	39A
HV-15197	S/G 2 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	1CBLAD	99
HY-15197A	S/G 1 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	1CBLAD	99
HY-15197B	S/G 2 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	1CBLAD	99

TABLE 9.5.1-1 (SHEET 11 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-15198	S/G 3 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	1CBLAD	99
HY-15198A	S/G 3 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	1CBLAD	99
HY-15198B	S/G 3 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	1CBLAD	99
HV-15199	S/G 4 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	1ABLAE	39A
HY-15199A	S/G 4 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	1ABLAE	39A
HY-15199B	S/G 4 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	1ABLAE	39A
HV-5227	S/G 1 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	1ABLAE	39A
HY-5227A	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5227B	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5227C	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5227D	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5227G	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5227H	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5227J	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5227K	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HV-5228	S/G 2 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	1CBLAD	99

TABLE 9.5.1-1 (SHEET 12 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HY-5228A	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5228B	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5228C	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5228D	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5228G	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HY-5228H	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HY-5228J	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HY-5228K	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HV-5229	S/G 3 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	1CBLAD	99
HY-5229A	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5229B	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5229C	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5229D	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	1CBLAD	99
HY-5229G	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HY-5229H	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99

TABLE 9.5.1-1 (SHEET 13 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	 Fire Zone
HY-5229J	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HY-5229K	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	1CBLAD	99
HV-5230	S/G 4 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	1ABLAE	39A
HY-5230A	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5230B	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5230C	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5230D	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	1ABLAE	39A
HY-5230G	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5230H	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5230J	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
HY-5230K	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	1ABLAE	39A
PSV-3001	S/G 1 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3002	S/G 1 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3003	S/G 1 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3004	S/G 1 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3005	S/G 1 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45

TABLE 9.5.1-1 (SHEET 14 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
PSV-3011	S/G 2 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3012	S/G 2 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3013	S/G 2 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3014	S/G 2 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3015	S/G 2 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3021	S/G 3 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3022	S/G 3 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3023	S/G 3 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3024	S/G 3 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3025	S/G 3 code safety valve	A, B	N/A	Hot	N/A	1CBLAD	104
PSV-3031	S/G 4 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3032	S/G 4 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3033	S/G 4 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3034	S/G 4 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
PSV-3035	S/G 4 code safety valve	A, B	N/A	Hot	N/A	1ABLAE	45
LT-0517	S/G 1 level	N/A[a]	4	N/A	No	1CTB	140A
LT-0518	S/G 1 level	N/A[a]	3	N/A	No	1CTB	140A
LT-0519	S/G 1 Level	N/A[a]	2	N/A	No	1CTB	140A
LT-0551	S/G 1 Level	N/A[a]	1	N/A	No	1CTB	140A
LT-0527	S/G 2 Level	N/A[a]	4	N/A	No	1CTB	140A
LT-0528	S/G 2 Level	N/A[a]	3	N/A	No	1CTB	140A

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 15 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
LT-0529	S/G 2 Level	N/A[a]	1	N/A	No	1CTB	140A
LT-0552	S/G 2 Level	N/A[a]	2	N/A	No	1CTB	140A
LT-0537	S/G 3 Level	N/A[a]	4	N/A	No	1CTB	140B
LT-0538	S/G 3 Level	N/A[a]	3	N/A	No	1CTB	140B
LT-0539	S/G 3 Level	N/A[a]	1	N/A	No	1CTB	140B
LT-0553	S/G 3 Level	N/A[a]	2	N/A	No	1CTB	140B
LT-0547	S/G 4 Level	N/A[a]	4	N/A	No	1CTB	140A
LT-0548	S/G 4 Level	N/A[a]	3	N/A	No	1CTB	140A
LT-0549	S/G 4 Level	N/A[a]	2	N/A	No	1CTB	140A
LT-0554	S/G 4 Level	N/A[a]	1	N/A	No	1CTB	140B
PT-0515	S/G 1 Pressure	N/A[a]	2	N/A	No	1ABLAD	39D
PT-0516	S/G 1 Pressure	N/A[a]	4	N/A	No	1ABLAD	39D
PT-0524	S/G 2 Pressure	N/A[a]	1	N/A	No	1CBLAA	101
PT-0526	S/G 2 Pressure	N/A[a]	3	N/A	No	1CBLAA	101
PT-0534	S/G 3 Pressure	N/A[a]	1	N/A	No	1CBLAI	93
PT-0536	S/G 3 Pressure	N/A[a]	3	N/A	No	1CBLAI	93
PT-0545	S/G 4 Pressure	N/A[a]	2	N/A	No	1ABLDG	48
PT-0546	S/G 4 Pressure	N/A[a]	4	N/A	No	1ABLDG	48
Auxiliary Feedwater System (15)							
1-1302-P4-002	AFW pump "B"	B	B	Both	Yes	1AFBA	155
1-1302-P4-003	AFW pump "A"	A	A	Both	Yes	1AFBB	156

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 16 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1302-V4-001	Condensate storage tank 1	A, B	N/A	Both	N/A	1AFBD	157B
1-1302-V4-002	Condensate storage tank 2	A, B	N/A	Both	N/A	1AFBD	157B
FV-5154	AFW pump B miniflow valve	B	B	Both	Yes	1AFBA	155
FT-5154	AFW pump B valve	B	2	Both	Yes	1AFBA	155
FV-5155	AFW pump A miniflow valve	A	A	Both	Yes	1AFBB	156
FT-5155	AFW pump A valve	A	1	Both	Yes	1AFBB	156
HV-5118	AFW pump B suction valve	B	B	Both	Yes	1AFBA	155
HV-5119	AFW pump A suction valve	A	A	Both	Yes	1AFBB	156
HV-5132	AFW pump B to S/G 2 valve	B	B	Both	Yes	1CBLAD	99
HV-5134	AFW pump B to S/G 3 valve	B	B	Both	Yes	1CBLAD	99
HV-5137	AFW pump A to S/G 4 valve	A	A	Both	Yes	1ABLAE	39A
HV-5139	AFW pump A to S/G 1 valve	A	A	Both	Yes	1ABLAE	39A
LT-5101	CST 1 level	B	2	Both	No (22)	1AFBD	157B
LT-5104	CST 2 level	B	2	Both	No (22)	1AFBD	157B
LT-5111	CST 1 level	A	1	Both	No (22)	1AFBD	157B
LT-5116	CST 2 level	A	1	Both	No (22)	1AFBD	157B
LI-5100	CST local level indicator	A,B	N/A	Both	No	1AFBD	157B
LI-5115	CST local level indicator	A,B	N/A	Both	No	1AFBD	157B
HV-5106	Steam to AFW pump turbine	N/A[(a)]	C	N/A	No	1AFBC	157A
FT-0510	S/G loop 1 feedwater flow (AMSAC)	N/A[(a)]	N	Hot	No	1ABLAE	45
FT-0511	S/G loop 1 feedwater flow (AMSAC)	N/A[(a)]	N	Hot	No	1ABLAE	45
FT-0520	S/G loop 2 feedwater flow (AMSAC)	N/A[(a)]	N	Hot	No	1CBLAN	86

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 17 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
FT-0521	S/G loop 2 feedwater flow (AMSAC)	N/A[a]	N	Hot	No	1CBLAN	86
FT-0530	S/G loop 3 feedwater flow (AMSAC)	N/A[a]	N	Hot	No	1CBLAN	86
FT-0531	S/G loop 3 feedwater flow (AMSAC)	N/A[a]	N	Hot	No	1CBLAN	86
FT-0540	S/G loop 4 feedwater flow (AMSAC)	N/A[a]	N	Hot	No	1ABLAE	45
FT-0541	S/G loop 4 feedwater flow (AMSAC)	N/A[a]	N	Hot	No	1ABLAE	45
Residual Heat Removal/Safety Injection System							
1-1205-E6-001	RHR heat exchanger "A"	A	N/A	Cold	N/A	1ABLCC	18
1-1205-E6-002	RHR heat exchanger "B"	B	N/A	Cold	N/A	1ABLCA	16
1-1205-P6-001	RHR pump "A"	A	A	Cold	Yes	1ABLDD	10
1-1205-P6-002	RHR pump "B"	B	B	Cold	Yes	1ABLDA	9

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 18 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-8809A	RHR pump to cold legs valve	A	A	Cold	Yes	1ABLAD	39D
HV-8809B	RHR pump to cold legs valve	B	B	Cold	Yes	1FBLCA	132
HV-8875A	S.I. accumulator 1 vent valve	A	A	Both	Yes	1CTB	140A
HV-8875B	S.I. accumulator 2 vent valve	A	A	Both	Yes	1CTB	140B
HV-8875C	S.I. accumulator 3 vent valve	A	A	Both	Yes	1CTB	140B
HV-8875D	S.I. accumulator 4 vent valve	A	A	Both	Yes	1CTB	140A
HV-8875E	S.I. accumulator 1 vent valve	B	B	Both	Yes	1CTB	140A
HV-8875F	S.I. accumulator 2 vent valve	B	B	Both	Yes	1CTB	140B
HV-8875G	S.I. accumulator 3 vent valve	B	B	Both	Yes	1CTB	140B
HV-8875H	S.I. accumulator 4 vent valve	B	B	Both	Yes	1CTB	140A

TABLE 9.5.1-1 (SHEET 19 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-0943A	S.I. accumulator header vent valve	A	A	Both	No (1)	1CTB	140B
HY-0943A	HV-0943A I/power converter	A	A	Both	No (1)	1CBLBT	61
HV-0943B	S.I. accumulator header vent valve	B	B	Both	Yes	1CTB	140B
HY-0943B	HV-0943B I/Power converter	B	B	Both	Yes	1CBLBD	60
FT-0618	RHR "A" flow	A	1	Cold	No (1)	1ABLDB	12
FT-0619	RHR "B" flow	B	2	Cold	No (1)	1ABLDB	12
FV-0610	RHR "A" miniflow valve	A	A	Cold	Yes	1ABLCC	18
FIS-0610	RHR "A" miniflow interlock	A	A (30)	Cold	Yes	1ABLDB	12
FV-0611	RHR "B" miniflow valve	B	B	Cold	Yes	1ABLCA	16
FIS-0611	RHR "B" miniflow interlock	B	B (30)	Cold	Yes	1ABLDB	12
FV-0618	RHR "A" heat exchanger bypass valve	A	N/A (2)	Cold	No (1)	1ABLCC	18
FY-0618	Heat exchanger bypass I/P converter	A	N (2)	Cold	No (1)	1ABLDB	24
FV-0619	RHR "B" heat exchanger bypass valve	B	N/A (2)	Cold	No (1)	1ABLCA	16
FY-0619	Heat exchanger bypass I/P converter	B	N (2)	Cold	No (1)(32)	1ABLDB	24
HV-0606	RHR "A" heat exchanger outlet valve	A	N/A (2)	Cold	No (1)(32)	1ABLCC	18
HY-0606	Heat exchanger outlet I/P converter	A	N (2)	Cold	No (1)	1ABLDB	24

TABLE 9.5.1-1 (SHEET 20 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-0607	RHR "B" heat exchanger outlet valve	B	N/A (2)	Cold	No (1)(32)	1ABLCA	16
HY-0607	Heat exchanger outlet I/P converter	B	N (2)	Cold	No (1)(32)	1ABLDB	24
HV-10465	RHR "A" vent valve	A	N (2)	Cold	No (24)	1ABLBB	26B
HV-10466	RHR "B" vent valve	B	N (2)	Cold	No (24)	1FBLCA	15
HV-8701A	RHR pump "A" suction valve	A	A	Cold	Yes	1CTB	140A
HV-8701B	RHR pump "A" suction valve	A	C	Cold	Yes	1CTB	140C
HV-8702A	RHR pump "B" suction valve	B	D	Cold	Yes	1CTB	140B
HV-8702B	RHR pump "B" suction valve	B	B	Cold	Yes	1CTB	140C
HV-8716A	RHR discharge header X-conn valve	A	A	Cold	No	1ABLDD	10
HV-8716B	RHR discharge header X-conn valve	B	B	Cold	No	1ABLDA	9
HV-8804A	RHR train "A" to CVCS valve	A	A	Cold	No (34)	1ABLCC	18
HV-8804B	RHR train "B" to SI valve	B	B	Cold	No (34)	1ABLCA	16
HV-8812A	RWST to RHR pump "A" valve	A	A	Cold	Yes	1ABLDD	10
HV-8812B	RWST to RHR pump "B" valve	B	B	Cold	Yes	1ABLDA	9
PT-0934	Containment pressure	N/A[a]	4	N/A	No	1FBLCA	132
PT-0935	Containment pressure	N/A[a]	3	N/A	No	1ABLBB	26B
PT-0936	Containment pressure	N/A[a]	2	N/A	No	1FBLCA	15
PT-0937	Containment pressure	N/A[a]	1	N/A	No	1ABLBB	26B

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 21 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Component Cooling Water System							
1-1203-E4-001	CCW heat exchanger "A"	A	N/A	Both	N/A	1ABLDG	54
1-1203-E4-002	CCW heat exchanger "B"	B	N/A	Both	N/A	1ABLAB	55
1-1203-P4-001	CCW pump 001	A	A	Both	Yes	1ABLDG	36
1-1203-P4-002	CCW pump 002	B	B	Both	Yes	1ABLAB	37
1-1203-P4-003	CCW pump 003	A	A	Both	Yes	1ABLDG	36
1-1203-P4-004	CCW pump 004	B	B	Both	Yes	1ABLAB	37
1-1203-P4-005	CCW pump 005	A	A	Both	Yes	1ABLDG	36
1-1203-P4-006	CCW pump 006	B	B	Both	Yes	1ABLAB	37
1-1203-T4-001	CCW surge tank	A	N/A	Both	N/A	1ABLDG	54
1-1203-T4-002	CCW surge tank	B	N/A	Both	N/A	1ABLAB	55
LSLL-1852	CCW pump 001 interlock	A	A (30)	Both	Yes (26)	1ABLDG	54
LSLL-1853	CCW pump 002 interlock	B	B (30)	Both	Yes (26)	1ABLAB	55
LSLL-1854	CCW pump 003 interlock	A	A (30)	Both	Yes (26)	1ABLDG	54
LSLL-1855	CCW pump 004 interlock	B	B (30)	Both	Yes (26)	1ABLAB	55
LSLL-1856	CCW pump 005 interlock	A	A (30)	Both	Yes (26)	1ABLDG	54
LSLL-1857	CCW pump 006 interlock	B	B (30)	Both	Yes (26)	1ABLAB	55
Nuclear Service Cooling Water System							
1-1202-P4-001	NSCW pump 001	A	A	Both	Yes	1NSPLAA	160A
1-1202-P4-002	NSCW pump 002	B	B	Both	Yes	1NSPLAB	160B

TABLE 9.5.1-1 (SHEET 22 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1202-P4-003	NSCW pump 003	A	A	Both	Yes	1NSPLAA	160A
1-1202-P4-004	NSCW pump 004	B	B	Both	Yes	1NSPLAB	160B
1-1202-P4-005	NSCW pump 005	A	A	Both	Yes	1NSPLAA	160A
1-1202-P4-006	NSCW pump 006	B	B	Both	Yes	1NSPLAB	160B
1-1202-W4-001	NSCW cooling tower	A	N/A	Both	N/A	1NSPLAA	160A
1-1202-W4-001-F01	NSCW cooling tower fan	A	A	Both	Yes	1NSPLAA	160A
1-1202-W4-001-F02	NSCW cooling tower fan	A	A	Both	Yes	1NSPLAA	160A
1-1202-W4-001-F03	NSCW cooling tower fan	A	A	Both	Yes	1NSPLAA	160A
1-1202-W4-001-F04	NSCW cooling tower fan	A	A	Both	Yes	1NSPLAA	160A
1-1202-W4-002	NSCW cooling tower	B	N/A	Both	N/A	1NSPLAB	160B
1-1202-W4-002-F01	NSCW cooling tower fan	B	B	Both	Yes	1NSPLAB	160B
1-1202-W4-002-F02	NSCW cooling tower fan	B	B	Both	Yes	1NSPLAB	160B
1-1202-W4-002-F03	NSCW cooling tower fan	B	B	Both	Yes	1NSPLAB	160B
1-1202-W4-002-F04	NSCW cooling tower fan	B	B	Both	Yes	1NSPLAB	160B
FT-1802	NSCW to ESF chiller "A"	A	3	Both	No (3)	1CBLCA	126A
FT-1803	NSCW to ESF chiller "B"	B	4	Both	No (3)	1CBL3M	125A
HV-11600	NSCW pump 001 valve	A	A	Both	Yes	1NSPLAA	160A
HV-11605	NSCW pump 005 valve	A	A	Both	Yes	1NSPLAA	160A
HV-11606	NSCW pump 003 valve	A	A	Both	Yes	1NSPLAA	160A

TABLE 9.5.1-1 (SHEET 23 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-11607	NSCW pump 002 valve	B	B	Both	Yes	1NSPLAB	160B
HV-11612	NSCW pump 006 valve	B	B	Both	Yes	1NSPLAB	160B
HV-11613	NSCW pump 004 valve	B	B	Both	Yes	1NSPLAB	160B
HV-1668A	"A" NSCW tower valve	A	A	Both	Yes	1NSPLAA	160A
HV-1668B	"A" NSCW tower bypass valve	A	A	Both	Yes	1NSPLAA	160A
HV-1669A	"B" NSCW tower valve	B	B	Both	Yes	1NSPLAB	160B
HV-1669B	"B" NSCW tower bypass valve	B	B	Both	Yes	1NSPLAB	160B
TE-1668	"A" NSCW tower bypass interlock	A	1	Both	No (3)	1NSPLAA	160A
TE-1669	"B" NSCW tower bypass interlock	B	2	Both	No (3)	1NSPLAB	160B
TV-11675	NSCW from ESF chiller "B"	B	B	Both	No (33)	1CBL3M	125A
TY-11675	NSCW from ESF chiller "B"	B	B	Both	No (33)	1CBL3M	125A
TV-11740	NSCW from ESF chiller "A"	A	A	Both	No (33)	1CBLCA	126A
TY-11740	NSCW from ESF chiller "A"	A	A	Both	No (33)	1CBLCA	126A
TE-11641	NSCW tower 001 fan F01 interlock	A	1	Both	No (3)	1NSPLAA	160A
TE-11642	NSCW tower 001 fan F02 interlock	A	1	Both	No (3)	1NSPLAA	160A
TE-11643	NSCW tower 001 fan F03 interlock	A	1	Both	No (3)	1NSPLAA	160A
TE-11644	NSCW tower 001 fan F04 interlock	A	1	Both	No (3)	1NSPLAA	160A
TE-11646	NSCW tower 002 fan F01 interlock	B	2	Both	No (3)	1NSPLAB	160B

TABLE 9.5.1-1 (SHEET 24 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TE-11647	NSCW tower 002 fan F02 interlock	B	2	Both	No (3)	1NSPLAB	160B
TE-11648	NSCW tower 002 fan F03 interlock	B	2	Both	No (3)	1NSPLAB	160B
TE-11649	NSCW tower 002 fan F04 interlock	B	2	Both	No (3)	1NSPLAB	160B
Diesel Generators							
1-2403-G4-001	Diesel generator package	A	A	Both	Yes	1DBL1A	161
1-2403-G4-002	Diesel generator package	B	B	Both	Yes	1DBL1B	162
1-2403-G4-001-V01	D.G. air start receiver	A	N/A	Both	N/A	1DBL1A	161
1-2403-G4-002-V01	D.G. air start receiver	B	N/A	Both	N/A	1DGL1B	162
1-2403-G4-001-V02	D.G. air start receiver	A	N/A	Both	N/A	1DBL1A	161
1-2403-G4-002-V02	D.G. air start receiver	B	N/A	Both	N/A	1DBL1B	162
1-2403-P4-001	D.F.O. storage tank pump	A	A	Both	No	1DPBA	165
1-2403-P4-002	D.F.O. storage tank pump	A	A	Both	No	1DPBA	165
1-2403-P4-003	D.F.O. storage tank pump	B	B	Both	No (27)	1DPBB	166
1-2403-P4-004	D.F.O. storage tank pump	B	B	Both	No (27)	1DPBB	166
1-2403-P5-DG1	Diesel generator panels DG1A	A	A	Both	Yes	1DBL1A	161
1-2403-P5-DG2	Diesel generator panels DG1A	A	A	Both	Yes	1DBL1A	161
1-2403-P5-DG3	Diesel generator panels DG1B	B	B	Both	Yes	1DBL1B	162
1-2403-P5-DG4	Diesel generator panels DG1B	B	B	Both	Yes	1DBL1B	162
1-2403-T4-001	D.F.O. storage tank	A	N/A	Both	N/A	1DPBA	165
1-2403-T4-002	D.F.O. storage tank	B	N/A	Both	N/A	1DPBB	166

TABLE 9.5.1-1 (SHEET 25 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-2403-T4-003	D.F.O. day tank	A	N/A	Both	N/A	1DBL1C	163
1-2403-T4-004	D.F.O. day tank	B	N/A	Both	N/A	1DBL1D	164
LSH-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	1DBL1C	163
LSL-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	1DBL1C	163
LSLL-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	1DBL1C	163
LSH-9021	D.F.O. storage tank pump interlock	B	B	Both	Yes (26)	1DBL1D	164
LSL-9021	D.F.O. storage tank pump interlock	B	B	Both	Yes (26)	1DBL1D	164
Essential Chilled Water System							
1-1592-C7-001	ESF chiller "A"	A	A	Both	Yes	1CBLCA	126A
1-1592-C7-002	ESF chiller "B"	B	B	Both	Yes	1CBL3M	125A
1-1592-P7-001	Chilled water pump "A"	A	A	Both	Yes	1CBLCA	126A
1-1592-P7-002	Chilled water pump "B"	B	B	Both	Yes	1CBL3M	125A
1-1592-T7-001	Expansion tank "A"	A	N/A	Both	N/A	1CBL3L	137
1-1592-T7-002	Expansion tank "B"	B	N/A	Both	N/A	1CBL3M	125A
FT-22426	ESF chilled water flow interlock	B	B	Both	No (3)	1CBL3M	125A
FT-22425	ESF chilled water flow interlock	A	A	Both	No (3)	1CBLCA	126A
TDC-4170	ESF chiller "A" interlock	A	A	Both	No (3)	1CBLCA	126A
TDC-4193	ESF chiller "B" interlock	B	B	Both	No (3)	1CBL3M	125A
TV-12124	Control room cooler valve (28)	A	A	Both	NR	1CBLCA	126A
TY-12124A	Cooler valve signal converter (28)	A	A	Both	NR	1CBLCA	126A

TABLE 9.5.1-1 (SHEET 26 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	 Fire Zone
TV-12125	Control room cooler valve (28)	B	B	Both	NR	1CBL3M	125A
TY-12125A	Cooler valve signal converter (28)	B	B	Both	NR	1CBL3M	125A
Ventilation and Air-Conditioning Systems							
1-1500-Q5-HVC	HVAC panel 1ACQHVC (28)	A, B	A, B	Both	N/A	1CBL1A	105
1-1500-V7-001-CBA	HVAC instrument panel (28)	A	A	Both	N/A	1CBL1A	105
1-1500-V7-002-CBB	HVAC instrument panel (28)	B	B	Both	N/A	1CBL1A	105
1-1531-N7-001	Control room cooler unit (28)	A	A	Both	NR	1CBLCA	126A
1-1531-N7-002	Control room cooler unit (28)	B	B	Both	NR	1CBL3M	125A
1HV-12118	OSA supply damper "A" (28)	A	A	Both	NR	1CBLCA	126A
1HY-12118	OSA supply damper "A" solenoid (28)	A	A (31)	Both	NR	1CBLCA	126A
1HV-12119	OSA supply damper "B" (28)	B	B	Both	NR	1CBL3M	125A
1HY-12119	OSA supply damper "B" solenoid (28)	B	B (31)	Both	NR	1CBL3M	125A

TABLE 9.5.1-1 (SHEET 27 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1HV-12128	Fan discharge damper (28)	A	A	Both	NR	1CBL1B	111
1HV-12129	Fan discharge damper (28)	B	B	Both	NR	1CBL1B	111
1HV-12130	Fan return damper (28)	A	A	Both	NR	1CBL1B	111
1HV-12131	Fan return damper (28)	B	B	Both	NR	1CBL1B	111
1HV-12146	CR normal supply isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	133B
1HY-12146A	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
1HV-12147	CR normal supply isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
1HY-12147A	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
1HV-12148	CR normal return isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
1HY-12148A	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
1HV-12149	CR normal return isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	131
1HY-12149A	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
AHV-12162	Kitchen/toilet exhaust damper (28)	A	N/A (2)	Both	NR	1CBL1G	110
AHY-12162A	Exhaust damper solenoid (28)	A	A (2)	Both	NR	1CBL1G	110
AHY-12162C	Exhaust damper solenoid (28)	A	A (2)	Both	NR	1CBL1G	110
AHV-12163	Kitchen/toilet exhaust damper (28)	B	N/A (2)	Both	NR	1CBL1G	110
AHY-12163A	Exhaust damper solenoid (28)	B	B (2)	Both	NR	1CBL1G	110
AHY-12163C	Exhaust damper solenoid (28)	B	B (2)	Both	NR	1CBL1G	110

TABLE 9.5.1-1 (SHEET 28 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2HV-12146	CR normal supply isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	131
1HY-12146B	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
1HY-12146C	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
2HV-12147	CR normal supply isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
1HY-12147B	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
1HY-12147C	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
2HV-12148	CR normal return isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
1HY-12148B	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
1HY-12148C	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
2HV-12149	CR normal return isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	131
1HY-12149B	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
1HY-12149C	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
1TE-12124	Control room temperature control (28)	A	A (2)	Both	NR	1CBLCA	126A
1TE-12125	Control rooom temperature control (28)	B	B (2)	Both	NR	1CBL3M	125A
1-1532-A7-001	CBSF electrical equipment room HVAC	A	A	Both	Yes	1CBLBA	72
1-1532-A7-002	CBSF electrical equipment room HVAC	B	B	Both	Yes	1CBLBD	70

TABLE 9.5.1-1 (SHEET 29 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1532-B7-001	CBSF battery room fan	A	A	Both	Yes	1CBLCB	80
1-1532-B7-002	CBSF battery room fan	B	B	Both	Yes	1CBLCB	80
1-1532-B7-003	CBSF battery room fan	A	A	Both	Yes	1CBLCB	80
1-1532-B7-004	CBSF battery room fan	B	B	Both	Yes	1CBLCB	80
HV-12727	CBSF battery room fan damper	B	B	Both	Yes	1CBLCB	80
HV-12742	CBSF battery room fan damper	A	A	Both	Yes	1CBLCB	80
HV-12748	CBSF battery room fan damper	A	A	Both	Yes	1CBLCB	80
HV-12749	CBSF battery room fan damper	B	B	Both	Yes	1CBLCB	80
TE-12725	CBSF electrical equipment room temperature	B	2	Both	No	1CBLBQ	79B
TE-12740	CBSF electrical equipment room temerature	A	1	Both	No	1CBLBM	78B
1-1539-A7-001	CB auxiliary relay room ESF cooler	A	A	Both	Yes	1CBLAN	94
1-1539-A7-002	CB auxiliary relay room cooler	B	B	Both	Yes	1CBL2A	121
1-1539-A7-005	CB normal AC room ESF cooler	A	A	Both	Yes	1CBL3H	135
1-1539-A7-006	Electrical equipment room ESF cooler	B	B	Both	Yes	1CBL3A	179
TIC-13150	Fan 1-1539-A7-005 interlock	A	A (30)	Both	Yes (26)	1CBL3H	135
TIC-13152	Fan 1-1539-A7-006 interlock	B	B (30)	Both	Yes (26)	1CBL3A	179
1-1555-A7-002	Train "B" MCC room cooler	B	B	Both	Yes	1ABL2A	53
1-1555-A7-003	Train "A" MCC room cooler	A	A	Both	Yes	1ABLBB	171

TABLE 9.5.1-1 (SHEET 30 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1555-A7-004	Train "B" MCC room cooler	B	B	Both	Yes	1ABLBA	34
1-1555-A7-005	Train "A" MCC room cooler	A	A	Both	Yes	1ABL1C	44
1-1555-A7-006	Train "B" MCC room cooler	B	B	Both	Yes	1ABL1B	43
1-1555-A7-007	RHR pump "A" room cooler	A	A	Both	Yes	1ABLDE	189
1-1555-A7-008	RHR pump "B" room cooler	B	B	Both	Yes	1ABLDC	190
1-1555-A7-011	CCW pump "A" room cooler	A	A	Both	Yes	1ABLDG	36
1-1555-A7-012	CCW pump "B" room cooler	B	B	Both	Yes	1ABLAB	37
1-1555-A7-013	Charging pump "A" room cooler	A	A	Both	Yes	1ABLCD	20
1-1555-A7-014	Charging pump "B" room cooler	B	B	Both	Yes	1ABLCE	19
1-1555-A7-001	Train "A" MCC room cooler	A	A	Both	Yes	1ABLDI	1
TISH-12200	Fan 1-1555-A7-001 interlock	A	A (30)	Both	Yes (26)	1ABLDH	2
TISH-12201	Fan 1-1555-A7-002 interlock	B	B (30)	Both	Yes (26)	1ABL1B	149
TISH-12202	Fan 1-1555-A7-003 interlock	A	A (30)	Both	Yes (26)	1ABLDG	22
TISH-12203	Fan 1-1555-A7-004 interlock	B	B (30)	Both	Yes (26)	1ABLBA	34
TISH-12204	Fan 1-1555-A7-005 interlock	A	A (30)	Both	Yes (26)	1ABL1C	44
TISH-12205	Fan 1-1555-A7-006 interlock	B	B (30)	Both	Yes (26)	1ABL1B	43
TE-12206	Fan 1-1555-A7-007 interlock	A	A (30)	Both	Yes (26)	1ABLDD	10
TSH-12206	Fan 1-1555-A7-007 interlock	A	A (30)	Both	Yes (26)	1ABLDB	12
TE-12212	Fan 1-1555-A7-008 interlock	B	B (30)	Both	Yes (26)	1ABLDA	9
TSH-12212	Fan 1-1555-A7-008 interlock	B	B (30)	Both	Yes (26)	1ABLDB	12

TABLE 9.5.1-1 (SHEET 31 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TISH-12208	Fan 1-1555-A7-011 interlock	A	A (30)	Both	Yes (26)	1ABLDG	36
TISH-12214	Fan 1-1555-A7-012 interlock	B	B (30)	Both	Yes (26)	1ABLAB	37
TE-12209	Fan 1-1555-A7-013 interlock	A	A (30)	Both	Yes (26)	1ABLCD	20
TSH-12209	Fan 1-1555-A7-013 interlock	A	A (30)	Both	Yes (26)	1ABLDG	14A
TISH-12215	Fan 1-1555-A7-014 interlock	B	B (30)	Both	Yes (26)	1ABLCE	19
1-1566-B7-001	D.G. building fan	A	A	Both	Yes	1DBL1A	161
1-1566-B7-002	D.G. building fan	B	B	Both	Yes	1DBL1B	162
1-1566-B7-003	D.G. building fan	A	A	Both	Yes	1DBL1A	161
1-1566-B7-004	D.G. building fan	B	B	Both	Yes	1DBL1B	162
HV-12050	D.G. building fan damper	A	A	Both	Yes	1DBL1A	161
HV-12051	D.G. building fan damper	A	A	Both	Yes	1DBL1A	161
HV-12053	D.G. building fan damper	B	B	Both	Yes	1DBL1B	162
HV-12054	D.G. building fan damper	B	B	Both	Yes	1DBL1B	162
TV-12085	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TV-12085A	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TV-12086	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TV-12086A	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12086	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12094A	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TV-12094C	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12094C	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12094D	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161

TABLE 9.5.1-1 (SHEET 32 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TY-12094D	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12094B	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12094E	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TY-12094F	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12095A	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TV-12095C	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12095C	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12095D	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12095D	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12095B	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12095E	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TY-12095F	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12096	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12096A	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12096	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12097	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TV-12097A	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TV-12098	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TV-12098A	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12098	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12099	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162

TABLE 9.5.1-1 (SHEET 33 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TV-12099A	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12099	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12100	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12100B	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12101	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12101B	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TV-12100A	D.G. building outside air damper	A	N/A (2)	Both	Yes	1DBL1A	161
TY-12100C	Outside air damper solenoid	A	A (2)	Both	Yes	1DBL1A	161
TV-12101A	D.G. building outside air damper	B	N/A (2)	Both	Yes	1DBL1B	162
TY-12101C	Outside air damper solenoid	B	B (2)	Both	Yes	1DBL1B	162
TISH-12051	D.G. building temperature interlock	A	A	Both	NA (26)	1DBL1A	161
TISH-12054	D.G. building temperature interlock	B	B	Both	NA (26)	1DBL1B	162
TISH-12100	D.G. ventilation temperature interlock	A	A (30)	Both	NA (26)	1DBL1A	161
TISH-12101	D.G. ventilation temperature Interlock	B	B (30)	Both	NA (26)	1DBL1B	162
FE-12087	D.G. building ventilation flow interlock	A	A	Both	Yes	1DBL1A	161
FS-12087	D.G. building ventilation flow interlock	A	A	Both	Yes	1DBL1A	161
FE-12088	D.G. building ventilation flow interlock	B	B	Both	Yes	1DBL1B	162

TABLE 9.5.1-1 (SHEET 34 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
FS-12088	D.G. building ventilation flow Interlock	B	B	Both	Yes	1DBL1B	162
1-1593-B7-002	AFW pump room "B" fan	B	B	Both	Yes	1AFBA	155
1-1593-B7-001	AFW pump room "A" fan	A	A	Both	Yes	1AFBB	156
HV-12005	AFW pump room "B" fan damper	B	B	Both	Yes	1AFBA	155
TIS-12005	AFW pump room "B" fan interlock	B	B (30)	Both	Yes (26)	1AFBA	155
HV-12006	AFW pump room "A" fan damper	A	A	Both	Yes	1AFBB	156
TIS-12006	AFW pump room "A" fan interlock	A	A (30)	Both	Yes (26)	1AFBB	156
1-1531-B7-002	CBCR ESF chiller room exhaust fan	A	A	Both	No	1CBLCA	126A
TIS-12303	Fan 1-1531-B7-002 interlock	A	A (30)	Both	No	1CBLCA	126A
1-1531-B7-004	CBCR ESF chiller room exhaust fan	B	B	Both	No (35)	1CBL3M	125A
TIS-12300	Fan 1-1531-B7-004 interlock	B	B (30)	Both	No	1CBL3M	125A
Auxiliary Component Cooling Water System							
1-1217-P4-001	ACCW pump	N/A (5)	A	Hot	No	1ABLDG	30
1-1217-P4-002	Spare ACCW pump	N/A (5)	B	Hot	No	1ABLBA	33
1-1217-E4-001	ACCW heat exchanger	N/A (5)	N/A	Both	N/A	1ABLDG	49
1-1217-E4-002	ACCW heat exchanger	N/A (5)	N/A	Both	N/A	1ABLAB	52
1-1217-T4-001	ACCW surge tank	N/A (5)	N/A	Both	N/A	1ABLAB	55
HV-1974	ACCW return isolation valve	N/A (5)	B	Hot	No	1CTB	140A
HV-1975	ACCW return isolation valve	N/A (5)	A	Hot	No	1ABLAE	39A
HV-1979	ACCW supply isolation valve	N/A (5)	A	Hot	No	1ABLAE	39A

TABLE 9.5.1-1 (SHEET 35 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	 Fire Zone
HV-1978	ACCW supply isolation valve	N/A (5)	B	Hot	No	1CTB	140A
LSLL-1956	ACCW pump interlock	N/A (5)	A (30)	Hot	No	1ABLAB	55
LSLL-1957	ACCW pump interlock	N/A (5)	B (30)	Hot	No	1ABLAB	55
PT-1956	ACCW pump interlock	N/A (5)	A	Hot	No	1ABLDG	30
PT-1957	ACCW pump interlock	N/A (5)	B	Hot	No	1ABLBA	33
Essential Electrical Distribution System							
1-1601-Q5-MCB	Main control board QMCB (28)	A, B	A, B (30)	Both	N/A	1CBL1A	105
1-1604-Q5-PCP	Miscellaneous equipment panel(28)	A, B	A, B	Both	N/A	1CBL1A	105
1-1604-Q5-PS1	Process protection set I (28)	A	1	Both	N/A	1CBL1A	105
1-1604-Q5-PS2	Process protection set II (28)	B	2	Both	N/A	1CBL1A	105
1-1604-Q5-PS3	Process protection set III (28)	A	3	Both	N/A	1CBL1A	105
1-1604-Q5-PS4	Process protection set IV (28)	B	4	Both	N/A	1CBL1A	105
1-1604-Q5-PP1	BOP protection channel I (28)	A	1	Both	N/A	1CBL1A	105
1-1604-Q5-PP2	BOP protection channel II (28)	B	2	Both	N/A	1CBL1A	105
1-1604-Q5-PP3	BOP protection channel III (28)	A	3	Both	N/A	1CBL1A	105
1-1604-Q5-PP4	BOP protection channel IV (28)	B	4	Both	N/A	1CBL1A	105
1UI-13134A	Liquid plasma display (28)	A	1	Both	N/A	1CBL1A	105
1UI-13134B	Liquid plasma display (28)	B	2	Both	N/A	1CBL1A	105
1-1623-D5-006A	Display processing Unit A	A	1	Both	Yes	1CBLAG	91
1-1623-D5-006B	Display processing Unit B	B	2	Both	Yes	1CBL2E	133B
1-1626-Q5-AMS	AMSAC cabinet	N/A[a]	N	Hot	N/A	1CBL1A	105

a. Spurious actuation concern only.

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1605-P5-SDA	Shutdown panel 1ACPSDA	A	A (30)	Both	N/A	1CBLAG	103
1-1605-P5-SDB	Shutdown panel 1ACPSDB	B	B (30)	Both	N/A	1CBLAL	98
1-1605-C5-ASI	Alternate shutdown indicating panel	B	2	Both	Yes	1CBL2E	133B
1-1605-Q5-SPA	Solid state protection panel-A	A	A,B,C,D	Both	N/A	1CBL1A	105
1-1605-Q5-SPB	Solid state protection panel-B	B	A,B,C,D,	Both	N/A	1CBL1A	105
1-1605-Q5-SPC	Solid state protection panel-C	A	3 (30)	Cold	N/A	1CBL1A	105
1-1605-Q5-SPD	Solid state protection panel-D	B	4 (30)	Cold	N/A	ICBL1A	105
1-1606-S6-002	Reactor trip switchgear	A, B	A, B	HOT	Yes	1CBLBA	69
1-1601-U3-T03	Termination cabinet 1ACPT03	A	A	Both	N/A	1CBLAK	95
1-1601-U3-T04	Termination cabinet 1BCPT04	B	B	Both	N/A	1CBL2B	120
1-1601-U3-T10	Termination cabinet 1BCPT10	B	B (30)	Both	N/A	1CBL2B	120
1-1601-U3-T15	Termination cabinet 1ACPT15	A	A 30)	Both	N/A	1CBLAK	95
1-1601-U3-T20	Termination cabinet 1BCPT20	B	B	Both	N/A	1CBL2B	120
1-1601-U3-T27	Termination cabinet 1ACPT27	A	A	Both	N/A	1CBLAK	95
1-1804-S3-A02	Class 1E 4-kV switchgear 1AA02	A	A	Both	Yes	1CBLAG	91
1-1804-S3-A03	Class 1E 4-kV switchgear 1BA03	B	B	Both	Yes	1CBLAH	92
1-1805-S3-ABA	Class 1E 480-V MCC 1ABA	A	A	Both	N/A	1CBL3H	135
1-1805-S3-ABB	Class 1E 480-V MCC 1ABB	A	A	Both	N/A	1ABL1C	44
1-1805-S3-ABC	Class 1E 480-V MCC 1ABC	A	A	Both	N/A	1CBLBB	75
1-1805-S3-ABD	Class 1E 480-V MCC 1ABD	A	A	Both	N/A	1ABLDG	22

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1805-S3-ABE	Class 1E 480-V MCC 1ABE	A	A	Both	N/A	1CBLBT	64
1-1805-S3-ABF	Class 1E 480-V MCC 1ABF	A	A	Both	N/A	1DBL1A	161
1-1805-S3-B04	Class 1E 480-V switchgear 1AB04	A	A	Both	Yes	1CBLBB	75
1-1805-S3-B05	Class 1E 480-V switchgear 1AB05	A	A	Both	Yes	1CBLBB	75
1-1805-S3-B06	Class 1E 480-V switchgear 1BB06	B	B	Both	Yes	1CBLBH	71
1-1805-S3-B07	Class 1E 480-V switchgear 1BB07	B	B	Both	Yes	1CBLBH	71
1-1805-S3-B15	Class 1E 480-V switchgear 1AB15	A	A	Both	Yes	1ABLDH	2
1-1805-S3-B16	Class 1E 480-V switchgear 1BB16	B	B	Both	Yes	1ABL1B	149
1-1805-S3-BBA	Class 1E 480-V MCC 1BBA	B	B	Both	N/A	1CBL3A	179
1-1805-S3-BBB	Class 1E 480-V MCC 1BBB	B	B	Both	N/A	1ABL1B	43
1-1805-S3-BBC	Class 1E 480-V MCC 1BBC	B	B	Both	N/A	1CBLBH	71
1-1805-S3-BBD	Class 1E 480-V MCC 1BBD	B	B	Both	N/A	1ABLBA	35
1-1805-S3-BBE	Class 1E 480-V MCC 1BBE	B	B	Both	N/A	1CBLAJ	158
1-1805-S3-BBF	Class 1E 480-V MCC 1BBF	B	B	Both	N/A	1DBL1B	162
1-1805-S3-RHR1A	Starter for RHR valve HV-8701B	A	C	Both	N/A	1CBLBL	77A
1-1805-S3-RHR2A	Starter for RHR valve HV-8702A	B	D	Both	N/A	1CBLBO	56A
1-1805-Y3-IC5	RHR isolation valve inverter for HV-8701B	A	C	Both	N/A	1CBLBL	77A
1-1805-Y3-ID6	RHR isolation valve inverter for HV-8702A	B	D	Both	N/A	1CBLBO	56A
1-1806-B3-BYA	Battery 1AD1B	A	A	Both	N/A	1CBLBM	78B

TABLE 9.5.1-1 (SHEET 38 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1806-B3-BYB	Battery 1BD1B	B	B	Both	N/A	1CBLBQ	79B
1-1806-B3-BYC	Battery 1CD1B	A	C	Both	N/A	1CBLBK	77B
1-1806-B3-BYD	Battery 1DD1B	B	D	Both	N/A	1CBLBJ	56B
1-1806-B3-CAA	Battery charger 1AD1CA	A	A	Both	N/A	1CBLBN	78A
1-1806-B3-CAB	Battery charger 1AD1CB	A	A	Both	N/A	1CBLBN	78A
1-1806-B3-CBA	Battery charger 1BD1CA	B	B	Both	N/A	1CBLBC	79A
1-1806-B3-CBB	Battery charger 1BD1CB	B	B	Both	N/A	1CBLBC	79A
1-1806-B3-CCA	Battery charger 1CD1CA	A	C	Both	N/A	1CBLBL	77A
1-1806-B3-CCB	Battery charger 1CD1CB	A	C	Both	N/A	1CBLBL	77A
1-1806-B3-CDA	Battery charger 1DD1CA	B	D	Both	N/A	1CBLBO	56A
1-1806-B3-CDB	Battery charger 1DD1CB	B	D	Both	N/A	1CBLBO	56A
1-1806-Q3-DA1	125-V-dc distribution panel 1AD11	A	A	Both	N/A	1CBLBN	78A
1-1806-Q3-DA2	125-V-dc distribution panel 1AD12	A	A	Both	N/A	1CBLBN	78A
1-1806-Q3-DB1	125-V-dc distribution panel 1BD11	B	B	Both	N/A	1CBLBC	79A
1-1806-Q3-DB2	125-V-dc distribution panel 1BD12	B	B	Both	N/A	1CBLBC	79A
1-1806-S3-DCA	125-V-dc MCC 1AD1M	A	A	Both	N/A	1CBLBN	78A
1-1806-S3-DCB	125-V-dc MCC 1BD1M	B	B	Both	N/A	1CBLBC	79A
1-1806-S3-DSA	125-V-dc switchgear 1AD1	A	A	Both	N/A	1CBLBN	78A
1-1806-S3-DSB	125-V-dc switchgear 1BD1	B	B	Both	N/A	1CBLBC	79A
1-1806-S3-DSC	125-V-dc switchgear 1CD1	A	C	Both	N/A	1CBLBL	77A

TABLE 9.5.1-1 (SHEET 39 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1806-S3-DSD	125-V-dc switchgear 1DD1	B	D	Both	N/A	1CBLBO	56A
1-1807-Q3-VI1	Vital bus distribution panel 1AY1A	A	A	Both	N/A	1CBLBN	78A
1-1807-Q3-VI2	Vital bus distribution panel 1BY1B	B	B	Both	N/A	1CBLBC	79A
1-1807-Q3-VI3	Vital bus distribution panel 1CY1A	A	C	Both	N/A	1CBLBL	77A
1-1807-Q3-VI4	Vital bus distribution panel 1DY1B	B	D	Both	N/A	1CBLBO	56A
1-1807-Q3-VI5	Vital bus distribution panel 1AY2A	A	A	Both	N/A	1ABL1C	44
1-1807-Q3-VI6	Vital bus distribution panel 1BY2B	B	B	Both	N/A	1ABL1B	43
1-1807-Y3-IA1	120-V-ac vital bus inverter 1AD1I1	A	A	Both	N/A	1CBLBN	78A
1-1807-Y3-IA11	120-V-ac vital bus inverter 1AD1I11	A	A	Both	N/A	1ABL1C	44
1-1807-Y3-IB12	120-V-ac vital bus inverter 1BD1I12	B	B	Both	N/A	1ABL1B	43
1-1807-Y3-IB2	120-V-ac vital bus inverter 1BD1I2	B	B	Both	N/A	1CBLBC	79A
1-1807-Y3-IC3	120-V-ac vital bus inverter 1CD1I3	A	C	Both	N/A	1CBLBL	77A
1-1807-Y3-ID4	120-V-ac vital bus inverter 1DD1I4	B	D	Both	N/A	1CBLBO	56A
1-1807-Y3-14	480/120-V transformer IBBC42RX	B	B	Both	N/A	1CBLBH	71
1-1807-Y3-16	Regulated transformer 1ABA29RX	A	A	Both	No	1CBL3H	135
1-1807-Y3-17	Regulated transformer 1BBA29RX	B	B	Both	No	1CBL3L	137
1-1816-U3-001	Auxiliary relay panel 1ACPAR1	A	A	Both	N/A	1CBLAN	94

TABLE 9.5.1-1 (SHEET 40 OF 81)

Unit 1 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
1-1816-U3-002	Auxiliary relay panel 1ACPAR2	A	A	Both	N/A	1CBLAN	94
1-1816-U3-003	Auxiliary relay panel 1BCPAR3	B	B	Both	N/A	1CBL2A	121
1-1816-U3-004	Auxiliary relay panel 1BCPAR4	B	B	Both	N/A	1CBL2A	121
1-1816-U3-007	Electrical auxiliary board QEAB (28)	A, B	A, B (30)	Both	N/A	1CBL1A	105
1-1816-U3-015	Auxiliary relay panel 1BCPAR7	B	B	Both	N/A	1CBL2A	121
1-1816-U3-017	Auxiliary relay panel 1ACPAR8	A	A (30)	Both	N/A	1CBLAN	94
1-1816-U3-018	Auxiliary relay panel 1BCPAR9	B	B (30)	Both	N/A	1CBLAH	92
1-1821-U3-001	Sequencer board 1ACPSQ1 (28)	A	1	Both	No (2)	1CBLAG	91
1-1821-U3-002	Sequencer board 1BCPSQ2 (28)	B	2	Both	No (2)	1CBLAH	92
Unit 2 Reactor Coolant system							
[a]	Core exit temp - loop 3	B	B	Both	Yes	2CTB	140B
[a]	Core exit temp - loop 2	B	B	Both	Yes	2CTB	140B
2-1201-B6-001	Steam generator loop 1	A	N/A	Both	N/A	2CTB	140C
2-1201-B6-002	Steam generator loop 2	B	N/A	Both	N/A	2CTB	140C
2-1201-B6-003	Steam generator loop 3	B	N/A	Both	N/A	2CTB	140C
2-1201-B6-004	Steam generator loop 4	A	N/A	Both	N/A	2CTB	140C

a. Core exit temperatures thermocouples TE-10002, 10003, 10006, 10008 through 100012, 10014, 10016 through 10019, 10021, 10022, 10024 through 10026, 10028, 10034, 10036, 10037, 10040, 10050.

TABLE 9.5.1-1 (SHEET 41 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Reactor Coolant System							
2-1201-V6-001	Reactor vessel	A, B	N/A	Both	N/A	2CTB	140A
2-1201-V6-002	Pressurizer	A, B	N/A	Both	N/A	2CTB	140E
2-1201-V6-003	Pressurizer relief tank	A, B	N/A	Both	N/A	2CTB	140B
HV-8095A	Reactor head vent valve	A	A	Both	Yes	2CTB	140C
HV-8095B	Reactor head vent valve	B	B	Both	Yes	2CTB	140C
HV-8096A	Reactor head vent valve	A	A	Both	Yes	2CTB	140C
HV-8096B	Reactor head vent valve	B	B	Both	Yes	2CTB	140B
HV-0442A	Reactor head vent valve	A	A	Both	No (1)	2CTB	140C
HY-0442A	HV-0442A I/power converter	A	A	Both	No (1)	2CBLBT	61
HV-0442B	Reactor head vent valve	B	B	Both	Yes	2CTB	140B
HY-0442B	HV-0442B I/Power converter	B	B	Both	Yes	2CBLBD	60
HV-8000A	Pressurizer PORV block valve (29)	A	A	Both	Yes	2CTB	140E
HV-8000B	Pressurizer PORV block valve (29)	B	B	Both	Yes	2CTB	140E
HV-8145	CVCS auxiliary spray valve	N/A	N/A (2)	Both	Yes	2CTB	140B
HY-8145	Auxiliary spray valve solenoid	N/A	N (2)	Both	Yes	2CTB	140B

TABLE 9.5.1-1 (SHEET 42 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
LT-0459	Pressurizer level	A	1	Both	No	2CTB	140A
LT-0460	Pressurizer level	B	2	Both	Yes	2CTB	140B
PT-0403	RCS wide range pressure	B	2	Both	Yes	2CTB	140A
PT-0405	RCS wide range pressure	A	1	Both	No	2CTB	140B
PT-0408	RHR valve pressure interlock	A	3	Cold	No (3)	2ABLDG	26A
PT-0418	RHR valve pressure interlock	B	4	Cold	No (3)	1ABLDB	27
PT-0428	RHR valve pressure interlock	B	2	Cold	No (3)	1ABLDB	27
PT-0438	RHR valve pressure interlock	A	1	Cold	No (3)	2ABLDG	26A
PV-0455A	Pressurizer PORV (29)	A	A	Both	Yes	2CTB	140E
PV-0456A	Pressurizer PORV (29)	B	B	Both	Yes	2CTB	140E
RE-13135A	RG 1.97 neutron flux chamber	A	A	Both	No	2CTB	140A
2-1602-P5-NFA	RG 1.97 neutron flux amplifier panel	A	A	Both	No	2CBLBT	61
RE-13135B	RG 1.97 Neutron flux chamber	B	B	Both	Yes	2CTB	140B
2-1602-P5-NFB	RG 1.97 Neutron flux amplifier panel	B	B	Both	Yes	2CBLBD	62
2-1602-P5-OIB	RG 1.97 Neutron flux OPT isolator panel	B	B	Both	Yes (40)	2CBLBD	62
TE-0413A	RCS T-hot wide range loop 1	A	1	Both	No	2CTB	140C
TE-0413B	RCS T-cold wide range loop 1	A (4)	2	Both	No	2CTB	140C

TABLE 9.5.1-1 (SHEET 43 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TE-0423B	RCS T-cold wide range loop 2	B (18)	2	Both	Yes	2CTB	140C
TE-0433B	RCS T-cold wide range loop 3	B (18)	2	Both	Yes	2CTB	140C
TE-0443A	RCS T-hot wide range loop 4	A	1	Both	No	2CTB	140C
TE-0443B	RCS T-cold wide range loop 4	A (4)	2	Both	No	2CTB	140C
PV-0455B	Pressurizer spray valve	N/A[a]	N (2)	N/A	Yes	2CTB	140E
PV-0455C	Pressurizer spray valve	N/A[a]	N (2)	N/A	Yes	2CTB	140E
PT-0455	Pressurizer pressure	N/A[a]	1	N/A	No (3)	2CTB	140B
PT-0456	Pressurizer pressure	N/A[a]	2	N/A	No (3)	2CTB	140B
PT-0457	Pressurizer pressure	N/A[a]	3	N/A	No	2CTB	140B
PT-0458	Pressurizer pressure	N/A[a]	4	N/A	No	2CTB	140B
PSV-8010A	Pressurizer code safety valve	A, B	N/A	HOT	N/A	2CTB	140E
PSV-8010B	Pressurizer code safety valve	A, B	N/A	HOT	N/A	2CTB	140E
PSV-8010C	Pressurizer code safety valve	A, B	N/A	HOT	N/A	2CTB	140E
PSE-10459	Pressurizer relief tank rupture disk	A, B	N/A	Both	N/A	2CTB	140A
PSE-10460	Pressurizer relief tank rupture disk	A, B	N/A	Both	N/A	2CTB	140A
Chemical and Volume Control System							
2-1208-E6-001	Regenerative heat exchanger	A	N/A	Both	N/A	2CTB	140B
2-1208-P6-002	Charging pump "A"	A	A	Both	Yes	2ABLCD	20
2-1208-P6-003	Charging pump "B"	B	B	Both	Yes	2ABLCE	19

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 44 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1208-P6-006	Boric acid transfer pump	A	A	Both	Yes	2ABLDJ	6
2-1208-P6-007	Boric acid transfer pump	B	B	Both	Yes	2ABLDG	3
2-1208-T4-003	Boric acid storage tank	A, B	N/A	Both	N/A	2ABLDG	3
2-1204-T4-001	Refueling water storage tank	A, B	N/A	Both	N/A	2NSPLAB	188
FT-0121	Charging line flow	N/A (5)	N	HOT	No	2ABLDG	14D
FV-0121	Centrifugal charging pump flow control valve	N/A (5)	N/A (2)	HOT	No	2ABLDG	21
FY-0121A	FV-0121 I/P converter	N/A (5)	N (2)	HOT	No	2ABLDG	14D
HV-0123	Excess letdown heat exchanger discharge valve	N/A[a]	N/A (2)	N/A	No	2CTB	140A
HY-0123	Excess letdown heat exchanger discharge valve solenoid	N/A[a]	N (2)	N/A	No	2CTB	140A
HV-0190A	TRAIN "A" boration path valve	A	A	Both	No (6)	2ABLAD	39D
HY-0190A	HV-0190A I/power converter	A	A	Both	No (6)	2ABLDG	36
HV-0190B	TRAIN "B" boration path valve	B	B	Both	No (6)	2ABLCE	19
HY-0190B	HV-0190B I/power converter	B	B	Both	No (6)	2ABLDG	14C
HV-8103A	RCP 1 seal water inlet valve	N/A (5)	B	HOT	No	2ABLAD	39D
HV-8103B	RCP 2 seal water inlet valve	N/A (5)	B	HOT	No	2ABLAD	39D
HV-8103C	RCP 3 seal water inlet valve	N/A (5)	B	HOT	No	2FBLCA	132
HV-8103D	RCP 4 seal water inlet valve	N/A (5)	B	HOT	No	2FBLCA	132
HV-8104	BAST to charging pump "A" valve	A	A	Both	Yes	2ABLDB	38
HV-8105	Train "A" charging path valve	A (7)	B	Both	Yes	2ABLAD	39D

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 45 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-8110	Seal water heat exchanger valve	A, B (8)	A	Both	Yes	2ABLBA	34
HV-8111A	Train "A" miniflow valve	A	B	Both	Yes	2ABLCD	20
HV-8111B	Train "B" miniflow valve	B	B	Both	Yes	2ABLCE	19
HV-8116	Train "A" boration path valve	A	A	Both	Yes	2ABLAD	39D
HV-8146	Normal charging path valve	A	A	Both	Yes	2CTB	140A
HV-8153	Excess letdown isolation valve	N/A[a]	N/A (2)	N/A	No (24)	2CTB	140B
HY-8153	Excess letdown isolation valve solenoid	N/A[a]	N (2)	N/A	No (24)	2CTB	140B
HV-8154	Excess letdown isolation valve	N/A[a]	N/A (2)	N/A	No (24)	2CTB	140B
HY-8154	Excess letdown isolation valve solenoid	N/A[a]	N (2)	N/A	No (24)	2CTB	140B
LV-0460	RCS normal letdown isolation valve (9)	B	N/A (2)	Both	Yes	2CTB	140C
LY-0460	RCS normal letdown solenoid (9)	B	N (2)	Both	Yes	2CTB	140C
LV-0459	RCS normal letdown isolation valve (9)	A	N/A (2)	Both	Yes	2CTB	140C
LY-0459	RCS normal letdown solenoid (9)	A	N (2)	Both	Yes	2CTB	140C
HV-8438	Charging pump "B" to normal charging pump valve	B	B	Both	Yes	2ABLCE	19
HV-8471A	Charging pump "A" suction valve	A	A	Both	Yes	2ABLCD	20
HV-8471B	Charging pump "B" suction valve	B	B	Both	Yes	2ABLCE	19
HV-8485A	Train "A" SI boration path valve	A	A	Both	Yes	2ABLCD	20

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 46 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-8485B	Train "B" SI boration path valve	B	B	Both	Yes	2ABLCE	19
HV-8508A	Train "A" miniflow valve	A (10)	A	Both	No (11)	2ABLCD	20
HV-8508B	Train "A" miniflow valve	B (10)	B	Both	No (11)	2ABLCE	19
HV-8509A	Train "B" miniflow valve	B (10)	A	Both	No (11)	2ABLCE	19
HV-8509B	Train "B" miniflow valve	A (10)	B	Both	No (11)	2ABLCD	20
LT-0102	BAST level	A (12)	1	Both	No (13)	2ABLDG	3
LT-0104	BAST level	B (12)	4	Both	No (13)	2ABLDG	3
PI-10115	Boric acid transfer pump "A" suction pressure	A,B	N/A	Both	No	2ABLDJ	6
LI-0990C	RWST local level indicator	A,B	N/A	Both	No	2NSPLAB	188
LT-0990	RWST level	A	1	Both	No (14)	2NSPLAB	188
LT-0991	RWST level	B	2	Both	No (14)	2NSPLAB	188
LV-0112B	VCT isolation valve	A	A	Both	Yes	2ABLDB	38
LV-0112C	VCT isolation valve	B	B	Both	Yes	2ABLDB	38
LV-0112D	RWST to charging pump valve	A	A	Both	Yes	2ABLDG	14D
LV-0112E	RWST to charging pump valve	B	B	Both	Yes	2ABLDG	14C
HV-8801A	SIS boration valve	A	A	Both	Yes	2ABLBB	39B
HV-8801B	SIS boration valve	B	B	Both	Yes	2ABLBB	39B
Main Steam System (15) (20)							
HV-13005A	S/G 1 steam isolation bypass valve	A	N/A (2)	Both	No (16)	2ABLAE	45
HY-13005A	S/G 1 steam isolation bypass solenoid	A	A (2)	Both	No (16)	2ABLAE	45
HV-13005B	S/G 1 steam isolation bypass valve	B	N/A (2)	Both	No (16)	2ABLAE	45
HY-13005B	S/G 1 steam isolation bypass solenoid	B	B (2)	Both	No (16)	2ABLAE	45

TABLE 9.5.1-1 (SHEET 47 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-13006A	S/G 4 steam Isolation bypass valve	A	N/A (2)	Both	No (16)	2ABLAE	45
HY-13006A	S/G 4 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	2ABLAE	45
HV-13006B	S/G 4 steam isolation bypass valve	B	N/A (2)	Both	No (16)	2ABLAE	45
HY-13006B	S/G 4 steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	2ABLAE	45
HV-13007A	S/G 2 Steam isolation bypass valve	A	N/A (2)	Both	No (16)	2CBLAD	104
HY-13007A	S/G 2 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	2CBLAD	104
HV-13007B	S/G 2 steam isolation bypass valve	B	N/A (2)	Both	No (16)	2CBLAD	104
HY-13007B	S/G 2 Steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	2CBLAD	104
HV-13008A	S/G 3 steam isolation bypass valve	A	N/A (2)	Both	No (16)	2CBLAD	104
HY-13008A	S/G 3 steam isolation bypass valve solenoid	A	A (2)	Both	No (16)	2CBLAD	104
HV-13008B	S/G 3 steam isolation bypass valve	B	N/A (2)	Both	No (16)	2CBLAD	104
HY-13008B	S/G 3 Steam isolation bypass valve solenoid	B	B (2)	Both	No (16)	2CBLAD	104
HV-3006A	S/G 1 main steam isolation valve	A	A	Both	No (16)	2ABLAE	45
HV-3006B	S/G 1 main steam isolation valve	B	B	Both	No (16)	2ABLAE	45
HV-3016A	S/G 2 main steam isolation valve	A	A	Both	No (16)	2CBLAD	104

TABLE 9.5.1-1 (SHEET 48 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-3016B	S/G 2 main steam isolation valve	B	B	Both	No (16)	2CBLAD	104
HV-3026A	S/G 3 main steam isolation valve	A	A	Both	No (16)	2CBLAD	104
HV-3026B	S/G 3 main steam isolation valve	B	B	Both	No (16)	2CBLAD	104
HV-3036A	S/G 4 main steam isolation valve	A	A	Both	No (16)	2ABLAE	45
HV-3036B	S/G 4 main steam isolation valve	B	B	Both	No (16)	2ABLAE	45
HV-15216A	S/G 1 blowdown isolation valve	B	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15216A	S/G 1 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	2CTB (17)	140A
HV-15216B	S/G 2 blowdown isolation valve	B	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15216B	S/G 2 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	2CTB (17)	140A
HV-15216C	S/G 3 blowdown isolation valve	B	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15216C	S/G 3 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	2CTB (17)	140A
HV-15216D	S/G 4 blowdown isolation valve	B	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15216D	S/G 4 blowdown isolation valve solenoid	B	B (2)	Both	No (16)	2CTB (17)	140A
HV-15212A	S/G 1 blowdown isolation valve	A	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15212A	S/G 1 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	2CTB (17)	140A
HV-15212B	S/G 2 blowdown isolation valve	A	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15212B	S/G 2 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	2CTB (17)	140A

TABLE 9.5.1-1 (SHEET 49 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-15212C	S/G 3 blowdown isolation valve	A	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15212C	S/G 3 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	2CTB (17)	140A
HV-15212D	S/G 4 blowdown isolation valve	A	N/A (2)	Both	No (16)	2CTB (17)	140A
HY-15212D	S/G 4 blowdown isolation valve solenoid	A	A (2)	Both	No (16)	2CTB (17)	140A
LT-0501	S/G 1 wide range level	A	1	Both	No	2CTB	140A
LT-0502	S/G 2 wide range level	B	2	Both	Yes	2CTB	140A
LT-0503	S/G 3 wide range level	B	2	Both	Yes	2CTB	140B
LT-0504	S/G 4 wide range level	A	3	Both	No	2CTB	140A
PT-0514	S/G 1 pressure	A	1	Both	No	2ABLAD	39D
PT-0525	S/G 2 pressure	B	2	Both	No (18)	2CBLAB	89
PT-0535	S/G 3 pressure	B	2	Both	No (18)	2CBLAT	102
PT-0544	S/G 4 pressure	A	1	Both	No	2ABLDG	48
PV-3000	S/G 1 atmospheric dump valve	A	A	Both	No (19)	2ABLAE	45
PY-3000	Atm dump valve signal converter	A	A	Both	No (19)	2ABL2E	148
PT-3000	Atm dump valve pressure transmitter	A	1	Both	No (19)	2ABLAD	39D
PV-3010	S/G 2 atmospheric dump valve	B	B	Both	Yes	2CBLAD	104
PY-3010	Atm dump valve signal converter	B	B	Both	Yes	2CBLAS	100
PT-3010	Atm dump valve pressure transmitter	B	2	Both	No	2CBLAB	89

TABLE 9.5.1-1 (SHEET 50 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
PV-3020	S/G 3 atmospheric dump valve	B	B	Both	Yes	2CBLAD	104
PY-3020	Atm dump valve signal converter	B	B	Both	Yes	2CBLAS	100
PT-3020	Atm dump valve pressure transmitter	B	2	Both	No	2CBLAT	102
PV-3030	S/G 4 atmospheric dump valve	A	A	Both	No (19)	2ABLAE	45
PY-3030	Atm dump valve signal converter	A	A	Both	No (19)	2ABL2E	148
PT-3030	Atm dump valve pressure transmitter	A	1	Both	No (19)	2ABLDG	48
HV-15196	S/G 1 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	2ABLAE	39A
HY-15196A	S/G 1 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	2ABLAE	39A
HY-15196B	S/G 1 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	2ABLAE	39A
HV-15197	S/G 2 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	2CBLAD	99
HY-15197A	S/G 1 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	2CBLAD	99
HY-15197B	S/G 2 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	2CBLAD	99
HV-15198	S/G 3 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	2CBLAD	99
HY-15198A	S/G 3 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	2CBLAD	99
HY-15198B	S/G 3 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	2CBLAD	99
HV-15199	S/G 4 feedwater isolation valve	A, B(20)	N/A (2)	Both	No (21)	2ABLAE	39A

TABLE 9.5.1-1 (SHEET 51 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HY-15199A	S/G 4 feedwater isolation valve solenoid	A	A (2)	Both	No (21)	2ABLAE	39A
HY-15199B	S/G 4 feedwater isolation valve solenoid	B	B (2)	Both	No (21)	2ABLAE	39A
HV-5227	S/G 1 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	2ABLAE	39A
HY-5227A	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5227B	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5227C	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5227D	S/G 1 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5227G	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5227H	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5227J	S/G 1 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5227K	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HV-5228	S/G 2 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	2CBLAD	99
HY-5228A	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5228B	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5228C	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99

TABLE 9.5.1-1 (SHEET 52 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HY-5228D	S/G 2 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5228G	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5228H	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5228J	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5228K	S/G 2 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HV-5229	S/G 3 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	2CBLAD	99
HY-5229A	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5229B	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5229C	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5229D	S/G 3 feedwater isolation valve solenoid	A	A	Both	No (21)	2CBLAD	99
HY-5229G	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5229H	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5229J	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99
HY-5229K	S/G 3 feedwater isolation valve solenoid	B	B	Both	No (21)	2CBLAD	99

TABLE 9.5.1-1 (SHEET 53 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-5230	S/G 4 feedwater isolation valve	A, B(20)	N/A	Both	No (21)	2ABLAE	39A
HY-5230A	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5230B	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5230C	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5230D	S/G 4 feedwater isolation valve solenoid	A	A	Both	No (21)	2ABLAE	39A
HY-5230G	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5230H	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5230J	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
HY-5230K	S/G 4 feedwater isolation valve solenoid	B	B	Both	No (21)	2ABLAE	39A
PSV-3001	S/G 1 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3002	S/G 1 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3003	S/G 1 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3004	S/G 1 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3005	S/G 1 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3011	S/G 2 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3012	S/G 2 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3013	S/G 2 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104

TABLE 9.5.1-1 (SHEET 54 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
PSV-3014	S/G 2 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3015	S/G 2 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3021	S/G 3 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3022	S/G 3 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3023	S/G 3 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3024	S/G 3 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3025	S/G 3 code safety valve	A, B	N/A	Hot	N/A	2CBLAD	104
PSV-3031	S/G 4 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3032	S/G 4 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3033	S/G 4 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3034	S/G 4 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
PSV-3035	S/G 4 code safety valve	A, B	N/A	Hot	N/A	2ABLAE	45
LT-0517	S/G 1 level	N/A[a]	4	N/A	No	2CTB	140A
LT-0518	S/G 1 level	N/A[a]	3	N/A	No	2CTB	140A
LT-0519	S/G 1 Level	N/A[a]	2	N/A	No	2CTB	140A
LT-0551	S/G 1 Level	N/A[a]	1	N/A	No	2CTB	140A
LT-0527	S/G 2 Level	N/A[a]	4	N/A	No	2CTB	140A
LT-0528	S/G 2 Level	N/A[a]	3	N/A	No	2CTB	140A
LT-0529	S/G 2 Level	N/A[a]	1	N/A	No	2CTB	140A
LT-0552	S/G 2 Level	N/A[a]	2	N/A	No	2CTB	140A

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 55 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
LT-0537	S/G 3 Level	N/A[a]	4	N/A	No	2CTB	140B
LT-0538	S/G 3 Level	N/A[a]	3	N/A	No	2CTB	140B
LT-0539	S/G 3 Level	N/A[a]	1	N/A	No	2CTB	140B
LT-0553	S/G 3 Level	N/A[a]	2	N/A	No	2CTB	140B
LT-0547	S/G 4 Level	N/A[a]	4	N/A	No	2CTB	140A
LT-0548	S/G 4 Level	N/A[a]	3	N/A	No	2CTB	140A
LT-0549	S/G 4 Level	N/A[a]	2	N/A	No	2CTB	140A
LT-0554	S/G 4 Level	N/A[a]	1	N/A	No	2CTB	140B
PT-0515	S/G 1 Pressure	N/A[a]	2	N/A	No	2ABLAD	39D
PT-0516	S/G 1 Pressure	N/A[a]	4	N/A	No	2ABLAD	39D
PT-0524	S/G 2 Pressure	N/A[a]	1	N/A	No	2CBLAA	101
PT-0526	S/G 2 Pressure	N/A[a]	3	N/A	No	2CBLAA	101
PT-0534	S/G 3 Pressure	N/A[a]	1	N/A	No	2CBLAI	93
PT-0536	S/G 3 Pressure	N/A[a]	3	N/A	No	2CBLAI	93
PT-0545	S/G 4 Pressure	N/A[a]	2	N/A	No	2ABLDG	48
PT-0546	S/G 4 Pressure	N/A[a]	4	N/A	No	2ABLDG	48
Auxiliary Feedwater System (15)							
2-1302-P4-002	AFW pump "B"	B	B	Both	Yes	2AFBA	155
2-1302-P4-003	AFW pump "A"	A	A	Both	Yes	2AFBB	156
2-1302-V4-001	Condensate storage tank 1	A, B	N/A	Both	N/A	2AFBD	157B
2-1302-V4-002	Condensate storage tank 2	A, B	N/A	Both	N/A	2AFBD	157B

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 56 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
FV-5154	AFW pump B miniflow valve	B	B	Both	Yes	2AFBA	155
FT-5154	AFW pump B valve	B	2	Both	Yes	2AFBA	155
FV-5155	AFW pump A miniflow valve	A	A	Both	Yes	2AFBB	156
FT-5155	AFW pump A valve	A	1	Both	Yes	2AFBB	156
HV-5118	AFW pump B suction valve	B	B	Both	Yes	2AFBA	155
HV-5119	AFW pump A suction valve	A	A	Both	Yes	2AFBB	156
HV-5132	AFW pump B to S/G 2 valve	B	B	Both	Yes	2CBLAD	99
HV-5134	AFW pump B to S/G 3 valve	B	B	Both	Yes	2CBLAD	99
HV-5137	AFW pump A to S/G 4 valve	A	A	Both	Yes	2ABLAE	39A
HV-5139	AFW pump A to S/G 1 valve	A	A	Both	Yes	2ABLAE	39A
LT-5101	CST 1 level	B	2	Both	No (22)	2AFBD	157B
LT-5104	CST 2 level	B	2	Both	No (22)	2AFBD	157B
LT-5111	CST 1 level	A	1	Both	No (22)	2AFBD	157B
LT-5116	CST 2 level	A	1	Both	No (22)	2AFBD	157B
LI-5100	CST local level indicator	A,B	N/A	Both	No	2AFBD	157B
LI-5115	CST local level indicator	A,B	N/A	Both	No	2AFBD	157B
HV-5106	Steam to AFW pump turbine	N/A[a]	C	N/A	No	2AFBC	157A
FT-0510	S/G 1 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2ABLAE	39A
FT-0511	S/G 1 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2ABLAE	39A
FT-0520	S/G 2 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2CBLAN	86
FT-0521	S/G 2 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2CBLAN	86

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 57 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
FT-0530	S/G 3 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2CBLAN	86
FT-0531	S/G 3 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2CBLAN	86
FT-0540	S/G 4 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2ABLAE	39A
FT-0541	S/G 4 FW Flow (AMSAC)	N/A[a]	N/A	N/A	N/A	2ABLAE	39A
Residual Heat Removal/Safety Injection System							
2-1205-E6-001	RHR heat exchanger "A"	A	N/A	Cold	N/A	2ABLCC	18
2-1205-E6-002	RHR heat exchanger "B"	B	N/A	Cold	N/A	2ABLCA	16
2-1205-P6-001	RHR pump "A"	A	A	Cold	Yes	2ABLDD	10
2-1205-P6-002	RHR pump "B"	B	B	Cold	Yes	2ABLDA	9
HV-8809A	RHR pump to cold legs valve	A	A	Cold	Yes	2ABLAD	39D
HV-8809B	RHR pump to cold legs valve	B	B	Cold	Yes	2FBLCA	132
HV-8875A	S.I. accumulator 1 vent valve	A	A	Both	Yes	2CTB	140A
HV-8875B	S.I. accumulator 2 vent valve	A	A	Both	Yes	2CTB	140B
HV-8875C	S.I. accumulator 3 vent valve	A	A	Both	Yes	2CTB	140B
HV-8875D	S.I. accumulator 4 vent valve	A	A	Both	Yes	2CTB	140A
HV-8875E	S.I. accumulator 1 vent valve	B	B	Both	Yes	2CTB	140A
HV-8875F	S.I. accumulator 2 vent valve	B	B	Both	Yes	2CTB	140B
HV-8875G	S.I. accumulator 3 vent valve	B	B	Both	Yes	2CTB	140B
HV-8875H	S.I. accumulator 4 vent valve	B	B	Both	Yes	2CTB	140A
HV-0943A	S.I. accumulator header vent valve	A	A	Both	No (1)	2CTB	140B
HY-0943A	HV-0943A I/power converter	A	A	Both	No (1)	2CBLBT	61

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 58 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-0943B	S.I. accumulator header vent valve	B	B	Both	Yes	2CTB	140B
HY-0943B	HV-0943B I/Power converter	B	B	Both	Yes	2CBLBD	60
FT-0618	RHR "A" flow	A	1	Cold	No (1)	2ABLDB	13
FT-0619	RHR "B" flow	B	2	Cold	No (1)	2ABLDB	13
FV-0610	RHR "A" miniflow valve	A	A	Cold	Yes	2ABLCC	18
FIS-0610	RHR "A" miniflow interlock	A	A (30)	Cold	Yes	2ABLDB	13
FV-0611	RHR "B" miniflow valve	B	B	Cold	Yes	2ABLCA	16
FIS-0611	RHR "B" miniflow interlock	B	B (30)	Cold	Yes	2ABLDB	13
FV-0618	RHR "A" heat exchanger bypass valve	A	N/A (2)	Cold	No (1)	2ABLCC	18
FY-0618	Heat exchanger bypass I/P converter	A	N (2)	Cold	No (1)	2ABLDB	24
FV-0619	RHR "B" heat exchanger bypass valve	B	N/A (2)	Cold	No (1)(32)	2ABLCA	16
FY-0619	Heat exchanger bypass I/P converter	B	N (2)	Cold	No (1)(32)	2ABLDB	24
HV-0606	RHR "A" heat exchanger outlet valve	A	N/A (2)	Cold	No (1)	2ABLCC	18
HY-0606	Heat exchanger outlet I/P converter	A	N (2)	Cold	No (1)	2ABLDB	24
HV-0607	RHR "B" heat exchanger outlet valve	B	N/A (2)	Cold	No (1)(32)	2ABLCA	16

TABLE 9.5.1-1 (SHEET 59 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HY-0607	Heat exchanger outlet I/P converter	B	N (2)	Cold	No (1)(32)	2ABLDB	24
HV-10465	RHR "A" vent valve	A	N (2)	Cold	No (24)	2ABLBB	26B
HV-10466	RHR "B" vent valve	B	N (2)	Cold	No (24)	2FBLCA	15
HV-8701A	RHR pump "A" suction valve	A	A	Cold	Yes	2CTB	140A
HV-8701B	RHR pump "A" suction valve	A	C	Cold	Yes	2CTB	140C
HV-8702A	RHR pump "B" suction valve	B	D	Cold	Yes	2CTB	140B
HV-8702B	RHR pump "B" suction valve	B	B	Cold	Yes	2CTB	140C
HV-8716A	RHR discharge header X-conn valve	A	A	Cold	No	2ABLDD	10
HV-8716B	RHR discharge header X-conn valve	B	B	Cold	No	2ABLDA	9
HV-8804A	RHR train "A" to CVCS valve	A	A	Cold	No (34)	2ABLCC	18
HV-8804B	RHR train "B" to SI valve	B	B	Cold	No (34)	2ABLCA	16
HV-8812A	RWST to RHR pump "A" valve	A	A	Cold	Yes	2ABLDD	10
HV-8812B	RWST to RHR pump "B" valve	B	B	Cold	Yes	2ABLDA	9
PT-0934	Containment pressure	N/A[a]	4	N/A	No	2FBLCA	132
PT-0935	Containment pressure	N/A[a]	3	N/A	No	2ABLBB	26B
PT-0936	Containment pressure	N/A[a]	2	N/A	No	2FBLCA	15
PT-0937	Containment pressure	N/A[a]	1	N/A	No	2ABLBB	26B
Component Cooling Water System							
2-1203-E4-001	CCW heat exchanger "A"	A	N/A	Both	N/A	2ABLDG	54
2-1203-E4-002	CCW heat exchanger "B"	B	N/A	Both	N/A	2ABLAB	55

a. Spurious actuation concern only.

TABLE 9.5.1-1 (SHEET 60 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1203-P4-001	CCW pump 001	A	A	Both	Yes	2ABLDG	36
2-1203-P4-002	CCW pump 002	B	B	Both	Yes	2ABLAB	37
2-1203-P4-003	CCW pump 003	A	A	Both	Yes	2ABLDG	36
2-1203-P4-004	CCW pump 004	B	B	Both	Yes	2ABLAB	37
2-1203-P4-005	CCW pump 005	A	A	Both	Yes	2ABLDG	36
2-1203-P4-006	CCW pump 006	B	B	Both	Yes	2ABLAB	37
2-1203-T4-001	CCW surge tank	A	N/A	Both	N/A	2ABLDG	54
2-1203-T4-002	CCW surge tank	B	N/A	Both	N/A	2ABLAB	55
LSLL-1852	CCW pump 001 interlock	A	A (30)	Both	Yes (26)	2ABLDG	54
LSLL-1853	CCW pump 002 interlock	B	B (30)	Both	Yes (26)	2ABLAB	55
LSLL-1854	CCW pump 003 interlock	A	A (30)	Both	Yes (26)	2ABLDG	54
LSLL-1855	CCW pump 004 interlock	B	B (30)	Both	Yes (26)	2ABLAB	55
LSLL-1856	CCW pump 005 interlock	A	A (30)	Both	Yes (26)	2ABLDG	54
LSLL-1857	CCW pump 006 interlock	B	B (30)	Both	Yes (26)	2ABLAB	55
Nuclear Service Cooling Water System							
2-1202-P4-001	NSCW pump 001	A	A	Both	Yes	2NSPLAA	160A
2-1202-P4-002	NSCW pump 002	B	B	Both	Yes	2NSPLAB	160B
2-1202-P4-003	NSCW pump 003	A	A	Both	Yes	2NSPLAA	160A
2-1202-P4-004	NSCW pump 004	B	B	Both	Yes	2NSPLAB	160B
2-1202-P4-005	NSCW pump 005	A	A	Both	Yes	2NSPLAA	160A

TABLE 9.5.1-1 (SHEET 61 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1202-P4-006	NSCW pump 006	B	B	Both	Yes	2NSPLAB	160B
2-1202-W4-001	NSCW cooling tower	A	N/A	Both	N/A	2NSPLAA	160A
2-1202-W4-001-F01	NSCW cooling tower fan	A	A	Both	Yes	2NSPLAA	160A
2-1202-W4-001-F02	NSCW cooling tower fan	A	A	Both	Yes	2NSPLAA	160A
2-1202-W4-001-F03	NSCW cooling tower fan	A	A	Both	Yes	2NSPLAA	160A
2-1202-W4-001-F04	NSCW cooling tower fan	A	A	Both	Yes	2NSPLAA	160A
2-1202-W4-002	NSCW cooling tower	B	N/A	Both	N/A	2NSPLAB	160B
2-1202-W4-002-F01	NSCW cooling tower fan	B	B	Both	Yes	2NSPLAB	160B
2-1202-W4-002-F02	NSCW cooling tower fan	B	B	Both	Yes	2NSPLAB	160B
2-1202-W4-002-F03	NSCW cooling tower fan	B	B	Both	Yes	2NSPLAB	160B
2-1202-W4-002-F04	NSCW cooling tower fan	B	B	Both	Yes	2NSPLAB	160B
FT-1802	NSCW to ESF chiller "A"	A	3	Both	No (3)	1CBL3J	126B
FT-1803	NSCW to ESF chiller "B"	B	4	Both	No (3)	1CBL3K	125B
HV-11600	NSCW pump 001 valve	A	A	Both	Yes	2NSPLAA	160A
HV-11605	NSCW pump 005 valve	A	A	Both	Yes	2NSPLAA	160A
HV-11606	NSCW pump 003 valve	A	A	Both	Yes	2NSPLAA	160A
HV-11607	NSCW pump 002 valve	B	B	Both	Yes	2NSPLAB	160B
HV-11612	NSCW pump 006 valve	B	B	Both	Yes	2NSPLAB	160B
HV-11613	NSCW pump 004 valve	B	B	Both	Yes	2NSPLAB	160B

TABLE 9.5.1-1 (SHEET 62 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-1668A	"A" NSCW tower valve	A	A	Both	Yes	2NSPLAA	160A
HV-1668B	"A" NSCW tower bypass valve	A	A	Both	Yes	2NSPLAA	160A
HV-1669A	"B" NSCW tower valve	B	B	Both	Yes	2NSPLAB	160B
HV-1669B	"B" NSCW tower bypass valve	B	B	Both	Yes	2NSPLAB	160B
TE-1668	"A" NSCW tower bypass interlock	A	1	Both	No (3)	2NSPLAA	160A
TE-1669	"B" NSCW tower bypass interlock	B	2	Both	No (3)	2NSPLAB	160B
TV-11675	NSCW from ESF chiller "B"	B	B	Both	No (33)	1CBL3K	125B
TY-11675	NSCW from ESF chiller "B"	B	B	Both	No (33)	1CBL3K	125B
TV-11740	NSCW from ESF chiller "A"	A	A	Both	No (33)	1CBL3J	126B
TY-11740	NSCW from ESF chiller "A"	A	A	Both	No (33)	1CBL3J	126B
TE-11641	NSCW tower 001 fan F01 interlock	A	1	Both	No (3)	2NSPLAA	160A
TE-11642	NSCW tower 001 fan F02 interlock	A	1	Both	No (3)	2NSPLAA	160A
TE-11643	NSCW tower 001 fan F03 interlock	A	1	Both	No (3)	2NSPLAA	160A
TE-11644	NSCW tower 001 fan F04 interlock	A	1	Both	No (3)	2NSPLAA	160A
TE-11646	NSCW tower 002 fan F01 interlock	B	2	Both	No (3)	2NSPLAB	160B
TE-11647	NSCW tower 002 fan F02 interlock	B	2	Both	No (3)	2NSPLAB	160B
TE-11648	NSCW tower 002 fan F03 interlock	B	2	Both	No (3)	2NSPLAB	160B
TE-11649	NSCW tower 002 fan F04 interlock	B	2	Both	No (3)	2NSPLAB	160B

TABLE 9.5.1-1 (SHEET 63 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Diesel Generators							
2-2403-G4-001	Diesel generator package	A	A	Both	Yes	2DBL1A	161
2-2403-G4-002	Diesel generator package	B	B	Both	Yes	2DBL1B	162
2-2403-G4-001-V01	D.G. air start receiver	A	N/A	Both	N/A	2DBL1A	161
2-2403-G4-002-V01	D.G. air start receiver	B	N/A	Both	N/A	2DGL1B	162
2-2403-G4-001-V02	D.G. air start receiver	A	N/A	Both	N/A	2DBL1A	161
2-2403-G4-002-V02	D.G. air start receiver	B	N/A	Both	N/A	2DBL1B	162
2-2403-P4-001	D.F.O. storage tank pump	A	A	Both	No	2DPBA	165
2-2403-P4-002	D.F.O. storage tank pump	A	A	Both	No	2DPBA	165
2-2403-P4-003	D.F.O. storage tank pump	B	B	Both	Yes	2DPBB	166
2-2403-P4-004	D.F.O. storage tank pump	B	B	Both	Yes	2DPBB	166
2-2403-P5-DG1	Diesel generator panels DG2A	A	A	Both	Yes	2DBL1A	161
2-2403-P5-DG2	Diesel generator panels DG2A	A	A	Both	Yes	2DBL1A	161
2-2403-P5-DG3	Diesel generator panels DG2B	B	B	Both	Yes	2DBL1B	162
2-2403-P5-DG4	Diesel generator panels DG2B	B	B	Both	Yes	2DBL1B	162
2-2403-T4-001	D.F.O. storage tank	A	N/A	Both	N/A	2DPBA	165
2-2403-T4-002	D.F.O. storage tank	B	N/A	Both	N/A	2DPBB	166
2-2403-T4-003	D.F.O. day tank	A	N/A	Both	N/A	2DBL1C	163
2-2403-T4-004	D.F.O. day tank	B	N/A	Both	N/A	2DBL1D	164
LSH-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	2DBL1C	163
LSL-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	2DBL1C	163

TABLE 9.5.1-1 (SHEET 64 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
LSLL-9020	D.F.O. storage tank pump interlock	A	A	Both	Yes (26)	2DBL1C	163
LSH-9021	D.F.O. storage tank pump interlock	B	B	Both	Yes (26)	2DBL1D	164
LSL-9021	D.F.O. storage tank pump interlock	B	B	Both	Yes (26)	2DBL1D	164
LSLL-9021	D.F.O. storage tank pump interlock	B	B	Both	Yes (26)	2DBL1D	164
Essential Chilled Water System							
2-1592-C7-001	ESF chiller "A"	A	A	Both	Yes	1CBL3J	126B
2-1592-C7-002	ESF chiller "B"	B	B	Both	Yes	1CBL3K	125B
2-1592-P7-001	Chilled water pump "A"	A	A	Both	Yes	1CBL3J	126B
2-1592-P7-002	Chilled water pump "B"	B	B	Both	Yes	1CBL3K	125B
2-1592-T7-001	Expansion tank "A"	A	N/A	Both	N/A	1CBL3J	126B
2-1592-T7-002	Expansion tank "B"	B	N/A	Both	N/A	1CBL3K	125B
FT-22426	ESF chilled water flow interlock	B	2	Both	No (3)	1CBL3K	125B
FT-22425	ESF chilled water flow interlock	A	1	Both	No (3)	1CBL3J	126B
TDC-4170	ESF chiller "A" interlock	A	A	Both	No (3)	1CBL3J	126B
TDC-4193	ESF chiller "B" interlock	B	B	Both	No (3)	1CBL3K	125B
TV-12124	Control room cooler valve (28)	A	A	Both	NR	1CBL3J	126B
TY-12124A	Cooler valve signal converter (28)	A	A	Both	NR	1CBL3J	126B
TV-12125	Control room cooler valve (28)	B	B	Both	NR	1CBL3K	125B
TY-12125A	Cooler valve signal converter (28)	B	B	Both	NR	1CBL3K	125B

TABLE 9.5.1-1 (SHEET 65 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Ventilation and air conditioning systems							
2-1500-Q5-HVC	HVAC panel 1ACQHVC (28)	A, B	A, B	Both	N/A	1CBL1A	105
2-1500-V7-001-CBA	HVAC instrument panel (28)	A	A	Both	N/A	1CBL1A	105
2-1500-V7-002-CBB	HVAC instrument panel (28)	B	B	Both	N/A	1CBL1A	105
2-1531-N7-001	Control room cooler unit (28)	A	A	Both	NR	1CBL3J	126B
2-1531-N7-002	Control room cooler unit (28)	B	B	Both	NR	1CBL3K	125B
2HV-12118	OSA supply damper "A" (28)	A	A	Both	NR	1CBL3J	126B
2HY-12118	OSA supply damper "A" solenoid (28)	A	A (31)	Both	NR	1CBL3J	126B
2HV-12119	OSA supply damper "B" (28)	B	B	Both	NR	1CBL3K	125B
2HY-12119	OSA supply damper "B" solenoid (28)	B	B (31)	Both	NR	1CBL3K	125B
2HV-12128	Fan discharge damper (28)	A	A	Both	NR	1CBL1B	112
2HV-12129	Fan discharge damper (28)	B	B	Both	NR	1CBL1B	185

TABLE 9.5.1-1 (SHEET 66 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2HV-12130	Fan return damper (28)	A	A	Both	NR	1CBL1B	112
2HV-12131	Fan return damper (28)	B	B	Both	NR	1CBL1B	185
1HV-12146	CR normal supply isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	133B
2HY-12146B	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
2HY-12146C	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
1HV-12147	CR normal supply isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	133B
2HY-12147B	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
2HY-12147C	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
1HV-12148	CR normal return isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	133B
2HY-12148B	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
2HY-12148C	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	133B
1HV-12149	CR normal return isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	133B
2HY-12149B	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
2HY-12149C	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	133B
AHV-12162	Kitchen/toilet exhaust damper (28)	A	N/A (2)	Both	NR	1CBL1G	110
AHY-12162B	Exhaust damper solenoid (28)	A	A (2)	Both	NR	1CBL1G	110
AHV-12163	Kitchen/toilet exhaust damper (28)	B	N/A (2)	Both	NR	1CBL1G	110

TABLE 9.5.1-1 (SHEET 67 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
AHY-12163B	Exhaust damper solenoid (28)	B	B (2)	Both	NR	1CBL1G	110
2HV-12146	CR normal supply isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	131
2HY-12146A	Supply damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
2HV-12147	CR normal supply isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
2HY-12147A	Supply damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
2HV-12148	CR normal return isolation damper (28)	B	N/A (2)	Both	NR	1CBL2E	131
2HY-12148A	Return damper solenoid (28)	B	B (2)	Both	NR	1CBL2E	131
2HV-12149	CR normal return isolation damper (28)	A	N/A (2)	Both	NR	1CBL2E	131
2HY-12149A	Return damper solenoid (28)	A	A (2)	Both	NR	1CBL2E	131
2TE-12124	Control room temperature control (28)	A	A (2)	Both	NR	1CBL3J	126B
2TE-12125	Control rooom temperature control (28)	B	B (2)	Both	NR	1CBL3K	125B
2-1532-A7-001	CBSF electrical equipment room HVAC	A	A	Both	Yes	2CBLBA	72
2-1532-A7-002	CBSF electrical equipment room HVAC	B	B	Both	Yes	2CBLBD	70
2-1532-B7-001	CBSF battery room fan	A	A	Both	Yes	2CBLCB	80
2-1532-B7-002	CBSF battery room fan	B	B	Both	Yes	2CBLCB	80
2-1532-B7-003	CBSF battery room fan	A	A	Both	Yes	2CBLCB	80
2-1532-B7-004	CBSF battery room fan	B	B	Both	Yes	2CBLCB	80
HV-12727	CBSF battery room fan damper	B	B	Both	Yes	2CBLCB	80

TABLE 9.5.1-1 (SHEET 68 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-12742	CBSF battery room fan damper	A	A	Both	Yes	2CBLCB	80
HV-12748	CBSF battery room fan damper	A	A	Both	Yes	2CBLCB	80
HV-12749	CBSF battery room fan damper	B	B	Both	Yes	2CBLCB	80
TE-12725	CBSF electrical equipment room temperature	B	2	Both	No	2CBLBQ	79B
TE-12740	CBSF electrical equipment room temerature	A	1	Both	No	2CBLBM	78B
2-1539-A7-001	CB auxiliary relay room ESF cooler	A	A	Both	Yes	2CBLAX	94
2-1539-A7-002	CB auxiliary relay room cooler	B	B	Both	Yes	2CBL2A	121
2-1539-A7-005	CB normal AC room ESF cooler	A	A	Both	Yes	1CBL3H	135
TIC-13150	Fan 2-1539-A7-005 interlock	A	A (30)	Both	Yes (26)	1CBL3H	135
2-1555-A7-002	Train "B" MCC room cooler	B	B	Both	Yes	2ABL2A	53
2-1555-A7-003	Train "A" MCC room cooler	A	A	Both	Yes	2ABLBB	171
2-1555-A7-004	Train "B" MCC room cooler	B	B	Both	Yes	2ABLBA	34
2-1555-A7-005	Train "A" MCC room cooler	A	A	Both	Yes	2ABL1C	44
2-1555-A7-006	Train "B" MCC room cooler	B	B	Both	Yes	2ABL1B	43
2-1555-A7-007	RHR pump "A" room cooler	A	A	Both	Yes	2ABLDE	189
2-1555-A7-008	RHR pump "B" room cooler	B	B	Both	Yes	2ABLDC	190
2-1555-A7-011	CCW pump "A" room cooler	A	A	Both	Yes	2ABLDG	36
2-1555-A7-012	CCW pump "B" room cooler	B	B	Both	Yes	2ABLAB	37
2-1555-A7-013	Charging pump "A" room cooler	A	A	Both	Yes	2ABLCD	20

TABLE 9.5.1-1 (SHEET 69 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1555-A7-014	Charging pump "B" room cooler	B	B	Both	Yes	2ABLCE	19
2-1555-A7-001	Train "A" MCC room cooler	A	A	Both	Yes	2ABLDI	1
TISH-12200	Fan 2-1555-A7-001 interlock	A	A (30)	Both	Yes (26)	2ABLDH	2
TISH-12201	Fan 2-1555-A7-002 interlock	B	B (30)	Both	Yes (26)	2ABL1B	149
TISH-12202	Fan 2-1555-A7-003 interlock	A	A (30)	Both	Yes (26)	2ABLDG	22
TISH-12203	Fan 2-1555-A7-004 interlock	B	B (30)	Both	Yes (26)	2ABLBA	35
TISH-12204	Fan 2-1555-A7-005 interlock	A	A (30)	Both	Yes (26)	2ABL1C	44
TISH-12205	Fan 2-1555-A7-006 interlock	B	B (30)	Both	Yes (26)	2ABL1B	43
TE-12206	Fan 2-1555-A7-007 interlock	A	A (30)	Both	Yes (26)	2ABLDD	10
TSH-12206	Fan 2-1555-A7-007 interlock	A	A (30)	Both	Yes (26)	2ABLDB	13
TE-12212	Fan 2-1555-A7-008 interlock	B	B (30)	Both	Yes (26)	2ABLDA	9
TSH-12212	Fan 2-1555-A7-008 interlock	B	B (30)	Both	Yes (26)	2ABLDB	13
TISH-12208	Fan 2-1555-A7-011 interlock	A	A (30)	Both	Yes (26)	2ABLDG	36
TISH-12214	Fan 2-1555-A7-012 interlock	B	B (30)	Both	Yes (26)	2ABLAB	37
TE-12209	Fan 2-1555-A7-013 interlock	A	A (30)	Both	Yes (26)	2ABLCD	20
TSH-12209	Fan 2-1555-A7-013 interlock	A	A (30)	Both	Yes (26)	2ABLDG	14A
TISH-12215	Fan 2-1555-A7-014 interlock	B	B (30)	Both	Yes (26)	2ABLCE	19
2-1566-B7-001	D.G. building fan	A	A	Both	Yes	2DBL1A	161
2-1566-B7-002	D.G. building fan	B	B	Both	Yes	2DBL1B	162
2-1566-B7-003	D.G. building fan	A	A	Both	Yes	2DBL1A	161
2-1566-B7-004	D.G. building fan	B	B	Both	Yes	2DBL1B	162

TABLE 9.5.1-1 (SHEET 70 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-12050	D.G. building fan damper	A	A	Both	Yes	2DBL1A	161
HV-12051	D.G. building fan damper	A	A	Both	Yes	2DBL1A	161
HV-12053	D.G. building fan damper	B	B	Both	Yes	2DBL1B	162
HV-12054	D.G. building fan damper	B	B	Both	Yes	2DBL1B	162
TV-12085	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TV-12085A	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TV-12086	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TV-12086A	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12086	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12094A	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TV-12094C	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12094C	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12094D	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12094D	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12094B	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12094E	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TY-12094F	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12095A	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TV-12095C	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12095C	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162

TABLE 9.5.1-1 (SHEET 71 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TV-12095D	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12095D	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TV-12095B	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12095E	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TY-12095F	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TV-12096	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TV-12096A	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12096	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12097	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TV-12097A	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TV-12098	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TV-12098A	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12098	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TV-12099	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TV-12099A	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12099	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TV-12100	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12100B	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12101	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12101B	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162

TABLE 9.5.1-1 (SHEET 72 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
TV-12100A	D.G. building outside air damper	A	N/A (2)	Both	Yes	2DBL1A	161
TY-12100C	Outside air damper solenoid	A	A (2)	Both	Yes	2DBL1A	161
TV-12101A	D.G. building outside air damper	B	N/A (2)	Both	Yes	2DBL1B	162
TY-12101C	Outside air damper solenoid	B	B (2)	Both	Yes	2DBL1B	162
TISH-12051	D.G. building temperature interlock	A	A	Both	NA (26)	2DBL1A	161
TISH-12054	D.G. building temperature interlock	B	B	Both	NA (26)	2DBL1B	162
TISH-12100	D.G. ventilation temperature interlock	A	A (30)	Both	NA (26)	2DBL1A	161
TISH-12101	D.G. ventilation temperature Interlock	B	B (30)	Both	NA (26)	2DBL1B	162
FE-12087	D.G. building ventilation flow interlock	A	A	Both	Yes	2DBL1A	161
FS-12087	D.G. building ventilation flow interlock	A	A	Both	Yes	2DBL1A	161
FE-12088	D.G. building ventilation flow interlock	B	B	Both	Yes	2DBL1B	162
FS-12088	D.G. building ventilation flow Interlock	B	B	Both	Yes	2DBL1B	162
2-1593-B7-002	AFW pump room "B" fan	B	B	Both	Yes	2AFBA	155
2-1593-B7-001	AFW pump room "A" fan	A	A	Both	Yes	2AFBB	156
HV-12005	AFW pump room "B" fan damper	B	B	Both	Yes	2AFBA	155
TIS-12005	AFW pump room "B" fan interlock	B	B (30)	Both	Yes (26)	2AFBA	155

TABLE 9.5.1-1 (SHEET 73 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
HV-12006	AFW pump room "A" fan damper	A	A	Both	Yes	2AFBB	156
TIS-12006	AFW pump room "A" fan interlock	A	A (30)	Both	Yes (26)	2AFBB	156
2-1531-B7-002	CBCR ESF chiller room exhaust fan	A	A	Both	No	1CBL3J	126B
TIS-12303	Fan 2-1531-B7-002 interlock	A	A (30)	Both	No	1CBL3J	126B
2-1531-B7-004	CBCR ESF chiller room exhaust fan	B	B	Both	No (35)	1CBL3K	125B
TIS-12300	Fan 2-1531-B7-004 interlock	B	B (30)	Both	No	1CBL3K	125B
Auxiliary Component Cooling Water System							
2-1217-P4-001	ACCW pump	N/A (5)	A	Hot	No	2ABLDG	30
2-1217-P4-002	Spare ACCW pump	N/A (5)	B	Hot	No	2ABLBA	33
2-1217-E4-001	ACCW heat exchanger	N/A (5)	N/A	Both	N/A	2ABLDG	49
2-1217-E4-002	ACCW heat exchanger	N/A (5)	N/A	Both	N/A	2ABLAB	52
2-1217-T4-001	ACCW surge tank	N/A (5)	N/A	Both	N/A	2ABLAB	55
HV-1974	ACCW return isolation valve	N/A (5)	B	Hot	No	2CTB	140A
HV-1975	ACCW return isolation valve	N/A (5)	A	Hot	No	2ABLAE	39A
HV-1979	ACCW supply isolation valve	N/A (5)	A	Hot	No	2ABLAE	39A
HV-1978	ACCW supply isolation valve	N/A (5)	B	Hot	No	2CTB	140A
LSLL-1956	ACCW pump interlock	N/A (5)	A (30)	Hot	No	2ABLAB	55
LSLL-1957	ACCW pump interlock	N/A (5)	B (30)	Hot	No	2ABLAB	55
PT-1956	ACCW pump interlock	N/A (5)	1	Hot	No	2ABLDG	30
PT-1957	ACCW pump interlock	N/A (5)	2	Hot	No	2ABLBA	33

TABLE 9.5.1-1 (SHEET 74 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
Essential Electrical Distribution System							
2-1601-Q5-MCB	Main control board QMCB (28)	A, B	A, B (30)	Both	N/A	1CBL1A	105
2-1604-Q5-PCP	Miscellaneous equipment panel(28)	A, B	A, B	Both	N/A	1CBL1A	105
2-1604-Q5-PS1	Process protection set I (28)	A	A	Both	N/A	1CBL1A	105
2-1604-Q5-PS2	Process protection set II (28)	B	B	Both	N/A	1CBL1A	105
2-1604-Q5-PS3	Process protection set III (28)	A	C	Both	N/A	1CBL1A	105
2-1604-Q5-PS4	Process protection set IV (28)	B	D	Both	N/A	1CBL1A	105
2-1604-Q5-PP1	BOP protection channel I (28)	A	A	Both	N/A	1CBL1A	105
2-1604-Q5-PP2	BOP protection channel II (28)	B	B	Both	N/A	1CBL1A	105
2-1604-Q5-PP3	BOP protection channel III (28)	A	C	Both	N/A	1CBL1A	105
2-1604-Q5-PP4	BOP protection channel IV (28)	B	D	Both	N/A	1CBL1A	105
2UI-13134A	Liquid plasma display (28)	A	A	Both	N/A	1CBL1A	105
2UI-13134B	Liquid plasma display (28)	B	B	Both	N/A	1CBL1A	105
2-1623-D5-002	Remote Processing Unit A2	A	A	Both	N/A	2CBLAG	91
2-1623-D5-004	Remote Processing Unit B2	B	B	Both	N/A	1CBL2E	131
2-1623-D5-006A	Display processing Unit A	A	A	Both	Yes	2CBLAG	91
2-1623-D5-006B	Display processing Unit B	B	B	Both	Yes	1CBL2E	131
2-1626-Q5-AMS	AMSAC cabinet (28)	N/A	N/A	N/A	N/A	1CBL1A	105
2-1605-P5-SDA	Shutdown panel 1ACPSDA	A	A (30)	Both	N/A	2CBLAG	103
2-1605-P5-SDB	Shutdown panel 1ACPSDB	B	B (30)	Both	N/A	2CBLAL	98

TABLE 9.5.1-1 (SHEET 75 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1605-C5-ASI	Alternate shutdown indicating panel	B	B	Both	Yes	1CBL2E	131
2-1605-Q5-SPA	Solid state protection panel-A	A	A,B,C,D	Both	N/A	1CBL1A	105
2-1605-Q5-SPB	Solid state protection panel-B	B	A,B,C,D,	Both	N/A	1CBL1A	105
2-1605-Q5-SPC	Solid state protection panel-C	A	3 (30)	Cold	N/A	1CBL1A	105
2-1605-Q5-SPD	Solid state protection panel-D	B	4 (30)	Cold	N/A	ICBL1A	105
2-1606-S6-002	Reactor trip switchgear	A, B	A, B	HOT	Yes	2CBLBA	69
2-1601-U3-T03	Termination cabinet 2ACPT03	A	A	Both	N/A	2CBLAK	95
2-1601-U3-T04	Termination cabinet 2BCPT04	B	B	Both	N/A	2CBL2B	120
2-1601-U3-T08	Termination cabinet 2BCPT08	B	B	Both	N/A	2CBL2B	120
2-1601-U3-T20	Termination cabinet 2BCPT20	B	B	Both	N/A	2CBL2B	120
2-1601-U3-T27	Termination cabinet 2ACPT27	A	A	Both	N/A	2CBLAK	95
2-1804-S3-A02	Class 1E 4-kV switchgear 2AA02	A	A	Both	Yes	2CBLAG	91
2-1804-S3-A03	Class 1E 4-kV switchgear 2BA03	B	B	Both	Yes	2CBLAH	92
2-1804-W3-CB700	Diesel generator A cable bus	A	A	Both	N/A	(37)	(37)
2-1804-W3-CB800	Diesel generator B cable bus	B	B	Both	N/A	(38)	(38)
2-1805-S3-ABA	Class 1E 480-V MCC 2ABA	A	A	Both	N/A	1CBL3H	135
2-1805-S3-ABB	Class 1E 480-V MCC 2ABB	A	A	Both	N/A	2ABL1C	44
2-1805-S3-ABC	Class 1E 480-V MCC 2ABC	A	A	Both	N/A	2CBLBB	75
2-1805-S3-ABD	Class 1E 480-V MCC 2ABD	A	A	Both	N/A	2ABLDG	22

TABLE 9.5.1-1 (SHEET 76 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Fire Zone
2-1805-S3-ABE	Class 1E 480-V MCC 2ABE	A	A	Both	N/A	2CBLBT	64
2-1805-S3-ABF	Class 1E 480-V MCC 2ABF	A	A	Both	N/A	2DBL1A	161
2-1805-S3-B04	Class 1E 480-V switchgear 2AB04	A	A	Both	Yes	2CBLBB	75
2-1805-S3-B05	Class 1E 480-V switchgear 2AB05	A	A	Both	Yes	2CBLBB	75
2-1805-S3-B06	Class 1E 480-V switchgear 2BB06	B	B	Both	Yes	2CBLBH	71
2-1805-S3-B07	Class 1E 480-V switchgear 2BB07	B	B	Both	Yes	2CBLBH	71
2-1805-S3-B15	Class 1E 480-V switchgear 2AB15	A	A	Both	Yes	2ABLDH	2
2-1805-S3-B16	Class 1E 480-V switchgear 2BB16	B	B	Both	Yes	2ABL1B	149
2-1805-S3-BBA	Class 1E 480-V MCC 2BBA	B	B	Both	N/A	1CBL3K	125B
2-1805-S3-BBB	Class 1E 480-V MCC 2BBB	B	B	Both	N/A	2ABL1B	43
2-1805-S3-BBC	Class 1E 480-V MCC 2BBC	B	B	Both	N/A	2CBLBH	71
2-1805-S3-BBD	Class 1E 480-V MCC 2BBD	B	B	Both	N/A	2ABLBA	35
2-1805-S3-BBE	Class 1E 480-V MCC 2BBE	B	B	Both	N/A	2CBLAJ	158
2-1805-S3-BBF	Class 1E 480-V MCC 2BBF	B	B	Both	N/A	2DBL1B	162
2-1805-S3-RHR1A	Starter for RHR valve HV-8701B	A	C	Both	N/A	2CBLBL	77A
2-1805-S3-RHR2A	Starter for RHR valve HV-8702A	B	D	Both	N/A	2CBLBO	56A
2-1805-Y3-IC5	RHR isolation valve inverter for HV-8701B	A	C	Both	N/A	2CBLBL	77A
2-1805-Y3-ID6	RHR isolation valve inverter for HV-8702A	B	D	Both	N/A	2CBLBO	56A
2-1806-B3-BYA	Battery 2AD1B	A	A	Both	N/A	2CBLBM	78B

TABLE 9.5.1-1 (SHEET 77 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1806-B3-BYB	Battery 2BD1B	B	B	Both	N/A	2CBLBQ	79B
2-1806-B3-BYC	Battery 2CD1B	A	C	Both	N/A	2CBLBK	77B
2-1806-B3-BYD	Battery 2DD1B	B	D	Both	N/A	2CBLBJ	56B
2-1806-B3-CAA	Battery charger 2AD1CA	A	A	Both	N/A	2CBLBN	78A
2-1806-B3-CAB	Battery charger 2AD1CB	A	A	Both	N/A	2CBLBN	78A
2-1806-B3-CBA	Battery charger 2BD1CA	B	B	Both	N/A	2CBLBC	79A
2-1806-B3-CBB	Battery charger 2BD1CB	B	B	Both	N/A	2CBLBC	79A
2-1806-B3-CCA	Battery charger 2CD1CA	A	C	Both	N/A	2CBLBL	77A
2-1806-B3-CCB	Battery charger 2CD1CB	A	C	Both	N/A	2CBLBL	77A
2-1806-B3-CDA	Battery charger 2DD1CA	B	D	Both	N/A	2CBLBO	56A
2-1806-B3-CDB	Battery charger 2DD1CB	B	D	Both	N/A	2CBLBO	56A
2-1806-Q3-DA1	125-V-dc distribution panel 2AD11	A	A	Both	N/A	2CBLBN	78A
2-1806-Q3-DA2	125-V-dc distribution panel 2AD12	A	A	Both	N/A	2CBLBN	78A
2-1806-Q3-DB1	125-V-dc distribution panel 2BD11	B	B	Both	N/A	2CBLBC	79A
2-1806-Q3-DB2	125-V-dc distribution panel 2BD12	B	B	Both	N/A	2CBLBC	79A
2-1806-S3-DCA	125-V-dc MCC 2AD1M	A	A	Both	N/A	2CBLBN	78A
2-1806-S3-DCB	125-V-dc MCC 2BD1M	B	B	Both	N/A	2CBLBC	79A
2-1806-S3-DSA	125-V-dc switchgear 2AD1	A	A	Both	N/A	2CBLBN	78A
2-1806-S3-DSB	125-V-dc switchgear 2BD1	B	B	Both	N/A	2CBLBC	79A
2-1806-S3-DSC	125-V-dc switchgear 2CD1	A	C	Both	N/A	2CBLBL	77A

TABLE 9.5.1-1 (SHEET 78 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Fire Zone
2-1806-S3-DSD	125-V-dc switchgear 2DD1	B	D	Both	N/A	2CBLBO	56A
2-1807-Q3-VI1	Vital bus distribution panel 2AY1A	A	A	Both	N/A	2CBLBN	78A
2-1807-Q3-VI2	Vital bus distribution panel 2BY1B	B	B	Both	N/A	2CBLBC	79A
2-1807-Q3-VI3	Vital bus distribution panel 2CY1A	A	C	Both	N/A	2CBLBL	77A
2-1807-Q3-VI4	Vital bus distribution panel 2DY1B	B	D	Both	N/A	2CBLBO	56A
2-1807-Q3-VI5	Vital bus distribution panel 2AY2A	A	A	Both	N/A	2ABL1C	44
2-1807-Q3-VI6	Vital bus distribution panel 2BY2B	B	B	Both	N/A	2ABL1B	43
2-1807-Y3-14	Regulated transformer 2BBC42RX	B	B	Both	N/A	2CBLBH	71
2-1807-Y3-16	Regulated transformer 2ABA02RX	A	A	Both	No	2CBL3C	178
2-1807-Y3-17	Regulated transformer 2BBA02RX	B	B	Both	No	1CBL3K	125B
2-1807-Y3-IA1	120-V-ac vital bus inverter 2AD1I1	A	A	Both	N/A	2CBLBN	78A
2-1807-Y3-IA11	120-V-ac vital bus inverter 2AD1I11	A	A	Both	N/A	2ABL1C	44
2-1807-Y3-IB12	120-V-ac vital bus inverter 2BD1I12	B	B	Both	N/A	2ABL1B	43
2-1807-Y3-IB2	120-V-ac vital bus inverter 2BD1I2	B	B	Both	N/A	2CBLBC	79A
2-1807-Y3-IC3	120-V-ac vital bus inverter 2CD1I3	A	C	Both	N/A	2CBLBL	77A
2-1807-Y3-ID4	120-V-ac vital bus inverter 2DD1I4	B	D	Both	N/A	2CBLBO	56A

TABLE 9.5.1-1 (SHEET 79 OF 81)

Unit 2 Tag Number	Description	SSD TRN	Power TRN/CHL	Hot/Cold Shutdown	C.R. Fire Isolation (39)	Location Fire Area	Location Fire Zone
2-1816-U3-001	Auxiliary relay panel 2ACPAR1	A	A	Both	N/A	2CBLAX	94
2-1816-U3-002	Auxiliary relay panel 2ACPAR2	A	A	Both	N/A	2CBLAX	94
2-1816-U3-003	Auxiliary relay panel 2BCPAR3	B	B	Both	N/A	2CBL2A	121
2-1816-U3-004	Auxiliary relay panel 2BCPAR4	B	B	Both	N/A	2CBL2A	121
2-1816-U3-007	Electrical auxiliary board QEAB (28)	A, B	A, B (30)	Both	N/A	1CBL1A	105
2-1816-U3-015	Auxiliary relay panel 2BCPAR7	B	B	Both	N/A	2CBL2A	121
2-1816-U3-017	Auxiliary relay panel 2ACPAR8	A	A (30)	Both	N/A	2CBLAX	94
2-1816-U3-018	Auxiliary relay panel 2BCPAR9	B	B (30)	Both	N/A	2CBLAH	92
2-1821-U3-001	Sequencer board 2ACPSQ1 (28)	A	A	Both	No (2)	2CBLAG	91
2-1821-U3-002	Sequencer board 2BCPSQ2 (28)	B	B	Both	No (2)	2CBLAH	92
2-1805-D3-38T	FLEX Manual Transfer Switch 2ABE38T	A	A	Both	N/A	2CBLBN	78A
2-1805-D3-04T	FLEX Manual Transfer Switch 2BBA04T	B	B	Both	N/A	2CBLBC	79A
2-1805-D3-37T	FLEX Manual Transfer Switch 2ABE37T	A	C	Both	N/A	2CBLBL	77A
2-1805-D3-39T	FLEX Manual Transfer Switch 2BBE39T	B	D	Both	N/A	2CBLBO	56A

TABLE 9.5.1-1 (SHEET 80 OF 81)

<u>NOTES</u>:

1. Operation of the remote shutdown panel transfer of control switch does not isolate all device circuitry from the control room.
2. Power and/or air supplies need not remain operational. Loss of power and/or air failure position is the desired safe shutdown position.
3. Interlock circuitry is isolated when the device control transfer is completed.
4. No safe shutdown train A powered RCS T-cold wide range temperature device is provided. Alternate indirect means of T-cold available (i.e., steam line pressure).
5. Either auxiliary cooling water system operation or CVCS seal injection is required to maintain the integrity of the reactor coolant pump seals. Loss of both means of seal cooling requires multiple hot shorts as a result of the fire.
6. Operation of the remote shutdown panel transfer of control switch does not isolate all device circuitry from the control room. Intermittent charging pump operation may be required to control RCS boration and makeup.
7. Alternate flow path available via boron injection tank (HV-8801A and HV-8801B).
8. Alternate flow path available via HV-8508B and HV-8509A.
9. For a fire inside the containment secondary shield, closure of valves HV-8149A, HV-8149B and HB-8149C may be required to isolate letdown.
10. Alternate flow path only.
11. Not required for a control room fire. Provide alternative miniflow paths in the event HV-8110 spuriously closes.
12. Loss of charging pump suction from the BAST necessitates RCS letdown to obtain cold shutdown boron concentration in the RCS.
13. For a control room fire use local pressure indicator PI-10115 or PI-10116 to determine the level in the BAST.
14. For a control room fire, use local tank level indicator LI-0990C.
15. The system is required for hot shutdown and during the transition to cold shutdown. It is not required after the RHR system is operating.
16. In the event of a control room fire, main steam, and steam generator blowdown isolation may require breaker opening at local power supply panels.
17. For a fire inside containment steam generator blowdown can be isolated using HV-7603A, HV-7603B, HB-7603C, and HV-7603D.
18. For a control room fire, use RCS T-cold wide range temperature indication at the train B remote shutdown panel.
19. Operation of the remote shutdown panel transfer of control switch does not preclude spurious actuation. Local breaker tripping may be required to preclude spurious opening. Local valve control may be required to control RCS heat removal.
20. For a fire at the feedwater isolation valves, stopping of the main feedwater pumps may be required. For a fire at the steam isolation valves, turbine generator tripping may be required.
21. For a control room fire, isolation of the main feedwater to the steam generators may require breaker opening at local power supply panels.

TABLE 9.5.1-1 (SHEET 81 OF 81)

22. For a control room fire, use local tank level indicators LI-5100 and LI-5115.

23. (Deleted)

24. For a control fire event, valve deenergization at its power supply panel may be required.

25. (Deleted)

26. Device and its electrical circuitry are totally independent of the control room.

27. Local starting of device by performing a repair at the power supply breaker may be required.

28. Not required for a control room fire.

29. Operability of the pressurizer PORVs is not required for a fire inside the containment. The pressurizer code safety valves and the reactor vessel head vent letdown paths are additional overpressurization protection features for the reactor coolant system. In the event spurious opening of a pressurizer PORV occurs, closure of the pressurizer PORV block valve will terminate the loss of reactor coolant system pressure and inventory. Where fire damage can preclude PORV block valve operability, operator actions to deenergize the PORV (fails closed upon loss of power) may be necessary.

30. Power is not required for this device to function. Power association for this device is the interlocked device control circuitry.

31. Power for operation of this component is supplied from the damper control power circuit.

32. For a control room fire event, local manual alignment may be required.

33. Valve travel is mechanically limited to always ensure minimum cooling water flow.

34. Valve to be deenergized prior to establishing RHR shutdown cooling operation.

35. For a control room fire event, local room ventilating may be required.

36. Breaker for valve locked locally in the open position.

37. Train A diesel generator bus duct passes through fire areas 2DBL1A, 2CBLBA, 2CBLAN, 2CBLAG/Fire Zones 161, 143, 73, 85, 91.

38. Train B diesel generator bus duct passes through fire areas 2DBL1B, 2CBLBD, 2CBLAI, 2CBLAH/Fire Zones 162, 144, 65, 66, 67, 93, 92.

39. The entry for this column, a N/A, Yes, or No, follows a logic tree described in calculation X4C2301S035.

40. For a control room fire, the optical isolator "TEST/STATUS" control switch should be in the "REMOTE" position.

TABLE 9.5.1-2

FIRE PROTECTION SYSTEM COMPONENT DATA

Electric Motor-Driven Fire Protection Water Pumps	
Quantity	1
Type	Horizontal centrifugal
Capacity (gal/min)	2500
Total dynamic head (ft)	289 (Design Requirement) 300 (Impeller Rated)
Diesel Engine-Driven Fire Water Pumps	
Quantity	2
Type	Horizontal split case
Capacity (gal/min)	2500
Total dynamic head (ft)	289
Fire Water Jockey Pumps	
Quantity	2
Type	Centrifugal
Capacity (gal/min)	60
Total dynamic head (ft)	289 for pump C-2301-P4-001; 260 for pump C-2301-P4-004
Fire Water Storage Tanks	
Quantity	2
Capacity (gal)	300,000

TABLE 9.5.1-3

SAFE SHUTDOWN FUNCTION SUCCESS PATHS

Function	Purpose	Success Paths: Preferred	Success Paths: Alternate
Reactivity control	Shutdown reactor to reduce heat production	Control rod insertion followed by boration from BAST	Control rod insertion followed by boration from RWST with head vent system letdown.
RCS inventory control	Keep core covered	Charging with letdown isolation	Same as preferred.
RCS pressure control	Maintain subcooled margin/prevent overpressurization	Pressurizer heaters[a] and code safety valves or PORVs.	Charging and code safety valves or PORVs.
Core heat removal	Transfer of heat to coolant	Reactor coolant pumps[a]	Natural circulation
RCS heat removal	Transfer of heat from coolant	RCS temperature >350°F: Auxiliary feedwater system and main steam bypass control[a] and code safety valves. RCS temperature 350°F: Shutdown cooling	RCS temperature >350°F: Main steam code safety valves along with auxiliary feedwater system and main steam power operated relief valves. RCS temperature <350°F: Same as preferred.
Maintenance of vital auxiliaries	Maintain operability of necessary support systems	Offsite power, normal HVAC, normal cooling and chilled water, etc.[a]	Onsite power, essential HVAC essential cooling and chilled water, etc.

a. Preferred path not actually evaluated. Alternate path is redundant and is assured to be operable with or without offsite power.

TABLE 9.5.1-4

FIRE EVENT SAFE SHUTDOWN
SEPARATION ANALYSIS METHODOLOGY

Step	Task
I	Identify systems and equipment required to achieve and maintain safe (cold) shutdown from functional requirements identified in RESAR-3, FSAR, and others such as the Emergency Response Guidelines.
II	Evaluate separation of redundant safe shutdown equipment from common hazards.
III	For equipment identified in Step I, identify the electrical circuits which are necessary to accomplish the safe shutdown functions.
IV	For the circuits identified in Step III, identify their locations in the plant with respect to fire areas.
V	Within each area, show that: • One train of equipment (including cables) necessary to achieve and maintain hot shutdown is free of fire damage through the existence of physical barriers and/or spatial separation, and • That the systems and equipment necessary to achieve and maintain cold shutdown is free of fire damage or can be repaired within 72 h, or • Alternate shutdown capability exists outside of and is free of potential damage from a postulated fire in the area under consideration.

TABLE 9.5.1-5

This table has been deleted.

TABLE 9.5.1-6

AREAS DESIGNED FOR STORAGE OF
RADIOACTIVE MATERIAL

New fuel storage area

Spent fuel storage area

Area outside refueling control area personnel locks (material would be clothing, wastes, miscellaneous contaminated materials)

Radiochemistry laboratory, sample laboratory, and radiation equipment calibration areas

Compacted waste storage area

Radwaste processing facility

Outage storage building

All designated radioactive waste storage areas

TABLE 9.5.1-7 (SHEET 1 OF 2)

COMPONENTS DESIGNED TO RETAIN AND
COLLECT RADIOACTIVITY

Backflushable filters as follows:

Seal water return

Spent resin sluice

Recycle evaporator feed

Recycle evaporator concentrates (Abandoned in place)

Waste evaporator feed (Filter is removed, housing used for piping only.)

Waste monitor tank

Floor drain tank

Steam generator blowdown

Cartridge filters as follows:

Boric acid filter

Waste gas drain filter

Turbine building drain demineralizer feed filter

Turbine building drain discharge filter

Laundry and hot shower filter

Steam generator blowdown filter

Spent fuel pit skimmer filter

Waste evaporator condensate filter

Reactor coolant

Spent fuel pit

Seal water injection

TABLE 9.5.1-7 (SHEET 2 OF 2)

Demineralizer as follows:

- Waste evaporator condensate demineralizer
- Recycle evaporator condensate demineralizer
- Waste monitor tank demineralizer
- Turbine building drain demineralizer
- Thermal regeneration demineralizer
- Spent fuel pool demineralizer
- CVCS mixed bed demineralizer
- Steam generator cation demineralizer
- Steam generator mixed bed demineralizer
- CVCS cation demineralizer
- Boron recycle feed demineralizer
- Radwaste processing facility demineralizer

HEPA and charcoal filter units for the following systems:

- Containment building post-LOCA purge exhaust
- Containment building preaccess purge exhaust
- Control building lab area filter exhaust
- Control builing control room OSA receive filter
- Fuel handling building post-accident filter exhaust
- Fuel handling building normal HVAC
- Auxiliary building normal HVAC
- Piping penetration area filtration
- Radwaste processing facility process area exhaust

TABLE 9.5.1-8

MAJOR PROCESS COLLECTION POINTS IN
RADIOACTIVE WASTE SYSTEMS

Waste gas decay tanks

Waste gas shutdown tanks

Reactor coolant drain tank

Waste holdup tank

Waste process evaporator (Abandoned in place)

Boron recycle evaporator (Abandoned in place)

Spent resin tanks

Chemical waste tank

Waste monitor tank

Waste evaporator concentrate tank (Abandoned in place)

Refueling water storage tank

Backflushable filter and tank

Volume control tank

Laundry hot shower drain tank

Boron concentration measuring tank

Boron recycle holdup tank

Building sumps

TABLE 9.5.1-9 (SHEET 1 OF 13)

EXCEPTIONS TO NFPA[1] CODES

NFPA 4 1977, ORGANIZATION OF FIRE SERVICES

NFPA superseded this Code with 1201 in 1979; see 1201-1984.

NFPA 4A-1969, FIRE DEPARTMENT ORGANIZATION

This code is not applicable to VEGP.

NFPA 10-1981, PORTABLE FIRE EXTINGUISHERS

Chapter 3: VEGP is in compliance with the spacing requirements of NFPA 10 by providing portable extinguishers to accommodate class A (ordinary combustibles) and class C (electrical equipment) fires consistent with maximum travel distances as required by the code. Although portable extinguishers are located at each fire hose cabinet, independent extinguisher locations have been developed in order to comply with code requirements and to provide more suitable protection.

Subsection 4-3.1: Due to the inaccessibility of containment during power operation, the portable fire extinguishers located inside containment will not receive a monthly visual inspection as required by this section. These extinguishers will be inspected per approved plant procedures during cold shutdown exceeding 24 hours unless performed within the previous month.

Subsection 4-3.2.5: This subsection is not applicable because water type extinguishers without gages are not used at VEGP.

Subsection 4-4.1: Due to the inaccessibility of containment during power operation, the portable fire extinguishers located inside containment will not receive an annual maintenance inspection as required by this section. These extinguishers will be inspected per approved plant procedures during cold shutdown exceeding 24 hours unless performed within the previous year.

NFPA 12A-1980, HALON 1301 FIRE EXTINGUISHING SYSTEMS

VEGP intends to comply with the requirements of NFPA 12A. The suppression system contractor will install the system in accordance with the code to the maximum extent possible. If any deviations due to physical limitations are identified by the contractor, they will be evaluated for acceptability by SNC through the services of a registered professional fire protection engineer.

Subsection 1-9.5.5.2: Halon containers continuously in service will be tested in accordance with the 2009 edition of NFPA 12A subsection 6.2.2, which no longer requires cylinders be emptied after 20 years of service.

TABLE 9.5.1-9 (SHEET 2 OF 13)

Subsection 1-11.1.2: The goal of the inspection and testing as stated in section 1-11.1.2 shall be accomplished. Specific deviations are as follows:

1. Only readily accessible portions of system piping, hangers, or straps will be inspected 18-months. If evidence of corrosion or damage exists on those portions of the system, an evaluation will be performed to determine the full extent of the problem and corrective action will be taken. This approach is justified based on the fact that all VEGP halon systems are small one-room systems where all system piping is subjected to the same controlled-atmosphere environment and inspection of accessible piping which provides a good representative sample while limiting personnel exposure to hazardous conditions necessary to gain access to inaccessible piping.

2. Volume verification will be performed using available tank level measuring equipment instead of weighing the tank. This method provides an accurate indication of tank volume and meets the intent of section 1-11.1.6 which requires a check of agent "quantity."

NFPA 13-1983, STANDARD FOR INSTALLATION OF SPRINKLER SYSTEMS

General: Due to the complexity of the plant, the determination of compliance with NFPA 13 is based in part upon the professional judgment of qualified fire protection engineers.

Subsections 1-5.1: The Unit 1 and common charcoal filter deluge valves (outside containment) are not cycled per code requirements. This exception is justified by the low probability of fire occurring in the charcoal filter and because alternate means exist to suppress fire.

Subsections 1-11.1: The underground main and lead-in piping will not be flushed before connection is made to the sprinkler piping. The underground main and lead-in piping will be flushed, in accordance with approved VEGP flush procedures, while connected with the sprinkler system. Measures will be taken and controlled via the flush procedure to prohibit the introduction of foreign material into the sprinkler piping during main and lead-in flushing. The sprinkler systems will then be flushed in accordance with the flush procedure after the header piping is verified cleaned.

For Unit 2, an alternative to flushing sprinkler systems will be implemented to ensure foreign material does not enter the suppression system by installing a test blank at the system isolation valve at time of sprinkler piping installation. This will prohibit foreign material from entering the sprinkler system piping should the isolation valve accidentally be opened. After the flushing of lead-in connections is completed, the test blanks will be removed in accordance with approved VEGP procedures.

For Unit 2, it is not always possible to flush underground mains and lead-in connections at the hydraulically calculated water demand of the system when this demand is greater than the flushing flowrates recommended by table 1-11.1.2. However, flushing is accomplished at the largest achievable flowrate of the temporary flushing system which is never less than the table 1-11.1.2 values.

TABLE 9.5.1-9 (SHEET 3 OF 13)

Subsection 1-11-2.5: Test blanks will not be painted or numbered; however, they will be strictly controlled by procedure which requires removal verification.

Subsection 2-2.1.2.4: The water allowance for outside hose is not added to the sprinkler and inside hose requirements for all buildings, since some buildings are not accessible for outside hose usage; i.e., Auxiliary Control Fuel Handling and Containment buildings. However, the design at Plant Vogtle is such that no given system plus hose stream will exceed the requirements of CMEB 9.5-1 section C.6.b.

Subsection 2-4: This subsection is not applicable because gravity tanks are not used at VEGP.

Subsection 2-6: This subsection is not applicable because pressure tanks are not used at VEGP.

Subsection 2-7: Fire department connections are not provided at VEGP. The local fire department will be used for additional fire brigade members only. The plant fire protection systems consist of redundant fire water pump and water supply, and the yard network is a loop providing water supply even if any one section is out of service. In addition, each fire hydrant at VEGP is equipped with a pumper connection.

Subsection 3-4, 3-5, 3-6, and 3-7: These subsections are not applicable because pipe schedule sizing systems are not used at VEGP.

Subsection 3-8.1, 3-8.3, 3-8.5, 3-8.6, and 3-8.7: These subsections are not applicable because storage racks are not used, stair towers are enclosed in 2-h-rated walls, underground dry pipe is not used and hose connections are not attached to sprinkler piping.

Subsection 3-11.2.2: Not all sprinkler risers of size 4 inches or larger have drain pipe hard-piped from the drain valve to building drains. However, the intent of this subsection is met by administrative means.

Subsection 3-14.2.7: This subsection is not applicable because a city connection is not provided at VEGP.

Subsection 3-16.6.1: Not all rooms that have temperatures above 100°F have intermediate temperature-rated sprinklers installed. However, the protection provided by the ordinary temperature sprinklers in these cases is acceptable.

Subsection 3-17.2: Audible local waterflow alarms are provided at the local annunciation panel rather than at the suppression system control station.

Subsection 3-17.4.5: Sprinkler system alarm control valves are not designed so that they may be locked or sealed in the open position. The VEGP sprinkler system annunciation design is such that the actuation alarm switch serves no function except for inadvertent or manual actuation indication. If the sprinkler system is tripped inadvertently, the system becomes a wet pipe system (no sprinkler flow), and the alarm alerts the plant operators to

TABLE 9.5.1-9 (SHEET 4 OF 13)

the condition. In addition, the alarm control valve position does not affect the operability of the sprinkler system in any way.

Subsection 4-2.5.1: A minimum of 18 inches clearance is not maintained below all sprinkler deflectors, but adequate sprinkler coverage is provided.

Subsection 4-4.4.4: No sprinklers are provided in concealed spaces. Detection is provided in concealed spaces containing combustibles.

Subsection 4-4.8: Sprinklers are not provided in all vertical shafts.

Subsection 4-4.11: Sprinklers are not provided under all decks.

Subsection 4-4.17: This subsection is not applicable because fur vaults are not provided at VEGP.

Subsection 4-4.21: This subsection is not applicable because theater stages are not provided at VEGP.

Subsection 4-5: Entire systems of sidewall sprinklers are not used at VEGP. Individual sidewall sprinklers may be used within some systems.

Subsection 5-2: Dry pipe sprinkler systems are not used at VEGP.

Subsection 5-4: Combined dry pipe and preaction systems are not used at VEGP.

Subsection 5-5: This subsection is not applicable due to heat tracing of piping subject to freezing.

Subsection 5-6: Nonfire protection connections to automatic sprinkler systems are not used at VEGP.

Chapter 6: Outside sprinklers for fire protection against exposure fires are not used at VEGP.

Subsection 7-1.1.2: Pipe less than 1-inch diameter is used in limited situations where substantiated by a hydraulic calculation.

Chapter 8: This chapter is not applicable at VEGP because no high-rise buildings are provided at VEGP.

Chapter 9: Large drop sprinklers are not used at VEGP.

Refer to Appendix 9B Section C.6.c.(3) for additional information on conformance with NFPA 13.

TABLE 9.5.1-9 (SHEET 5 OF 13)

NFPA 14-1983, STANDPIPE AND HOSE SYSTEMS

NOTE: Although the Seismic Category 1 standpipe system is not designed to conform to NFPA 14, it will be tested in accordance with Section 8-1.2 and Section 8-2.1 of NFPA 14-1983.

Except for the following chapters, sections, subsections, and their applicable appendix items, VEGP conforms with NFPA 14-1983 "Standpipe and Hose Systems" for Class II wet standpipe systems. This conformance is assured during the design process through compliance with approved design criteria and procedures.

Subsection 2-1.4: This subsection and all subsections dealing with standpipe height limitation and required zoning for structure heights in excess of 275-ft are not applicable. The lowest elevation for a hose connection is approximately 123 ft, and the highest elevation for a hose connection is approximately 285 ft giving a difference of 162 ft, which is less than 275 ft, so vertical zoning is not required.

Subsections 2-1.6; 2-1.7; 2-1.9 and 2-1.10: These subsections dealing with vertical zoning are not applicable. See reason stated above.

Subsection 5-6: This subsection is not applicable. Wet standpipe systems have redundant fire water pump and water supply, and the yard network is a loop-providing water supply even if any one section is out of service.

Subsection 7-1.1; 7-1.2: These subsections are not applicable because gravity tanks are not used at VEGP.

Subsection 8-1.2: This subsection is not applicable because fire department connections are not provided at VEGP.

Subsection 8-1.2.1: This subsection is not applicable. See reason stated above.

Subsection 8-2.5: The local fire department will be notified of system impairments by the fire team captain upon their arrival at the scene if the impairment may impact their operations. This method will ensure adequate notice to the local fire department.

Chapter 9: This chapter is not applicable from the time of fuel load and on.

NFPA 15-1982, WATER SPRAY FIXED SYSTEMS

General: The protection of cable trays is accomplished by utilizing the guidance of NFPA 15, but with a preaction system using closed directional spray nozzles rather than the NFPA 15 open spray nozzles. This is done to minimize the possible effect of water spray onto safety-related equipment.

Subsection 2-12: This subsection is not applicable because fire department connections are not provided at VEGP as licensed in NFPA 13 Subsection 2-7 above.

Subsection 3.3.2: This subsection is not applicable as stated above.

TABLE 9.5.1-9 (SHEET 6 OF 13)

Subsection 4-4.3.5: This subsection is not applicable because no belt conveyors are provided at VEGP.

Subsection 6-1.1: Testing and maintenance of water spray systems will be under the control of VEGP and will be done by qualified VEGP testing personnel.

Refer to appendix 9B Section C.6.c (3) for additional information on conformance with NFPA 15.

NFPA 20-1983, STANDARD FOR THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS

Subsection 2-2: The electric motor-driven fire pump has been modified with an impeller of a larger diameter for increased pump performance. This modification voids the UL listing of the fire pump assembly.

Subsection 2-8.1: The above ground suction piping at Plant Vogtle is black steel pipe with welded connections fabricated in accordance with ANSI-B31.1 procedures. The exterior of the pipe is painted; however, the interior is not. The firewater makeup at Plant Vogtle is provided from the makeup wellwater system which is inherently clean. Therefore, an interior coating was not used for the above ground suction piping. If during periodic flushing, evidence of corrosion or organic deposits is observed, consideration will be given to the use of an interior coating.

Subsection 2-13.2.1: The flow meter dial in Fire Pumphouse No. 2 indicates 160% (4000 gal/min) of rated pump capacity rather than the 175% (4375 gal/min) range recommended by NFPA. The maximum output of any single fire pump at Plant Vogtle is 3750 gal/min, which is within the range of the dial used. The motor-driven pump utilizes a 4160-V-ac switchgear instead of a NFPA-20 pump controller. UL/FM 4-kV motor controllers are not available and the 4-kV switchgear is considered more reliable.

Subsection 2-14.2: This subsection is not applicable at VEGP.

Chapters 4 and 5: These chapters are not applicable at VEGP.

Subsection 8-6.1: Engine runs will be performed at frequencies approved by Nuclear Electric Insurance Limited (NEIL).[1]

Chapter 10: This chapter is not applicable at VEGP.

NFPA 24-1984, STANDARD FOR INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENCES

Subsection 3-3.1: Where the indicating post portion of a post indicator and valve assembly interferes with the plant perimeter security system, the post has been replaced with a curb box and dial indicator assembly. This assembly is not listed by UL.

Subsection 5-6.1: Solid stream nozzles will not be provided as required by section 5-6.1.

TABLE 9.5.1-9 (SHEET 7 OF 13)

Instead, two class C nozzles will be maintained in the hose house in lieu of solid stream nozzles due to electrical fire hazards.

Chapter 6: This chapter not applicable at VEGP.

NFPA 26-1983, SUPERVISION OF VALVES CONTROLLING WATER SOURCES FOR FIRE PROTECTION

Subsection 6-7.2.1: All valves will not be locked and sealed as required by section 6-7.2.1. All valves will either be locked or electrically supervised and will be inspected in accordance with the VEGP fire protection surveillance program.

Subsection 8-2: A person will not be stationed to monitor a closed valve as required by section 8-2. Alternative fire protection measures will be implemented in accordance with the VEGP fire protection surveillance program.

Subsection 8-7: The public fire department will not be routinely notified of impairments on automatic systems as required by section 8-7. They will be notified by the fire team captain upon their arrival at the scene if the impairment impacts their area of operation.

Subsection 1-1: Some isolation valves are normally maintained in a closed position. This includes the containment isolation valves and isolation valves to charcoal filters, deluge system, and certain manual sprinkler system with closed head sprinklers. These valves are maintained closed to prevent inadvertent operation and equipment damage.

NFPA 27-1981, PRIVATE FIRE BRIGADES

Subsection 3-1.2(a): The VEGP fire brigade will not be responsible for establishment of safety-programs as directed by section 3-1.2(a). Safety programs are the responsibility of the safety department.

Subsection 3-2.1: The fire team captain on shift will be the acting fire brigade chief as described in section 3-2.1.

Subsection 3-2.1.2: All of the duties required for the fire team captain by section 3-2.1.2 will not be his responsibilities. These responsibilities will be shared with the VEGP Nuclear Training Department and the designated fire protection engineer.

Subsection 3.2.2 is not applicable at VEGP.

Subsection 4-2.1: Training will not, on a routine basis, be conducted by a state certified instructor as required by 4-2.1. Training will be normally handled by a qualified instructor.

Subsection 4-3: 1-h training sessions will not be held on monthly basis as required by section 4-3. This deviation is justified because VEGP training sessions will be held on a quarterly and annual basis. This combination of quarterly and annual training will average greater than 1.33 hours per month. This training schedule provides more total training hours than required by the code.

TABLE 9.5.1-9 (SHEET 8 OF 13)

NFPA 30-1981 FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE

Subsection 2-1.4: This subsection is not applicable. All the tanks are atmospheric.

Subsection 2-1.5: This subsection is not applicable. All the tanks are atmospheric.

Subsection 2-5.6: This subsection is not applicable. None of the tanks are located in areas subject to flooding.

Subsection 2-9: This subsection is not applicable at VEGP. Subsection 4-5.2, 4-5.3, and 4-5.5: These subsection are not applicable.

Chapter 5: This chapter is not applicable. The tanks are for fuel oil, lubricating oil and transformer oil, the storage and reservoirs are for use, and there is no processing.

Chapter 6: This chapter is not applicable. See the reason stated above.

Chapter 7: This chapter is not applicable. See reason stated above.

Chapter 8: This chapter is not applicable. See reason stated above.

Chapter 9: This chapter is not applicable.

NFPA 70-1981, NATIONAL ELECTRICAL CODE

Section 760-3: This section is not applicable and is not specifically marked. It is only terminated at fire detection/suppression system equipment dedicated for those purposes.

Section 760-5: This section is not applicable; there are no aerial circuits.

Section 760-6: Equipment is grounded per manufacturer's recommendations.

Section 760 Part B: This section is not applicable; all circuits are power signaling circuits.

Section 760-16, 18: This section is not applicable.

Section 760-23: The 120-V-ac panel do not show any marking to identify the fire protective signaling circuits. Accidental opening of the breaker will be annunciated at the fire alarm PC workstation.

Section 760-28: Exception No. 1: Insulation types used in cables are different from those listed.

Section 760-29: Line-type detectors are used to sense high temperatures in safety-related cable trays. Separation of 2-in. from nonpower limited cables is not possible.

TABLE 9.5.1-9 (SHEET 9 OF 13)

NFPA 72D-1979, PROPRIETARY PROTECTIVE SIGNALING SYSTEMS

Subsection 1-3.1: The central supervising station is located in the control room in accordance with CMEB 9.5-1.

Subsection 1-3.4: The shift supervisor will be responsible for monitoring and operating the system and taking necessary actions as required by section 1-3.4; these will not be his primary responsibilities. He will, have a sufficient staff available to respond to any plant emergency that may require plant shutdown.

Subsection 1-4.1: Immediate notification to the local fire department will not be accomplished as required by section 1-4.1. The shift supervisor will provide timely notification at his discretion.

Subsection 1-4.2: This subsection is not applicable.

Subsection 1-4.3: This subsection is not applicable.

Subsection 2-4.1: Operator controls at the central supervising station will not be tested at each shift change as directed by section 2-4.1. This deviation is justified because the system will be tested, as required, by the fire protection surveillance program.

Subsection 2-4.3: The tests prescribed by sections 2-4.3(a) and 2-4.3(b) will not be performed at the frequency required. In accordance with the fire protection surveillance program, water flow alarm devices and detection alarm circuit supervision are tested at frequencies approved by NEIL.[(1)] This deviation is justified based on the fact that the supervising station is constantly attended, the system is electronically supervised, a roving watch (with other duties also) is always in effect and loss of the supervisory signaling function annunciates horns locally and in the control room.

Subsection 2-4.5: This subsection is not applicable.

Subsection 2-6: Power supply sources designed in accordance with NFPA 72D-1975, Section 2220 per CMEB 9.5-1.

Subsection 2-6.5: This subsection is not applicable.

Subsection 3-4: This subsection is not applicable.

Subsection 3-6.2.2 - Trouble signal is initiated for abnormal condition of valve position loss of supervisory circuits, or low air and pressure; restoration to normal condition turns off the trouble signal.

Subsection 3-6.4.3A and B - These subsections are not applicable.

Subsection 3-6.4.3.C - This subsection is not applicable.

Subsection 3-6.4.4 - High and low water level are annunciated; restoration to normal water level will turn-off the annunciation.

TABLE 9.5.1-9 (SHEET 10 OF 13)

Subsection 3-6.4.5 - No temperature monitoring is provided because climate conditions are such that tank freezing is not a problem.

Subsection 3-7 - This subsection is not applicable.

Subsection 3-8 - This subsection is not applicable.

Subsection 3-9 - Class A initiating devices, as defined in NFPA 72D-1975, are used in accordance with CMEB 9.5-1. Local display cabinets (LDCs) have been utilized in a limited number of detection zones to aid in the determination of the location of a fire within large fire zones. Where these LDCs have been used, the fire detection supervisory system may not detect single open circuits in the negative detector wires or open circuits caused by smoke detectors that have been removed from their mounting baseplate as called for in table 3-9.1. Fire alarm transmission capability is not impaired by this situation. See paragraph 9.5.1.2.3.2 for further details.

Subsection 4-4.2 - This subsection is not applicable.

Subsection 4-7.3 - This subsection is not applicable.

NFPA 72E-1982, AUTOMATIC FIRE DETECTORS

Subsection 3-3.1: In some instances when heat detectors are used, the detector temperature setting is lower than the recommended temperature of this section. This condition does not present an adverse situation because the minimum heat detector actuation temperature is higher than the maximum ambient ceiling temperature.

Subsection 2-6.3 - Smoke detectors installed in the main control board are recessed into the top of the panel with adequate means provided to minimize the possibility of the detector from entering the interior of the board and affecting safety-related components therein. Ventilation is provided to allow smoke to reach the recessed smoke detector.

Chapter 6 - This chapter is not applicable.

Section 8-3 - Periodic tests will be performed at frequencies approved by NEIL.(1) To assure that each smoke detector is within its sensitivity range, a sensitivity test shall be performed within 1 year after installation and at a maximum interval of every 5 years, based on acceptable performance, thereafter as described in the 2007 edition of NFPA 72, section 10.4.4.2.

The following information is not relative to the operability and maintenance of the VEGP smoke detection system and will not be provided on procedure checklists as required by the listed sections:

Subsection 8-6.1(d): Installer/maintenance company name, address, and representative.

Subsection 8-6.1(e): Approving agency name, address, and representative.

TABLE 9.5.1-9 (SHEET 11 OF 13)

Subsection 8-6.1(k): Signature of approval authority representative. This information is not relative to the operability and maintenance of the VEGP smoke detection system.

Subsection 8-6.2(e): Installer/maintenance company name, address, and representative.

Subsection 8-6.2(f): Approving agency name, address, and representative.

Subsection 8-6.2(l): Signature of approval authority representative.

NFPA 80-1983 FIRE DOORS AND WINDOWS

Section 1-6.1: VEGP fire doors may undergo minor modifications that void or otherwise compromise the Underwriters Laboratories label that was originally affixed to the door. Therefore, each door may not be labeled as required by this section. In all cases the modifications have been individually evaluated and determined not to adversely affect the door's fire rating as allowed by the guidelines of NRC Generic Letter 86-10 section 3.2.3.

Section 2-5.4: Clearances between the door and the door frame may exceed the 1/8-in. gap required by this section. The gap may extend to a maximum of 3/8 in. on single swinging metal fire doors to a maximum of 1/4 in. on double swinging metal fire doors. The gap between meeting edges of double swinging metal fire doors may also extend to a maximum of 1/4 in. The gap at the strikeplate area will not exceed 1/8 in. in any case. VEGP swinging hollow metal fire doors have been tested by an independent laboratory to the above-referenced dimensions. Pressure and bulletproof swinging doors have been evaluated to be comparable to or exceed the qualifications of the hollow metal doors that were tested by the independent laboratory.

Section 2-8.7.1: Fire doors to control building electrical equipment rooms are equipped with hold-open devices for use during station blackout conditions. Due to air balance conditions, some doors at VEGP may require deliberate manual action to close. Personnel are trained on the proper use of doors to ensure they are fully closed and latched following use.

Chapter 13 - This chapter is not applicable.

NFPA 90A-1981, INSTALLATION OF AIR CONDITIONING AND VENTILATION SYSTEMS

Subsection 2-1.2.2: This subsection is not applicable, since flexible duct connection penetrating floors are not used.

Chapter 4: Automatic shutdown of fan or isolation of return airflow upon receipt of a fire alarm is not provided in the control room. The control room is a continuously occupied area and the operator is relied upon to evaluate the fire location and take appropriate action to isolate necessary dampers, shutdown normal fans, if necessary, and start the smoke removal fan manually.

TABLE 9.5.1-9 (SHEET 12 OF 13)

NFPA 92M-1972, WATERPROOFING AND DRAINING OF FLOORS

NFPA 92M is not utilized in the VEGP design for the following reasons:

- Floor drains have been provided in the various fire areas to drain any water accumulation resulting from fire fighting activities.
- Potential flooding damage to safe-shutdown equipment resulting from fire suppression system operation will be evaluated in the plant flooding analysis and appropriate corrective action to preclude any damage from occurring will be implemented.
- In areas where decontamination chemicals are expected to be utilized, the floor surfaces have been applied with an epoxy coating.

NFPA 1201-1984 (FORMALLY NFPA-4) ORGANIZATION FOR FIRE SERVICES

This standard is written specifically for a public fire department and does not apply to the fire protection program of a nuclear power plant. However, the standard does provide some guidance that VEGP feels will enhance the loss prevention program and will comply with the following sections/subsections only: 1-1.1.2, 1-2.1, 1-2.2.1, 1-6.1, 3-3.1.2.1, 5-2.1.5, 5-2.1.6, 6-2.1, 6-3.2, 6-4.1.1, 15-1.3.1, 15-1.3.2, 15-1.3.3, 15-2.1.3, 15-2.2, 15-3.1.1, 16-1.2.3, and 16-2.5.

NFPA 1962-1979, CARE, USE, AND MAINTENANCE OF FIRE HOSE INCLUDING CONNECTIONS AND NOZZLES

Subsection 2-3.4 - This subsection is not applicable.

Subsection 2-4.2 - This subsection is not applicable.

Subsection 2-4.3 - This subsection is not applicable.

Chapter 3 - This chapter is not applicable.

Chapter 4 - This chapter is not applicable.

Chapter 6 – Individual records for each section of fire hose are not kept. Acceptance information on the hose can be found from the warehouse stock description. Each section of hose is labeled with the latest hydrostatic test date.

Subsection 8-3.2 - This subsection is not applicable.

Subsection 7-3 - This subsection is not applicable.

Subsection 8-5 - This subsection is not applicable.

TABLE 9.5.1-9 (SHEET 13 OF 13)

Subsection 8-6 - This subsection is not applicable.

Notes:

1) Test and inspection frequencies may differ from NFPA standards where approved by Nuclear Electric Insurance Limited (NEIL).

TABLE 9.5.1-10 (SHEET 1 OF 10)

FIRE PROTECTION FUNCTIONALITY REQUIREMENTS

Action Steps in Attachment C describe compensatory measures to take for degraded or nonfunctional fire protection features or post-fire safe shutdown capability. Alternative compensatory measures may be specified by preparing an evaluation in accordance with NRC Regulatory Issue Summary 2005-07. The use of alternative compensatory measures should be considered for conditions affecting post-fire safe shutdown capability, such as an identified lack of cable separation for safe shutdown components in lieu of fire watches, since fire watches alone may not be the most effective measures. Other measures which improve operator ability to manage the potential loss of the safe shutdown component or components should be considered. Alternative compensatory measures such as temporary fire barriers, temporary detection systems, and temporary suppression systems may also be considered for degraded fire protection features. It is acceptable to implement the traditional compensatory measure (i.e. fire watch) until an alternate compensatory measure evaluation can be performed. Alternative compensatory measures may also be specified for pre-planned impairments of fire protection features or post-fire safe shutdown capability.

NOTE: The Technical Requirements Manual defined terms FUNCTIONAL and FUNCTIONALITY are used in the following Fire Protection requirements instead of the Technical Specification defined terms OPERABLE and OPERABILITY.

1.0 FIRE DETECTION INSTRUMENTATION

1.1 LIMITING CONDITION FOR OPERATION

As a minimum, the fire detection instrumentation for each fire detection zone shown in table 9.5.1-10a shall be FUNCTIONAL.

1.2 APPLICABILITY

Whenever equipment protected by the fire detection instrument is required to be operable or FUNCTIONAL as applicable.

1.3 ACTION

A. With any, but not more than one-half the total Function A fire detection instruments in any fire zone shown in table 9.5.1-10a nonfunctional, restore the nonfunctional instrument(s) to FUNCTIONAL status within 14 days or within the next 1 h; establish a fire patrol [(a)] to inspect the zone(s) with the nonfunctional instrument(s) at least once per h, unless the instrument(s) is located inside the containment; then inspect that containment zone at least once per 8 h or monitor the containment air temperature at least once per h at the locations listed in the Technical Specification Bases for SR 3.6.5.1.

B. With more than one-half of the Function A fire detection instruments in any fire zone or any room within a zone shown in table 9.5.1-10a nonfunctional, within 1 h establish a fire patrol [(a)] to inspect the zone(s) or rooms with the nonfunctional instrument(s) at least once per h, unless the instrument(s) is located inside the containment; then inspect that containment zone at least

TABLE 9.5.1-10 (SHEET 2 OF 10)

once per 8 h (or monitor the containment air temperature at least once per h at the locations listed in the Technical Specification Bases for SR 3.6.5.1).

C. With any Function B fire detection instrument shown in the table 9.5.1-10a nonfunctional, within 1 h manually trip the affected preaction sprinkler system control valve if not already tripped, and enter the appropriate action statement (1.3.A or 1.3.B) above.[b]

D. With annunciation lost to the fire alarm PC workstation but still available at the local panel(s), within 1 h establish a fire patrol [a] to inspect the local panel(s) (at least once per h) for which control room annunciation is lost.

1.4 SURVEILLANCE REQUIREMENTS

1.4.1 Each of the above required fire detection instruments which are accessible during plant operation shall be demonstrated FUNCTIONAL at least once per 18 months by performance of a trip actuating device operational test. Fire detectors which are not accessible during plant operation shall be demonstrated FUNCTIONAL by the performance of a trip actuating device operational test during each refueling outage.

1.4.2 The NFPA Standard 72D supervised circuits supervision associated with the detector alarms of each of the above required fire detection instruments shall be demonstrated FUNCTIONAL a least once per 18 months.

2.0 FIRE SUPPRESSION WATER SYSTEM

2.1 LIMITING CONDITION FOR OPERATION

The fire suppression water system shall be FUNCTIONAL with:

A. At least two fire suppression pumps, each with a capacity of 2500 gal/min, with their discharge aligned to the fire suppression header.

B. At least two separate water supplies, each with a minimum contained volume of 300,000 gal, which is greater than the largest system demand.

C. A FUNCTIONAL flow path capable of taking suction from the north tank or the south tank and transferring the water through distribution piping with FUNCTIONAL sectionalizing control or isolation valves to the yard hydrant curb valves, the last valve ahead of the water flow alarm device on each sprinkler, and the last valve ahead of the control valve on each sprinkler system required to be FUNCTIONAL per sections 3.0, 5.0, and 6.0 of this table.

2.2 APPLICABILITY

At all times.

TABLE 9.5.1-10 (SHEET 3 OF 10)

2.3 ACTION

A. With one of the two required pumps nonfunctional and/or with one water supply nonfunctional, restore the nonfunctional equipment to FUNCTIONAL status within 7 days, or establish a nominal backup fire suppression supply system or begin orderly plant shutdown within 7 days.

B. With all three fire pumps nonfunctional or with both water supply tanks nonfunctional, establish a nominal backup fire suppression supply system within 24 h, or begin an orderly plant shutdown.

C. With the fire suppression water system otherwise nonfunctional, establish an alternate fire suppression water supply to the nonfunctional portion within 24 h.

2.4 SURVEILLANCE REQUIREMENTS

2.4.1 FIRE SUPPRESSION WATER SYSTEM

The fire suppression water system shall be demonstrated FUNCTIONAL:

A. At least once per 7 days by verifying the contained water supply volume.

B. At least once per quarter by verifying that each valve that is accessible during plant operation (manual, power-operated, or automatic) in the flow path is in its correct position.

C. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.[m]

D. At least once per 18 months by:

1. Performing a system functional test which includes simulated automatic actuation of the system throughout its operation sequence.

2. Performing a flush on the yard loop portions that feed systems protecting safe shutdown capability.

3. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.[m]

G. At least once per 5 years by performing a flow test of the system in accordance with Section 16, Chapter 8 of the Fire Protection Handbook, 15th Edition, published by the National Fire Protection Association.

H. During each cold shutdown exceeding 24 h by verifying that each inaccessible valve in the flowpath is in its correct position unless that verification is performed within the previous month.

TABLE 9.5.1-10 (SHEET 4 OF 10)

2.4.2 DIESEL ENGINE DRIVEN FIRE PUMP

Each diesel engine driven fire pump shall be demonstrated FUNCTIONAL:

A. At least once per 31 days by verifying:

1. Each fuel storage tank contains at least 90 gal of fuel, and

2. Each diesel starts from ambient conditions and operates for at least 30 min on recirculation flow.

B. At least once per 92 days by verifying that a sample of diesel fuel from each fuel storage tank, obtained in accordance with D4057-81 has a kinematic viscosity between 1.9 and 4.1 centistokes at 40°C when tested in accordance with ASTM-D445-82 and an acceptable clear and bright appearance when tested in accordance with ASTM-D4176-82.

C. At least once per 18 months by:

1. Subjecting each diesel to an inspection in accordance with procedures prepared in conjunction with the manufacturer's recommendations for its class of service.

2. Verifying that each pump starts within is design setpoint range.

D. The fire pump diesel starting 24-V battery bank and charger shall be demonstrated FUNCTIONAL by regular performance of surveillance activities commensurate with the type of battery in service.

2.4.3 ELECTRIC MOTOR-DRIVEN FIRE PUMP

The electric motor-driven fire pump shall be demonstrated FUNCTIONAL:

A. At least once per 31 days by starting and operating it for at least 15 minutes on recirculation flow.

B. At least once per 18 months by verifying the pump starts within its design setpoint range.

3.0 SPRINKLER SYSTEMS

3.1 LIMITING CONDITION FOR OPERATION

Sprinkler systems listed in table 9.5.1-10.b shall be FUNCTIONAL.

3.2 APPLICABILITY

Whenever equipment protected by the sprinkler system is required to be operable or FUNCTIONAL as applicable.

TABLE 9.5.1-10 (SHEET 5 OF 10)

3.3 ACTION

With one or more of the above required spray and/or sprinkler systems nonfunctional[c] within 1 h, establish an hourly fire patrol.[a]

3.4 SURVEILLANCE REQUIREMENTS

3.4.1 Each of the above required sprinkler systems shall be demonstrated FUNCTIONAL.

A. At least once per 18 months:

1. By performing a system functional test which includes simulated automatic actuation of the system, and verifying that the automatic valves in the flow path actuate to their correct positions on a simulated fire condition test signal.

2. By a visual inspection of the unsupervised dry pipe sprinkler headers to verify their integrity.

3. By visual inspection of each sprinkler or nozzle to verify sprinkler or nozzle orientation and to verify sprinkler or nozzle has not been damaged or obstructed.

4. By verifying the water supply is sufficient to meet the hydraulic flow and pressure requirements of the sprinkler system as described in NFPA 13 after accounting for additional system losses of no less than 500 gal/min for manual fire fighting activities.

4.0 HALON SYSTEMS

4.1 LIMITING CONDITION FOR OPERATION

The following halon systems shall be FUNCTIONAL:

System	Location
1-2304-R4-001	Remote shutdown panel train B, room A43 - control building
2-2304-R4-001	Remote shutdown panel train B, room A24 - control building
1-2304-R4-002	Remote shutdown panel train A, room A75 - control building
2-2304-R4-002	Remote shutdown panel train A, room A16 - control building
1-2304-R4-006	Records storage area, room 160 - control building

TABLE 9.5.1-10 (SHEET 6 OF 10)

4.2 APPLICABILITY

Whenever equipment protected by the halon system is required to be operable or FUNCTIONAL as applicable.

4.3 ACTION

With one or more of the above required halon systems nonfunctional, within 1 h establish an hourly fire patrol.[a]

4.4 SURVEILLANCE REQUIREMENTS

4.4.1 Each of the above required halon systems shall be demonstrated FUNCTIONAL:

A. At least once per 18 months by verifying halon storage tank weight to be at least 95 percent of full charge weight (or level) and pressure to be at least 90 percent of full charge pressure.

B. At least once per 18 months by verifying the system, including associated ventilation system fire dampers and fire door release mechanism, actuates manually and automatically, upon receipt of a simulated actuation signal.

5.0 FIRE HOSE STATIONS

5.1 LIMITING CONDITION FOR OPERATION

The fire hose stations given in table 9.5.1-10c shall be FUNCTIONAL.

5.2 APPLICABILITY

Whenever equipment in the areas protected by the fire hose stations is required to be operable or FUNCTIONAL as applicable.

5.3 ACTION

With one or more of the fire hose stations given in table 9.5.1-10c nonfunctional, provide at the nearest FUNCTIONAL hose station an additional equivalent capacity hose of sufficient length to provide coverage for the area left unprotected by the nonfunctional hose station. The fire hose shall be stored in a roll at the outlet of the FUNCTIONAL hose station. Signs shall be mounted at the hose station to identify the proper hose to use. The above action requirement shall be accomplished within 1 h if the nonfunctional fire hose is the primary[d] means of fire suppression; otherwise, provide the additional hose within 24 h.

5.4 SURVEILLANCE REQUIREMENTS

5.4.1 Each of the fire hose stations given in table 9.5.1-10c shall be demonstrated FUNCTIONAL:

TABLE 9.5.1-10 (SHEET 7 OF 10)

A. At least once per quarter, by a visual inspection of the fire hose stations accessible during plant operations to assure all required equipment is at the station.

B. At least once per 18 months, by:

1. Visual inspection of the stations not accessible during plant operation to assure all required equipment is at the station.

2. Removing the hose for inspection and reracking.

3. Inspecting all gaskets and replacing any degraded gaskets in the couplings.

C. At least once per 3 years, by:

1. Partially opening each hose station valve to verify valve FUNCTIONALITY and no flow blockage.

2. Conducting a hose hydrostatic test at a pressure of 250 psig.

6.0 YARD FIRE HYDRANTS AND HYDRANT HOSE HOUSES

6.1 <u>LIMITING CONDITION FOR OPERATION</u>

The yard fire hydrants and associated hydrant hose houses given in table 9.5.1-10d shall be FUNCTIONAL.

6.2 <u>APPLICABILITY</u>

Whenever equipment in the areas protected by the yard fire hydrants is required to be operable or FUNCTIONAL as applicable.

6.3 <u>ACTION</u>

With one or more of the yard hydrants given in table 9.5.1-10d nonfunctional, within 1 hour have one hydrant hose and equipment card inside the plant protected area to provide the equipment necessary to cover the area for which the nonfunctional hydrant provided service. The hydrant hose and equipment cart should be positioned at the closest operable hydrant(s) shown in table 9.5.1-10d if the failed hydrant is a primary hydrant. For a backup hydrant, perform the same action within 24 hours. The hydrant hose and equipment cart used for compensatory action should be in addition to the hydrant hose and equipment cart used for fire brigade response. Each hydrant hose and equipment cart carries, as a minimum, the equipment that was provided by three hydrant hose houses. When there are more than three nonfunctional hydrants given in table 9.5.1-10d, or should a hydrant hose and equipment cart become nonfunctional, obtain a third hydrant hose and equipment cart. Should all hydrant hose and equipment carts become nonfunctional,

TABLE 9.5.1-10 (SHEET 8 OF 10)

remove the equipment and restock the primary hydrant houses listed in table 9.5.1-10d within 1 hour and backup hydrant houses within 24 hours for the FUNCTIONAL hydrants only.

6.4 SURVEILLANCE REQUIREMENTS

6.4.1 Each of the yard fire hydrants and associated hydrant hose houses given in table 9.5.1-10d shall be demonstrated FUNCTIONAL:

A. Perform periodic visual inspections of the hydrant hose and equipment cart for gas and oil levels, and general condition of the equipment and the cart.

B. At least once every quarter, by visual inspection of the hydrant hose house or hydrant hose and equipment cart, whichever is in service, to assure all required equipment is in place and FUNCTIONAL.

C. At least once per 12 months, by visually inspecting each yard fire hydrant and verifying that the hydrant barrel is dry and that the hydrant is not damaged.

D. At least once per 12 months by:

1. Conducting a hose hydrostatic test at a pressure of 250 psig.

2. Inspecting all the gaskets and replacing any degraded gaskets in the couplings.

3. Performing a flow check of each hydrant to verify its FUNCTIONALITY.

7.0 FIRE-RATED ASSEMBLIES

7.1 LIMITING CONDITION FOR OPERATION

All fire barriers (walls, floor/ceilings, radiant energy shields, and cable tray enclosures) separating redundant safe shutdown fire areas from each other to include fire-rated assemblies in penetrations (fire doors, fire dampers, and penetration seals) shall be FUNCTIONAL.

7.2 APPLICABILITY

Whenever the safe shutdown equipment in the fire areas on either side of the assemblies or barriers is required to be operable or FUNCTIONAL as applicable.

7.3 ACTION

With one or more of the above required fire barriers and/or fire-rated assemblies nonfunctional, within 1 h either establish a continuous fire watch [a] on at least one side of the affected assembly, or verify the FUNCTIONALITY of fire detectors at least on one side of the nonfunctional assembly and establish an hourly fire patrol.[a]

TABLE 9.5.1-10 (SHEET 9 OF 10)

7.4 SURVEILLANCE REQUIREMENTS

7.4.1 At least once per 18 months the above required fire-rated assemblies shall be verified FUNCTIONAL by performing a visual inspection of:

A. The exposed surfaces of each fire rated assembly.[e,f,g,h,i,j,k,l]

B. Each fire damper and associated hardware.

C. At least 10 percent of each type of sealed penetration (mechanical and electrical).[f] If apparent changes in appearance or abnormal degradations are found, a visual inspection of an additional 10 percent of each type of sealed penetration shall be made. This inspection process shall continue until a 10-percent sample with no apparent changes in appearance or abnormal degradation is found.

7.4.2 Each of the above required fire doors shall be verified FUNCTIONAL by:

A. Verifying that each normally closed, unlocked, accessible fire door is closed at least once per 24 h.

B. Verifying that doors with automatic hold-open and release mechanisms are free of obstructions at least once per 24 h.

C. Verifying that each locked closed fire door is closed at least once per 7 days.

D. Performing a visual inspection for normally closed, accessible fire doors of the closing mechanisms and latches of automatic self-closing fire doors at least once per 6 months. Held-open fire doors with automatic hold-open and release mechanisms will be inspected at least once per 6 months.

E. Performing a functional test of doors with automatic hold-open and release mechanisms at least once per 18 months.

a. The use of remote monitoring with CCTV is an acceptable alternative to a fire watch or fire patrol as used in the action statements of this table for normally inaccessible areas or designated high radiation areas when monitored at the required frequencies stated in the table.

b. With the affected preaction systems tripped, the Function B detection instruments revert to Function A detection instruments.

c. For preaction sprinkler systems, in the event of a detector failure, FUNCTIONALITY will be maintained by manually tripping the preaction sprinkler system control valve.

d. A hose station is considered "primary" only if there is no automatic suppression system providing protection for safe shutdown equipment within effective reach of the hose station.

e. The hatch plugs in the ceilings of auxiliary building rooms RA123, RA124, RA125, RA126, RA127, RA128, RA129, RA130, RA131, RA132, RA133, and RA134 do not need to be removed

TABLE 9.5.1-10 (SHEET 10 OF 10)

to verify a portion of the boundary between fire areas 1-AB-L1-H and 2-AB-LD-B. The verification of this portion is accomplished by inspecting the floor of R142 with the hatch plugs over these rooms installed.

f. The ceiling and west wall of auxiliary building room RD37 need not be inspected to verify a portion of the boundary between fire areas 1-AB-LD-B and 2-AB-LD-B. The verification of this portion is accomplished by inspecting the floors of RC51, RC54, RC55, and RC56 along with the east wall of RD33.

g. The south wall and floor of tunnel 1T6B need not be inspected to respectively verify the fire area boundary between 1-AFB-C and 1-EB-B and the fire area boundary between 1-AFB-C and 1-CB-LA-A. This verification is accomplished by inspecting the north walls of Unit 1 equipment building rooms R116 and R114 and the ceilings of control building rooms RA61 and RA62.

h. The south wall and floor of tunnel 2T6B need not be inspected to respectively verify the fire area boundary between 2-AFB-C and 2-EB-B and the fire area boundary between 2-AFB-C and 2-CB-LA-A. This verification is accomplished by inspecting the north walls of Unit 2 equipment building rooms R116 and R114 and the ceilings of control building rooms RA03 and RA04.

i. The north wall, partial south wall, and partial floor of fuel handling building room RB10 need not be inspected to respectively verify the fire area boundary between 1-AB-LD-B and 1-CB-LC-B, the fire area boundary between 1-AB-LD-B and 1-CB-LB-D, the fire area boundary between 1-AB-LD-B and 1-FB-LC-A, and the fire area boundary between 1-AB-LD-B and 1-CB-LC-A. This verification is accomplished by respectively inspecting the south walls of control building rooms RB39 and RB43, the north walls of fuel handling building rooms RB12 and RB11, and the ceiling of fuel handling building room RC08.

j. The north wall, partial south wall, and partial floor of fuel handling building room RB04 need not be inspected to respectively verify the fire area boundary between 1-AB-LD-B and 1-CB-LC-B, the fire area boundary between 1-AB-LD-B and 2-CB-LB-D, the fire area boundary between 1-AB-LD-B and 2-FB-LC-A, and the fire area boundary between 1-AB-LD-B and 2-CB-LC-A. This verification is accomplished by respectively inspecting the south walls of control building rooms RB39, RB38, and RB19; the north walls of fuel handling building rooms RB02 and RB01; and the ceiling of fuel handling building room RC04.

k. The west wall and partial floor of fuel handling building room RB05 need not be inspected to respectively verify the fire area boundary between fire areas 1-AB-LD-B and 2-FB-LC-A and the fire area boundary between fire areas 1-AB-LD-B and 2-CB-LC-A. This verification is accomplished by respectively inspecting the east walls of fuel handling building rooms RB01 and RB02 and the ceiling of fuel handling building room RC04.

l. The east wall and partial floor of fuel handling building room RB09 need not be inspected to respectively verify the fire area boundary between fire areas 1-AB-LD-B and 1-FB-LC-A and the fire area boundary between fire areas 1-AB-LD-B and 1-CB-LC-A. This verification is accomplished by respectively inspecting the west walls of fuel handling building rooms RB11 and RB12 and the ceiling of fuel handling building room RC08.

m. The Unit 1 and common charcoal filter deluge valves (outside containment) are not cycled per code requirements. This exception is justified by the low probability of fire occurring in the charcoal filter and because alternate means exist to suppress fire.

TABLE 9.5.1-10A (SHEET 1 OF 12)

FIRE DETECTION INSTRUMENTS

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Auxiliary Building (Unit 1)						
1	119	Level D piping penetration room train A			0/7	
2	119	Level D switchgear rooms train A			2/0	
3	119	Level D CCW drain tank rooms			0/24	
4	119	Level D CTMT spray pump rooms train A			0/3	
5	119	Level D CTMT spray pump rooms train B			0/2	
6	119	Level D boric acid pump room			2/0	
8	119	Level D pipe chases train A			0/2	
9	119	Level D RHR pump rooms			0/2	
10	119	Level D RHR pump rooms			0/2	
11 A	119	Level D pipe chases train B			0/2	
11 B	119	Level D pipe chases train B			0/2	
12 A	119	Level D RHR valve and control rooms			0/23	
12 B	119	Level D RHR valve and control rooms			0/8	
12 C	119	Level D RHR valve and control rooms			0/22	
189	119	Level D cooler room train A			1/0	
190	119	Level D cooler room train B			1/0	
14 A	143	Level C RWST and charging pumps rooms			10/0	
14 B	143	Level C RWST and charging pumps rooms			28/0	
14 C	143	Level C RWST and charging pumps rooms			0/4	
14 D	143	Level C RWST and charging pumps rooms			0/5	
16	143	Level C RHR exchanger room			0/4	
17	143	Level C electrical chase room train A			0/13	
18	143	Level C RHR exchanger room			4/0	
19	143	Level C CVCS centrifugal charging pump room trains A and B			0/4	
20	143	Level C CVCS centrifugal charging pump room trains A and B			0/4	
21	143	Level C CVCS centrifugal charging pump rooms			0/4	
22	143	Level C MCC 1ABD room train A			3/0	
23	143	Level C electrical chase rooms			0/10	
24 A	143	Level C heat exchanger bypass room			20/0	
24 B	143	Level C heat exchanger bypass room			30/0	
25	143	Level C electrical chase rooms			0/8	
26 A	170	Level B RHR valve pressure room			0/16	
26 B	170	Level B RHR valve pressure room			0/9	
30	170	Level B auxiliary CCW pump room			0/3	
31	170	Level B safety injection pump room trains A and B			0/3	
32	170	Level B safety injection pump room trains A and B			0/3	

TABLE 9.5.1-10A (SHEET 2 OF 12)

Fire-Zone	Elevation	Instrument Location	Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
			Total Number of Instruments[a]			
33	170	Level B auxiliary CCW pump room			0/3	
34	170	Level B reactor makeup water pump rooms			0/10	
35	170	Level B MCC 1BBC			3/0	
40 A	170	Level B decay tank rooms			0/10	
40 B	170	Level B resin filter rooms			0/30	
40 C	170	Level B corridors			0/21	
171	170	Level B boron injection recirculating pump rooms			0/16	
36	195	Level A CCW pump room			0/12	
37	195	Level A CCW pump room			0/16	
38 A	195	Level A train A charging pump room			0/28	
38 B	195	Level A train B charging pump room			0/32	
39 A	195	Level A pipe penetration rooms			12/0	
39 B	195	Level A pipe penetration rooms			2/0	
39 C	195	Level A pipe penetration rooms			0/5	
39 D	195	Level A pipe penetration rooms			0/5	
43	220	Level 1 MCC 1BBB room train B			0/2	
44	220	Level 1 MCC 1ABB room train A			3/0	
45	220	Level 1 main steam isolation valve rooms	0/12			
46	220	Level 1 demin access hatch, switchgear/control panel rooms			0/25	
47 A	220	Level 1 new fuel unload area			36/0	
47 B	220	Level 1 new fuel unload area and elevator no. 1			17/0	
48	220	Level 1 train A cable chase rooms	0/4		0/5	
49	220	Level 1 auxiliary comp cooling water heat exchanger rooms			0/9	
52	220	Level 1 auxiliary comp cooling water heat exchanger rooms and elevator no. 3			0/12	
150	220	Level 1 drum storage area			6/0	
53	240	Level 2 HVAC equipment rooms			0/18	
54	240	Level 2 comp cooling water heat exchanger room train A			0/8	
55	240	Level 2 Comp cooling water heat exchanger room train B			0/12	
147	240	Level 2 filter rooms train B			4/0	
148	240	Level 2 switchgear rooms			2/0	
149	240	Level 2 switchgear rooms train B			0/3	
172	240	Level 2 filter rooms train A			0/4	
Auxiliary Building (Unit 2)						
1	119	Level D piping penetration room train A			0/7	
2	119	Level D switchgear rooms train A			2/0	
3	119	Level D CCW drain tank rooms			0/20	
4	119	Level D CTMT spray pump rooms train A			0/3	
5	119	Level D CTMT spray pump rooms train B			0/2	
6	119	Level D boric acid pump room			2/0	

TABLE 9.5.1-10A (SHEET 3 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
8	119	Level D pipe chases train A			0/2	
9	119	Level D RHR pump rooms			0/2	
10	119	Level D RHR pump rooms			0/2	
11 A	119	Level D pipe chases train B			0/2	
11 B	119	Level D pipe chases train B			0/38	
13 A	119	Level D RHR valve and control rooms			18/0	
13 B	119	Level D RHR valve and control rooms			0/19	
189	119	Level D cooler room train A			1/0	
190	119	Level D cooler room train B			1/0	
14 A	143	Level C RWST and charging pumps rooms			10/0	
14 B	143	Level C RWST and charging pumps rooms			28/0	
14 C	143	Level C RWST and charging pumps rooms			0/4	
14 D	143	Level C RWST and charging pumps rooms			0/5	
16	143	Level C RHR exchanger room			4/0	
17	143	Level C electrical chase room train A			0/13	
18	143	Level C RHR exchanger room			4/0	
19	143	Level C CVCS centrifugal charging pump room trains A and B			0/4	
20	143	Level C CVCS centrifugal charging pump room trains A and B			0/4	
21	143	Level C CVCS centrifugal charging pump rooms			0/4	
22	143	Level C MCC 2ABD room train A			3/0	
23	143	Level C electrical chase rooms			0/10	
24 A	143	Level C heat exchanger bypass room	2/0		19/0	
24 B	143	Level C heat exchanger bypass room			22/0	
25	143	Level C electrical chase rooms			0/8	
26 A	170	Level B RHR valve pressure room			0/16	
26 B	170	Level B RHR valve pressure room			0/9	
30	170	Level B auxiliary CCW pump room			0/3	
31	170	Level B safety injection pump room trains A and B			0/3	
32	170	Level B safety injection pump room trains A and B			0/3	
33	170	Level B auxiliary CCW pump room			0/3	
34	170	Level B reactor makeup water pump rooms			0/11	
35	170	Level B MCC 2BBC			3/0	
40 A	170	Level B decay tank rooms			23/0	
40 B	170	Level B resin filter rooms			33/0	
171	170	Level B boron injection recirculating pump rooms			0/14	
36	195	Level A CCW pump room			0/12	
37	195	Level A CCW pump room			0/16	
38 A	195	Level A train A charging pump room			0/20	
38 B	195	Level A train B charging pump room			22/0	
39 A	195	Level A pipe penetration rooms	2/0		10/0	
39 B	195	Level A pipe penetration rooms			2/0	

TABLE 9.5.1-10A (SHEET 4 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
39 C	195	Level A pipe penetration rooms			0/5	
39 D	195	Level A pipe penetration rooms			0/5	
43	220	Level 1 MCC 2BBB room train B			0/2	
44	220	Level 1 MCC 2ABB room train A			3/0	
45	220	Level 1 main steam isolation valve rooms	0/12			
46	220	Level 1 demineralizer access hatch, switchgear/control panel rooms			0/21	
48	220	Level 1 train A cable chase rooms	0/4		0/7	
49	220	Level 1 auxiliary compressor cooling water heat exchanger rooms			0/9	
50	220	Level 1 hot machine shop			16/0	
52	220	Level 1 auxiliary compressor cooling water heat exchanger rooms and elevation No. 3			0/10	
53	240	Level 2 HVAC equipment rooms			0/18	
54	240	Level 2 compressor cooling water heat exchanger room train A			0/8	
55	240	Level 2 compressor cooling water heat exchanger room train B			0/12	
147	240	Level 2 filter rooms train B			4/0	
148	240	Level 2 switchgear rooms			2/0	
149	240	Level 2 switchgear rooms train B			0/3	
172	240	Level 2 filter rooms train A			0/4	
Control Building (Unit 1)						
56 A	180	Level B switchgear and battery train D room channel 4			0/2	
56 B	180	Level B switchgear and battery train D room channel 4			0/2	
58	180	Level B normal HVAC room			10/0	
59	180	Level B normal HVAC room			4/0	
60	180	Level B electrical penetration rooms train B			0/3	
61	180	Level B electrical penetration rooms train A			0/9	
62	180	Level B electrical penetration rooms train B			0/15	
63	180	Level B MCC rooms			3/0	
64	180	Level B MCC rooms			4/0	
65	180	Level B corridor train A			0/3	
66	180	Level B corridor train B			0/3	
67	180	Level B corridor train B			0/12	
68	180	Level B MG set rooms train B			2/0	
69	180	Level B MG set rooms train A			5/0	
70	180	Level B HVAC equipment rooms train B			6/0	

TABLE 9.5.1-10A (SHEET 5 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Control Building (Unit 1) (con't)						
71	180	Level B switchgear room train B			3/0	
72	180	Level B HVAC equipment rooms train A			0/5	
73	180	Level B corridor train A			0/33	
74	180	Level B switchgear rooms			6/0	
75	180	Level B switchgear room train A			4/0	
76	180	Level B non-train DC room			3/0	
77 A	180	Level B switchgear and battery train C room channel 3			2/0	
77 B	180	Level B switchgear and battery train C room channel 3			0/2	
78 A	180	Level B switchgear and battery train A room channel 1			2/0	
78 B	180	Level B switchgear and battery train A room channel 1			0/4	
79 A	180	Level B switchgear and battery train B room channel 2			2/0	
79 B	180	Level B switchgear and battery train B room channel 2			0/2	
80	180	Level B switchgear room			0/15	
81 A	180	Level B mechanical shaft rooms train A			10/0	
81 B	180	Level B mechanical shaft rooms train A			8/0	
82	180	Level B electrical penetration rooms train B			2/0	
83	180	Level B electrical shafts			0/2	
138	180	Level B lobby corridor			13/0	
151	180	Level B electrical shaft train A			0/2	
152	180	Level B electrical shaft room train B			0/2	
153	180	Level B electrical shafts			0/2	
57 A	200	Level A mechanical shaft room train B			9/0	
57 B	200	Level A mechanical shaft room train B			12/0	
84	200	Level A east-west corridors			0/6	
85	200	Level A corridor train A			0/22	
86	200	Level A corridor train A			0/6	
87	200	Level A switchgear rooms			4/0	
88	200	Level A electrical penetration rooms train B			0/8	
89	200	Level A electrical penetration rooms			0/7	
90	200	Level A switchgear rooms			3/0	
91	200	Level A switchgear rooms train A			7/0	
92	200	Level A switchgear rooms train B			8/0	
93	200	Level A corridor train B			0/13	
94	200	Level A HVAC and auxiliary relay rooms			4/0	
95	200	Level A cable spreading room train A			0/18	
96	200	Level A computer rooms			8/0	
97	200	Level A electrical shaft rooms train B			0/2	
98	200	Level A hot shutdown rooms train B			3/0	
99	200	Level A feedwater valves rooms			11/0	

TABLE 9.5.1-10A (SHEET 6 OF 12)

			Total Number of Instruments[a]			
Fire-Zone	Elevation	Instrument Location	Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Control Building (Unit 1) (con't)						
99	200	Level A feedwater valves rooms	4/0		7/0	
100	200	Level A HVAC equipment rooms train B			4/0	
101	200	Level A HVAC equipment rooms train A			0/10	
102	200	Level A electrical penetration rooms			0/2	
103	200	Level A hot shutdown rooms train A			3/0	
154	200	Level A HVAC equipment room			8/0	
158	200	Level A train B MCC rooms			2/0	
159	200	Level A MCC rooms train A			2/0	
169	200	Level A lobby corridor			11/0	
173	200	Level A electrical shafts train A			0/2	
174	200	Level A electrical shafts			0/2	
175	200	Level A electrical shafts			0/2	
105	220	Main control room			23/0	
106	220	Level 1 control room kitchen	1/0		6/0	
107	220	Level 1 electrical shaft train A			0/4	
108	220	Level 1 electrical shaft			0/4	
109	220	Level 1 chemical storage room			2/0	
110	220	Level 1 record storage room			3/0	
111	220	Level 1 Radiochem lab, sample and Tech rooms			6/0	
112	220	Level 1 lab, offices and counting rooms	1/0		13/0	
113	220	Level 1 instrument repair and storage room			0/6	
114	220	Level 1 drum storage room			2/0	
115	220	Level 1 laundry and offices			10/0	
116	220	Level decontamination and first aid station			7/0	
117	220	Level 1 health physics storage room			0/4	
118	220	Level 1 corridor			0/20	
119	220	Level 1 Lobby and Lunch Room			14/0	
124	220	Level 1 corridor			0/13	
176	220	Level electrical shaft train B			0/6	
177	220	Level normal electrical shaft			0/7	
183 A	220	Level 1 conference and emergency storage			4/0	
183 B	220	Level 1 corridor			2/0	
185	220	Level 1 men's room			4/0	
120	240	Level 2 cable spreading rooms train B			0/13	
121	240	Level 2 auxiliary relay rooms train B			2/0	
122 A	240	Level 2 normal filter unit room			6/0	
122 B	240	Level 2 normal filter unit room			10/0	
127	240	Level 2 CAS room			7/0	
133 A	240	Level 2 battery room			0/2	
133 B	240	Level 2 lobby and offices			0/26	
134	240	Level 2 instrument calibration lab			6/0	
125 A	260	Level 3 train B chiller room and HVAC filter room			0/8	
126 A	260	Level 3 train A chiller room and HVAC filter room			0/8	

TABLE 9.5.1-10A (SHEET 7 OF 12)

			Total Number of Instruments[a]			
Fire-Zone	Elevation	Instrument Location	Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Control Building (Unit 1) (con't)						
126 B	260	Level 3 train A chiller room and HVAC filter room			0/9	
135	260	Level 3 normal HVAC equipment room			0/24	
136	260	Level 3 water heater room			2/0	
137	260	Level 3 lobby corridor			0/12	
178	260	Level 3 electrical shaft train A			0/2	
179	260	Level 3 electrical equipment room			6/0	
180	260	Level 3 electrical normal shaft			0/2	
181	260	Level 3 electrical normal shaft			0/2	
182	240	Level 2 corridor, lobby			0/16	
170	280	Level 4 HVAC, battery, switchgear rooms, and damper for elevation 2			27/0	
Control Building (Unit 2)						
56 A	180	Level B switchgear and battery train D room channel 4			2/0	
56 B	180	Level B switchgear and battery train D room channel 4			2/0	
59	180	Level B normal HVAC room			4/0	
60	180	Level B electrical penetration rooms train B			0/3	
61	180	Level B electrical penetration rooms train A			0/9	
62	180	Level B electrical penetration rooms train B			0/15	
63	180	Level B MCC rooms			3/0	
64	180	Level B MCC rooms			4/0	
65	180	Level B corridor train A			0/5	
66	180	Level B corridor train B			0/3	
67	180	Level B corridor train B			0/12	
68	180	Level B MG set rooms train B			2/0	
69	180	Level B MG set rooms train A			5/0	
70	180	Level B HVAC equipment rooms train B			6/0	
71	180	Level B switchgear room train B			3/0	
72	180	Level B HVAC equipment rooms train A			0/7	
73	180	Level B corridor train A			0/30	
74	180	Level B switchgear rooms			4/0	
75	180	Level B switchgear room train A			4/0	
76	180	Level B non-train DC room			2/0	
77 A	180	Level B switchgear and battery train C room channel 3			2/0	
77 B	180	Level B switchgear and battery train C room channel 3			2/0	
78 A	180	Level B switchgear and battery train A room channel 1			2/0	
78 B	180	Level B switchgear and battery train A room channel 1			2/0	
79 A	180	Level B switchgear and battery train B room channel 2			2/0	

TABLE 9.5.1-10A (SHEET 8 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Control Building (Unit 2) (con't)						
79 B	180	Level B switchgear and battery train B room channel 2			2/0	
80	180	Level B switchgear room			0/22	
81 A	180	Level B mechanical shaft rooms train A			10/0	
82	180	Level B electrical penetration rooms train B			2/0	
83	180	Level B electrical shafts			0/2	
151	180	Level B electrical shaft train A			0/2	
152	180	Level B electrical shaft room train B			0/2	
153	180	Level B electrical shafts			0/2	
57 A	200	Level A mechanical shaft room train B			9/0	
84	200	Level A east-west corridors			0/6	
85	200	Level A corridor train A			0/23	
86	200	Level A corridor train A			0/6	
87	200	Level A switchgear rooms			4/0	
88	200	Level A electrical penetration rooms train B			0/8	
89	200	Level A electrical penetration rooms			0/7	
90	200	Level A switchgear rooms			3/0	
91	200	Level A switchgear rooms train A			7/0	
92	200	Level A switchgear rooms train B			8/0	
93	200	Level A corridor train B			0/13	
94	200	Level A HVAC and auxiliary relay rooms			6/0	
95	200	Level A cable spreading room train A			0/18	
96	200	Level A computer rooms			13/0	
97	200	Level A electrical shaft rooms train B			0/2	
98	200	Level A hot shutdown rooms train B			3/0	
99	200	Level A feedwater valves rooms	4/0		7/0	
100	200	Level A HVAC equipment rooms train B			4/0	
101	200	Level A HVAC equipment rooms train A			0/10	
102	200	Level A electrical penetration rooms			0/2	
103	200	Level A hot shutdown rooms train A			3/0	
158	200	Level A train B MCC rooms			2/0	
159	200	Level A MCC rooms train A			2/0	
169	200	Level A lobby corridor			2/0	
173	200	Level A electrical shafts train A			0/2	
174	200	Level A electrical shafts			0/2	
175	200	Level A electrical shafts			0/2	
200	200	Level A stairwell			2/0	
105	220	Main control room			30/0	
107	220	Level 1 electrical shaft train A			0/4	
108	220	Level 1 electrical shaft			0/4	
176	240	Level 2 electrical shaft train B			0/5	
177	240	Level 2 normal electrical shaft			0/4	
120	240	Level 2 cable spreading rooms train B			0/18	

TABLE 9.5.1-10A (SHEET 9 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)
Control Building (Unit 2) (con't)						
121	240	Level 2 auxiliary relay rooms train B			6/0	
122 B	240	Level 2 normal filter unit room			10/0	
123	240	Level 2 locker room			17/0	
127	240	Level 2 CAS room			7/0	
128	240	Level 2 storage			0/4	
129	240	Level 2 women's toilet			0/5	
130	240	Level 2 corridor			0/6	
131	240	Level 2 warehouse storage			0/3	
141 C	240	Level 2 storage			6/0	
201	240	Level 2 storage			0/4	
125 B	240	Level 3 train B chiller room and HVAC filter room			0/13	
126 B	240	Level 3 train A chiller room and HVAC filter room			0/9	
178	240	Level 3 electrical shaft train A			0/2	
180	240	Level 3 electrical normal shaft			0/2	
182	240	Level 3 corridor			0/15	
170	260	Level 4 HVAC, battery, switchgear rooms, and damper for elevation 2			0/32	
Fuel Handling Building (Unit 1)						
42B	140	Tunnel electrical chase rooms (Unit 1)			0/15	
15	160	Level B & C piping penetration room train B			0/14	
27	160	Level B and C access tunnel and corridor			9/0	
29	160	Level B and C electrical chase train B			0/8	
28	200	Level A corridor			16/0	
132	200	Level A piping penetration room train B			0/6	
139 A	200	Level A fuel storage area			35/0	
139 B	200	Level A fuel storage area			35/0	
142	270	Level 3 normal HVAC equipment room			22/0	
167	270	Level 3 post accident exhaust filter room			11/0	
168	270	Level 3 post accident exhaust filter room			14/0	
Fuel Handling Building (Unit 2)						
42 B	140	Tunnel electrical chase rooms (Unit 1)			0/20	
15	160	Level B and C piping penetration room train B			0/13	
27	160	Level B and C access tunnel and corridor			9/0	
29	160	Level B and C electrical chase train B			0/8	
132	200	Level A piping penetration room train B			0/6	
Equipment Building (Unit 1)						
104	220	Level 1 main steam valve rooms	16/0			
141 A	220	Level 1 purge exhaust unit area			0/18	
141 B	220	Level 1 filter exhaust unit area			6/0	

TABLE 9.5.1-10A (SHEET 10 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)	Line A/B
Equipment Building (Unit 2)							
104	220	Level 1 main steam valve rooms	16/0				
141 A	220	Level 1 purge exhaust unit area			0/17		
141 B	220	Level 1 filter exhaust unit area			6/0		
Containment Building (Unit 1)[b]							
140 C.1	N/A	Reactor coolant pump 1				3/0	
140 C.2	N/A	Reactor coolant pump 2				3/0	
140 C.3	N/A	Reactor coolant pump 3				3/0	
140 C.4	N/A	Reactor coolant pump 4				3/0	
140 A.1	N/A	Cable tray train A circuit A and B					1/0
140 B.1	N/A	Cable tray train B circuit G and L					1/0
140 B.2	N/A	Cable tray train B circuit H and J					1/0
140 A.2	N/A	Cable tray train A circuit C					1/0
140 A.3	N/A	Cable tray train A circuit D					1/0
140 B.3	N/A	Cable tray train B circuit K					1/0
140 B.4	N/A	Cable tray train B circuit M					1/0
140 A.4	N/A	Cable tray train A circuit E and F					1/0
140 A.5	N/A	Cable tray train A circuit N					1/0
140 B.5	N/A	Cable tray train B circuit P					1/0
140 A.6	N/A	Cable tray train A circuit (spare)					1/0
140 B.6	N/A	Cable tray train B circuit (spare)					1/0
Containment Building (Unit 2)							
140 C.1	N/A	Reactor coolant pump 1				3/0	
140 C.2	N/A	Reactor coolant pump 2				3/0	
140 C.3	N/A	Reactor coolant pump 3				3/0	
140 C.4	N/A	Reactor coolant pump 4				3/0	
140 A.1	N/A	Cable tray train A circuit A and B					1/0
140 B.1	N/A	Cable tray train B circuit G and L					1/0
140 B.2	N/A	Cable tray train B circuit H and J					1/0
140 A.2	N/A	Cable tray train A circuit C					1/0
140 A.3	N/A	Cable tray train A circuit D					1/0
140 B.3	N/A	Cable tray train B circuit K					1/0
140 B.4	N/A	Cable tray train B circuit M					1/0
140 A.4	N/A	Cable tray train A circuit E and F					1/0
140 A.5	N/A	Cable tray train A circuit N					1/0
140 B.5	N/A	Cable tray train B circuit P					1/0
140 A.6	N/A	Cable tray train A circuit T					1/0
140 B.6	N/A	Cable tray train B circuit U					1/0

TABLE 9.5.1-10A (SHEET 11 OF 12)

			Total Number of Instruments[a]				
Fire-Zone	Elevation	Instrument Location	Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)	Line X/Y
Diesel Generator Building (Unit 1)							
143	180	Electrical tunnel train A			0/9		
144	180	Electrical tunnel train B			0/9		
161	220	Standby diesel generator room train A	0/37			0/4	
162	220	Standby diesel generator room train B	16/16			0/4	
163	220	Diesel fuel oil day tank room Train A				0/2	
164	220	Diesel fuel oil day tank room train B				0/2	
165	211	Diesel fuel oil storage tank pumps room train A		2/0			2/0
166	211	Diesel fuel oil storage tank pumps room train B		5/0			2/0
Diesel Generator Building (Unit 2)							
143	180	Electrical tunnel train A			0/9		
144	180	Electrical tunnel train B			0/9		
161	220	Standby diesel generator room train A	0/37			0/4	
162	220	Standby diesel generator room train B	0/37			0/4	
163	220	Diesel fuel oil day tank room train A				0/2	
164	220	Diesel fuel oil day tank room train B				0/2	
165	211	Diesel fuel oil storage tank pumps room train A	2/0			2/0	
166	211	Diesel fuel oil storage tank pumps room train B	5/0			2/0	
NSCW Pumphouse (Unit 1)							
145	N/A	Electrical chase train A	0/8				
146	N/A	Electrical chase train B	0/9				
160 A	N/A	NSCW pumps train A	7/0				
160 B	N/A	NSCW pumps train B	7/0				
NSCW Pumphouse (Unit 2)							
145	N/A	Electrical chase train A	0/8				
146	N/A	Electrical chase train B	0/9				
160 A	N/A	NSCW pumps train A	7/0			4/0	
160 B	N/A	NSCW pumps train B	7/0			4/0	

TABLE 9.5.1-10A (SHEET 12 OF 12)

Fire-Zone	Elevation	Instrument Location	Total Number of Instruments[a] Heat (A/B)	Flame (A/B)	Smoke (A/B)	IR (A/B)	Line X/Y
Auxiliary Feedwater Pumphouse (Unit 1)							
155	N/A	Pump room train B	0/1		0/4		
156	N/A	Pump room train A	0/1		0/4		
157 A	N/A	Auxiliary feedwater room	0/3		0/6		
157 B	N/A	Auxiliary feedwater room			0/2		
Auxiliary Feedwater Pumphouse (Unit 2)							
155	N/A	Pump room train B	0/2		0/4		
156	N/A	Pump room train A			0/4		
157 A	N/A	Auxiliary feedwater room	0/3		0/6		
157 B	N/A	Auxiliary feedwater room			2/0		
Radwaste Processing Facility (Units 1 and 2)							
350	N/A	Process area			42/0		
350	N/A	Electrical room			1/0		
350	N/A	Mechanical room			1/0		
350	N/A	Dressout area			2/0		
350	N/A	Control room			2/0		

a. A is the number of instruments associated with early fire detection and notification only; B is the number of instruments associated with actuation fire suppression systems and early fire detection and notification.

b. The fire detection instruments located within the containment are not required to be operable during the performance of type A containment leakage rate tests.

TABLE 9.5.1-10B (SHEET 1 OF 5)

SPRINKLER SYSTEMS

Unit 1 System No.	Building	Level	Type
1	Auxiliary	D	Preaction
2	Auxiliary	D	Preaction
3	Auxiliary	D	Preaction
4	Auxiliary	D	Preaction
5	Auxiliary	D	Preaction
6	Auxiliary	D	Preaction
7	Auxiliary	C/D	Preaction
8	Auxiliary	C	Preaction
9	Auxiliary	C	Preaction
10	Auxiliary	C	Preaction
11	Auxiliary	C	Preaction
13	Auxiliary	C/D	Preaction
14	Auxiliary	C	Preaction
15	Auxiliary	B	Preaction
16	Auxiliary	B	Preaction
17	Auxiliary	B	Preaction
18	Auxiliary	B	Preaction
19	Auxiliary	B	Preaction
20	Auxiliary	B	Preaction
21	Auxiliary	B	Preaction
22	Auxiliary	B	Preaction
23	Auxiliary	A	Preaction
24	Auxiliary	B/C	Preaction
25	Auxiliary	B/C	Preaction
26	Auxiliary	A/1	Preaction
27	Tunnel	-	Preaction
28	Tunnel	-	Preaction
29	Tunnel	-	Preaction
30	Tunnel	-	Preaction
31	D/G	1	Preaction
32	D/G	1	Preaction
41	Auxiliary	1/2	Preaction
42	Auxiliary	2	Preaction
45	Auxiliary	A/1	Preaction
46	Auxiliary	A	Preaction
47	Auxiliary	A	Preaction
48	Auxiliary	A	Preaction
49	Auxiliary	A	Preaction
50	Auxiliary	A/B	Preaction
52	AFW	1	Preaction
53	AFW	1	Preaction
54	AFW	1	Preaction

TABLE 9.5.1-10B (SHEET 2 OF 5)

Unit 1 System No.	Building	Level	Type
56	Fuel	B/C	Preaction
57	Fuel	1/A/B	Preaction
58	Control	B/A	Preaction
59	Control	B/A	Preaction
60	Control	B	Preaction
61	Control	B	Preaction
62	Control	B	Preaction
63	Control	B	Preaction
64	Control	B	Preaction
65	Control	C	Preaction
66	Control	A	Preaction
67	Control	A	Preaction
68	Control	A	Preaction
69	Control	A	Preaction
70	Control	A	Preaction
71	Control	A	Preaction
72	Control	A/B	Preaction
75	Control	2	Preaction
76	Control	2	Preaction
77	Control	2	Preaction
78	Control	2	Preaction
79	Control	1/2	Preaction
80	Control	2	Preaction
81	Control	2	Preaction
83	Auxiliary	2	Preaction
85	Auxiliary	2	Preaction
87	Control	3	Preaction
88	Auxiliary	2	Preaction
89	Control	3	Preaction
91	Auxiliary	1	Preaction
92	Auxiliary	1	Preaction
93	Auxiliary	1	Preaction
94	Auxiliary	1	Preaction
95	Auxiliary	A/1	Preaction
96	Control	A/B	Preaction
99	Control	B	Water spray
101	Auxiliary	B	Water spray
102	Auxiliary	B	Water spray
103	Auxiliary	B	Water spray
104	Auxiliary	B	Water spray
105	Control	B	Water spray
106	Control	B	Water spray
107	Control	B	Water spray

TABLE 9.5.1-10B (SHEET 3 OF 5)

Unit 2 System No.	Building	Level	Type
1	Auxiliary	D	Preaction
2	Auxiliary	D	Preaction
3	Auxiliary	D	Preaction
4	Auxiliary	D	Preaction
5	Auxiliary	D	Preaction
6	Auxiliary	D	Preaction
7	Auxiliary	C/D	Preaction
8	Auxiliary	C	Preaction
9	Auxiliary	C	Preaction
10	Auxiliary	C	Preaction
11	Auxiliary	C	Preaction
13	Auxiliary	C/D	Preaction
14	Auxiliary	C	Preaction
15	Auxiliary	B	Preaction
16	Auxiliary	B	Preaction
17	Auxiliary	B	Preaction
18	Auxiliary	B	Preaction
19	Auxiliary	B	Preaction
20	Auxiliary	B	Preaction
21	Auxiliary	B	Preaction
22	Auxiliary	B	Preaction
23	Auxiliary	A	Preaction
24	Auxiliary	B/C	Preaction
25	Auxiliary	B/C	Preaction
26	Auxiliary	A/1	Preaction
27	Tunnel	-	Preaction
28	Tunnel	-	Preaction
29	Tunnel	-	Preaction
30	Tunnel	-	Preaction
31	D/G	1	Preaction
32	D/G	1	Preaction
41	Auxiliary	1/2	Preaction
42	Auxiliary	2	Preaction
45	Auxiliary	A/1	Preaction
46	Auxiliary	A	Preaction
47	Auxiliary	A	Preaction
48	Auxiliary	A	Preaction
49	Auxiliary	A	Preaction
50	Auxiliary	A/B	Preaction
52	AFW	1	Preaction
53	AFW	1	Preaction
54	AFW	1	Preaction
56	Fuel	B/C	Preaction

TABLE 9.5.1-10B (SHEET 4 OF 5)

Unit 2 System No.	Building	Level	Type
57	Fuel	1/A/B	Preaction
58	Control	B/A	Preaction
59	Control	B/A	Preaction
60	Control	B	Preaction
61	Control	B	Preaction
62	Control	B	Preaction
63	Control	B	Preaction
64	Control	B	Preaction
65	Control	C	Preaction
66	Control	A	Preaction
67	Control	A	Preaction
68	Control	A	Preaction
69	Control	A	Preaction
70	Control	A	Preaction
71	Control	A	Preaction
72	Control	A/B	Preaction
75	Control	2	Preaction
76	Control	2	Preaction
77	Control	2	Preaction
78	Control	2	Preaction
79	Control	2	Preaction
80	Control	2	Preaction
81	Control	2	Preaction
83	Auxiliary	2	Preaction
85	Auxiliary	2	Preaction
87	Control	3	Preaction
88	Auxiliary	2	Preaction
89	Control	3	Preaction
91	Auxiliary	1	Preaction
92	Auxiliary	1	Preaction
93	Auxiliary	1	Preaction
94	Auxiliary	1	Preaction
95	Auxiliary	A/1	Preaction
96	Control	A/B	Preaction
99	Control	B	Water spray
100	Control	B	Water spray
101	Auxiliary	B	Water spray
102	Auxiliary	B	Water spray
105	Control	B	Water spray
106	Control	B	Water spray
107	Control	B	Water spray

TABLE 9.5.1-10B (SHEET 5 OF 5)

Unit 2 System No.	Building	Level	Type
1561-N7-001	Auxiliary	2	Manual water spray[a]
1561-N7-002	Auxiliary	2	Manual water spray[a]
1531-N7-001	Control	3	Manual water spray[a]
1531-N7-002	Control	3	Manual water spray[a]
1553-N7-001	Auxiliary	2	Manual water spray[a]
1553-N7-002	Auxiliary	2	Manual water spray[a]
1553-N7-003	Auxiliary	2	Manual water spray[a]
1506-N7-001	Equipment	1	Manual water spray[a]
1508-N7-001	Equipment	1	Manual water spray[a]
1504-N7-001	Containment	2	Manual water spray[a]
1504-N7-002	Containment	2	Manual water spray[a]

a. Charcoal filter protection.

TABLE 9.5.1-10C (SHEET 1 OF 10)

HOSE STATIONS

Hose Stations	Location: Level	Location: Fire Zone
Control Building		
1-2301-R4-047	B	62
1-2301-R4-048	B	61
1-2301-R4-049	B	65
1-2301-R4-050	B	65
1-2301-R4-051	B	73
1-2301-R4-052	B	73
1-2301-R4-053	B	73
1-2301-R4-054	B	80
1-2301-R4-055	B	67
1-2301-R4-069	B	73
1-2301-R4-070	B	73
1-2301-R4-071	B	65
1-2301-R4-072	B	138
1-2301-R4-056	A	169
1-2301-R4-057	A	95
1-2301-R4-058	A	93
1-2301-R4-059	A	88
1-2301-R4-060	A	93
1-2301-R4-061	A	101
1-2301-R4-062	A	89
1-2301-R4-063	A	85
1-2301-R4-064	A	85
1-2301-R4-065	A	85
A-2301-R4-066	A	169
1-2301-R4-067	A	85
1-2301-R3-068	A	169
1-2301-R4-073	1	118
1-2301-R4-074	1	111
A-2301-R4-075	1	124
1-2301-R4-078	1	113
1-2301-R4-079	1	113
A-2301-R4-080	2	127
1-2301-R4-081	2	122A
1-2301-R4-083	2	133B
1-2301-R4-084	2	120
1-2301-R4-085	2	133B
A-2301-R4-086	3	137
1-2301-R4-088	3	137

TABLE 9.5.1-10C (SHEET 2 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Control Building (cont.)		
1-2301-R4-089	3	137
1-2301-R4-090	3	179
1-2301-R4-091	3	135
1-2301-R4-092	4	170
2-2301-R4-047	B	62
2-2301-R4-048	B	61
2-2301-R4-049	B	65
2-2301-R4-050	B	65
2-2301-R4-051	B	73
2-2301-R4-052	B	73
2-2301-R4-053	B	73
2-2301-R4-054	B	80
2-2301-R4-055	B	67
2-2301-R4-069	B	73
2-2301-R4-070	B	73
2-2301-R4-071	B	65
2-2301-R4-072	B	138
2-2301-R4-056	A	95
2-2301-R4-057	A	95
2-2301-R4-058	A	93
2-2301-R4-059	A	88
2-2301-R4-060	A	93
2-2301-R4-061	A	101
2-2301-R4-062	A	89
2-2301-R4-063	A	85
2-2301-R4-064	A	85
2-2301-R4-065	A	85
2-2301-R4-067	A	85
2-2301-R4-068	A	154
2-2301-R4-073	1	118
2-2301-R4-078	1	119
2-2301-R4-079	1	118
2-2301-R4-197	1	118
2-2301-R4-081	2	182
2-2301-R4-082	2	120
2-2301-R4-083	2	130
2-2301-R4-084	2	120
2-2301-R4-085	2	122B
2-2301-R4-089	3	135
2-2301-R4-091	3	135
2-2301-R4-092	4	170

TABLE 9.5.1-10C (SHEET 3 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Auxiliary Building		
1-2301-R4-156	2	53
1-2301-R4-134	2	53
1-2301-R4-135	2	53
1-2301-R4-136	2	147
1-2301-R4-137	2	54
1-2301-R4-138	2	55
1-2301-R4-139	2	53
1-2301-R4-157	2	53
A-2301-R4-160	1	47
1-2301-R4-159	1	45
1-2301-R4-158	1	46
1-2301-R4-128	1	46
1-2301-R4-129	1	46
1-2301-R4-130	1	47
1-2301-R4-131	1	52
1-2301-R4-132	1	49
1-2301-R4-133	1	48
A-2301-R4-162	A	38
1-2301-R4-122	A	38
1-2301-R4-123	A	39A
1-2301-R4-124	A	39C
1-2301-R4-125	A	39A
1-2301-R4-126	A	37
1-2301-R4-161	A	38
1-2301-R4-127	A	38
1-2301-R4-112	B	26A
1-2301-R4-113	B	34
1-2301-R4-114	B	171
1-2301-R4-115	B	34
1-2301-R4-116	B	26B
1-2301-R4-117	B	40
1-2301-R4-118	B	40
1-2301-R4-119	B	40
1-2301-R4-120	B	40
A-2301-R4-121	B	40
1-2301-R4-170	B	26A
1-2301-R4-171	B	40

TABLE 9.5.1-10C (SHEET 4 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Auxiliary Building (cont)		
1-2301-R4-105	C	14C
1-2301-R4-106	C	14A
1-2301-R4-107	C	24
1-2301-R4-108	C	14B
1-2301-R4-109	C	14D
1-2301-R4-110	C	24
A-2301-R4-111	C	24
1-2301-R4-167	C	14B
1-2301-R4-168	C	11B
1-2301-R4-169	C	24
1-2301-R4-021	C	14B
1-2301-R4-163	D	11B
1-2301-R4-164	D	1
1-2301-R4-165	D	12
1-2301-R4-098	D	3
1-2301-R4-099	D	1
1-2301-R4-100	D	3
1-2301-R4-101	D	12
1-2301-R4-102	D	12
1-2301-R4-103	D	12
A-2301-R4-104	D	12
2-2301-R4-156	2	53
2-2301-R4-134	2	53
2-2301-R4-135	2	53
2-2301-R4-136	2	147
2-2301-R4-137	2	54
2-2301-R4-138	2	55
2-2301-R4-139	2	53
2-2301-R4-157	2	53
2-2301-R4-159	1	45
2-2301-R4-158	1	46
2-2301-R4-128	1	46
2-2301-R4-129	1	46
2-2301-R4-130	1	47
2-2301-R4-131	1	52
2-2301-R4-132	1	49
2-2301-R4-133	1	48
2-2301-R4-122	A	38
2-2301-R4-123	A	39A
2-2301-R4-124	A	39C

TABLE 9.5.1-10C (SHEET 5 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Auxiliary Building (cont)		
2-2301-R4-125	A	39A
2-2301-R4-126	A	37
2-2301-R4-127	A	38
2-2301-R4-161	A	38
2-2301-R4-112	B	26A
2-2301-R4-113	B	34
2-2301-R4-114	B	171
2-2301-R4-115	B	34
2-2301-R4-116	B	26B
2-2301-R4-117	B	40
2-2301-R4-118	B	40
2-2301-R4-119	B	40
2-2301-R4-120	B	40
2-2301-R4-170	B	26A
2-2301-R4-171	B	40
2-2301-R4-105	C	14C
2-2301-R4-106	C	14A
2-2301-R4-107	C	24
2-2301-R4-108	C	14B
2-2301-R4-109	C	14D
2-2301-R4-110	C	24
2-2301-R4-167	C	14B
2-2301-R4-168	C	11B
2-2301-R4-169	C	24
2-2301-R4-021	C	14B
2-2301-R4-163	D	11B
2-2301-R4-164	D	1
2-2301-R4-165	D	13
2-2301-R4-098	D	3
2-2301-R4-099	D	1
2-2301-R4-100	D	3
2-2301-R4-101	D	13
2-2301-R4-102	D	13
2-2301-R4-103	D	13
Diesel Building		
1-2301-R4-172	1	161
1-2301-R4-173	1	162
2-2301-R4-172	1	161
2-2301-R4-173	1	162

TABLE 9.5.1-10C (SHEET 6 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Auxiliary Feedwater Pump House		
1-2301-R4-152	1	155
1-2301-R4-153	1	157A
1-2301-R4-154	1	156
2-2301-R4-152	1	155
2-2301-R4-153	1	157A
2-2301-R4-154	1	156
Containment		
1-2301-R4-001	B	140A
1-2301-R4-002	B	140A
1-2301-R4-003	A	140A
1-2301-R4-004	1	140A
1-2301-R4-005	2	140B
1-2301-R4-006	2	140B
1-2301-R4-007	B	140C
1-2301-R4-008	B	140A
1-2301-R4-009	1	140A
1-2301-R4-010	2	140A
1-2301-R4-011	B	140B
1-2301-R4-012	A	140B
1-2301-R4-013	1	140B
1-2301-R4-014	2	140B
1-2301-R4-015	3	140B
1-2301-R4-016	A	140A
1-2301-R4-017	B	140C
1-2301-R4-201	A	140A
1-2301-R4-202	B	140A
1-2301-R4-203	A	140B
1-2301-R4-204	A	140A
2-2301-R4-001	C	140A
2-2301-R4-002	B	140A
2-2301-R4-003	A	140A
2-2301-R4-004	1	140A
2-2301-R4-005	2	140B
2-2301-R4-006	3	140B
2-2301-R4-007	C	140A
2-2301-R4-008	A	140A
2-2301-R4-009	1	140A
2-2301-R4-010	2	140A
2-2301-R4-011	C	140B
2-2301-R4-012	A	140B

TABLE 9.5.1-10C (SHEET 7 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Control (cont.)		
2-2301-R4-013	1	140B
2-2301-R4-014	2	140B
2-2301-R4-015	3	140B
2-2301-R4-016	A	140C
2-2301-R4-017	C	140A
2-2301-R4-201	A	140A
2-2301-R4-202	B	140A
2-2301-R4-203	A	140B
2-2301-R4-204	A	140A
Fuel Handling Building		
1-2301-R4-034	C	15
1-2301-R4-035	B	27
1-2301-R4-036	B	27
1-2301-R4-037	A	132
1-2301-R4-038	A	28
1-2301-R4-039	A	28
1-2301-R4-040	B	27
1-2301-R4-041	B	15
1-2301-R4-042	1	139
1-2301-R4-043	1	139
2-2301-R4-034	C	15
2-2301-R4-035	B	27
2-2301-R4-036	B	27
2-2301-R4-037	A	132
2-2301-R4-038	A	28
2-2301-R4-039	A	28
2-2301-R4-040	B	27
2-2301-R4-041	B	15
2-2301-R4-042	1	139
2-2301-R4-043	1	139
N-S-Electrical Tunnel - Control Building		
1-2301-R4-026	C	42B
1-2301-R4-027	C	42B
1-2301-R4-028	C	42B
1-2301-R4-029	C	42B
1-2301-R4-030	C	42B
1-2301-R4-031	C	42B

TABLE 9.5.1-10C (SHEET 8 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
N-S-Electrical Tunnel - Control Building (cont)		
1-2301-R4-032	C	42B
1-2301-R4-033	C	42B
2-2301-R4-026	C	42B
2-2301-R4-027	C	42B
2-2301-R4-028	C	42B
2-2301-R4-029	C	42B
2-2301-R4-030	C	42B
2-2301-R4-031	C	42B
2-2301-R4-032	C	42B
2-2301-R4-033	C	42B
E-W Tunnel - Control Building		
1-2301-R4-045	A	84
1-2301-R4-046	A	84
1-2301-R4-093	A	84
1-2301-R4-094	A	84
1-2301-R4-095	A	84
1-2301-R4-096	A	84
1-2301-R4-097	A	84
1-2301-R4-166	A	84
2-2301-R4-045	A	84
2-2301-R4-046	A	84
2-2301-R4-093	A	84
2-2301-R4-094	A	84
2-2301-R4-095	A	84
2-2301-R4-096	A	84
2-2301-R4-097	A	84
2-2301-R4-166	A	84
Tunnels 1T4A & 1T4B		
1-2301-R4-174	Below grade	144
1-2301-R4-175	Below grade	144
1-2301-R4-176	Below grade	144
1-2301-R4-177	Below grade	144
1-2301-R4-178	Below grade	144
1-2301-R4-179	Below grade	144
1-2301-R4-180	Below grade	143
1-2301-R4-181	Below grade	143
1-2301-R4-182	Below grade	143

TABLE 9.5.1-10C (SHEET 9 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Tunnels 1T4A & 1T4B		
1-2301-R4-183	Below grade	143
1-2301-R4-184	Below grade	143
1-2301-R4-185	Below grade	143
Tunnels 1T5A & 1T5B		
1-2301-R4-140	Below grade	145
1-2301-R4-141	Below grade	145
1-2301-R4-143	Below grade	145
1-2301-R4-144	Below grade	145
1-2301-R4-146	Below grade	146
1-2301-R4-147	Below grade	146
1-2301-R4-148	Below grade	146
1-2301-R4-149	Below grade	146
1-2301-R4-150	Below grade	146
1-2301-R4-151	Below grade	146
Tunnels 2T4A & 2T4B		
2-2301-R4-174	Below grade	144
2-2301-R4-175	Below grade	144
2-2301-R4-176	Below grade	144
2-2301-R4-177	Below grade	144
2-2301-R4-178	Below grade	144
2-2301-R4-179	Below grade	144
2-2301-R4-180	Below grade	143
2-2301-R4-181	Below grade	143
2-2301-R4-182	Below grade	143
2-2301-R4-183	Below grade	143
2-2301-R4-184	Below grade	143
2-2301-R4-185	Below grade	143
Tunnels 2T5A & 2T5B		
2-2301-R4-140	Below grade	145
2-2301-R4-141	Below grade	145
2-2301-R4-143	Below grade	145
2-2301-R4-144	Below grade	145
2-2301-R4-146	Below grade	146
2-2301-R4-147	Below grade	146
2-2301-R4-148	Below grade	146

TABLE 9.5.1-10C (SHEET 10 OF 10)

Hose Stations	Location: Level	Location: Fire Zone
Tunnels 2T5A & 2T5B (cont)		
2-2301-R4-149	Below grade	146
2-2301-R4-150	Below grade	146
2-2301-R4-151	Below grade	146
Equipment Building		
2-2301-R4-022	1	141B
2-2301-R4-023	1	141A
2-2301-R4-024	1	141A

TABLE 9.5.1-10D

YARD FIRE HYDRANTS AND ASSOCIATED HYDRANT HOSE HOUSES

Hydrant Number	Location	Primary/Backup
C-2301-U4-941	SSE of NSCW Tower A (Unit 1)	B
C-2301-U4-943	ESE of NSCW Tower A (Unit 1)	P
C-2301-U4-946	E of CS Tank (Unit 1)	P
C-2301-U4-994	SW of NSCW Tower B (Unit 1)	P
C-2301-U4-944	E of DGB (Unit 1)	B
C-2301-U4-947	NE of CS Tank (Unit 1)	B
C-2301-U4-936	NW of CS Tank (Unit 2)	B
C-2301-U4-933	W of CS Tank (Unit 2)	P
C-2301-U4-932	W of DGB (Unit 2)	B
C-2301-U4-930	W of NSCW Tower A (Unit 2)	P
C-2301-U4-928	SW of NSCW Tower A (Unit 2)	B

TABLE 9.5.2-1

COMMUNICATION EQUIPMENT AND LOCATIONS
AVAILABLE FOR SAFE SHUTDOWN

Location	Available Equipment		
Control room	T/P,	PABX,	RSP, CSP, MSP
Shutdown panel A	T/P,	PABX,	CSP, MSP
Shutdown panel B	T/P,	PABX,	CSP, MSP
Auxiliary feedwater turbine-driven pump panel	T/P,	PABX,	CSP, MSP
Diesel generator local panel	T/P,	PABX,	CSP, MSP
Safety-related 4.16-kV switchgear rooms	T/P[(a)]	PABX,	CSP, MSP
Safety-related 480-V switchgear rooms	T/P[(b)]	PABX,[(c)]	CSP, MSP
RHR Hx Inlet Valves[(d)]			CSP

T/P - Telephone/page
PABX - Private automatic branch exchange system
RSP - Refueling sound-powered system
CSP - Cold shutdown sound-powered system
MSP - Maintenance sound-powered system

(a) Paging output only.
(b) Paging output only, except the rooms containing switchgear AB15 (Auxiliary Building R-D105 Unit 1; and R-D104, Unit 2) which do not have T/P equipment. T/P equipment is available for rooms containing switchgear 2BB06 and 2BB07 (control building R-B18, Unit 2).
(c) Except the rooms containing switchgear BB16 (R-207, Unit 1; R-223, Unit 2) which do not have PABX equipment.
(d) RHR Hx inlet valves to control RCS temperature, rooms R-C89 and R-C38.

TABLE 9.5.3-1 (SHEET 1 OF 7)

EMERGENCY[a] AND ESSENTIAL[b] LIGHTING SYSTEM FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode [d]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
1.	No. 23 breaker[c] on MCC 1ABC-NC, train A, 1E	Provide continuity and protection between MCC and lighting panel for MCR and cold shutdown panel areas	A	Inadvertent open	A. Operator observation B. Control room alarm	None. 50% loss of lighting in MCR and cold shutdown panel areas. 90-min battery-powered lighting available in MCR; 8-h battery-powered lighting available in both areas. Train B available.	
2.	1ABC23RX-XFMR, [e] train A	Reduce 480 V to 120 V	A	No output	No alarm or indicator	None. Same as 1.	
3.	1NLP29, emergency lighting panel	Distribute emergency lights in MCR and cold shutdown panel areas	A	No output	Same as 2	None. Same as 1. Also, power from Unit 2 available to MCR via SBO transfer switches (item 50).	Seismic Category 1 Panel
4.	No. 23 breaker[c] - same as 1 except MCC 1BBC, train B, 1E	Same as 1	A	Same as 1	Same as 1A	None. Same as 1 and 1B except train A available.	
5.	1BBC23RX-XFMR, [e] train B	Same as 2	A	No output	Same as 2	None. Same as 4.	
6.	1NLP32, emergency lighting panel	Same as 3	A	No output	Same as 2	None. Same as 4. Also, power from Unit 2 available to MCR via SBO transfer switches (item 50).	Seismic Category 1 Panel
7.	No. 13 breaker[c] - same as 1 except MCC 1ABF	Same as 1 except for diesel generator and auxiliary feedwater pump local control areas	A	Same as 1	Same as 1A	None. 50% loss of and 1B lighting in these areas. Train B available.	

TABLE 9.5.3-1 (SHEET 2 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(d)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
8.	1ABF13RX - [(e)] same as 2	Same as 2	A	No output	Same as 2	None. Same as 7.	
9.	1NLP50 - same as 3	Same as 3 except for diesel generator and auxiliary feedwater pump local control areas	A	No output	Same as 2	None. Same as 7.	Seismic Category 1 Panel
10.	No. 13 breaker[(c)] - same as 4 except MCC 1BBF	Same as 7	A	Same as 1	Same as 1A	None. Same as 7 except train A available.	
11.	1BBF13RX - [(e)] same as 5	Same as 2	A	No output	Same as 2	None. Same as 10.	
12.	1NLP47 -same as 6	Same as 9	A	No output	Same as 2	None. Same as 10.	Seismic Category 1 Panel
13.	No. 15 breaker[(c)] - same as 1 except MCC 1NBS, non-1E	Same as 1 except for control and fuel handling building and tunnel areas.	B	Inadvertent open	Operator observation	Partial loss of essential lighting in the control and fuel handling building and tunnel areas. 8-h battery-backed emergency lighting available.	
14.	1NBS15X-XFMR, non-1E	Reduce 480 V to 208/120 V	B	No output	Same as 2	Same as 13	
15.	1NLP35, essential lighting panel, non-1E	Distribute essential lights in control and fuel handling building and tunnel areas	B	No output	Same as 2	Same as 13	

TABLE 9.5.3-1 (SHEET 3 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(d)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
16.	No. 15 breaker[(c)] - same as 4 except MCC 1NBR, non-1E	Same as 13	B	Inadvertent open	Same as 13	Partial loss of essential lighting in the control and fuel handling building and tunnel areas. 8-h battery-backed emergency lighting available.	
17.	1NBR15X - same as 14	Same as 14	B	No output	Same as 2	Same as 16	
18.	1NLP36 - same as 15	Same as 15	B	No output	Same as 2	Same as 16	
19.	No. 23 breaker[(c)] - same as 13	Same as 1 except containment building	B	Inadvertent open	Operator observation	Same as 13 (except for containment)	
20.	1NBS23X - same as 14	Same as 14	B	No output	Same as 2	Same as 19	
21.	1NLP04 - same as 15	Distribute essential lights in containment building	B	No output	Same as 2	Same as 19	
22.	No. 14 breaker[(c)] - same as 16	Same as 19	B	Inadvertent open	Same as 19	Same as 16 (except for containment)	
23.	1NBR14X - same as 14	Same as 14	B	No output	Same as 2	Same as 22	
24.	1NLP03 - same as 15	Same as 21	B	No output	Same as 2	Same as 22	
25.	No. 11 breaker[(c)] - same as 13	Same as 1 except for auxiliary building	B	Inadvertent open	Same as 19	Partial loss of essential lighting in the auxiliary building. 8-h battery-backed emergency lighting available.	
26.	1NBS11X - same as 14	Same as 14	B	No output	Same as 2	Same as 25	

TABLE 9.5.3-1 (SHEET 4 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [(d)]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
27.	1NLP109 - same as 15	Distribute essential lights in auxiliary building	B	No output	Same as 2	Same as 25	
28.	No. 31 breaker[(c)] - same as 16	Same as 25	B	Inadvertent open	Same as 19	Same as 25	
29.	1NBR31X - same as 14	Same as 14	B	No output	Same as 2	Same as 25	
30.	1NLP110 - same as 15	Same as 27	B	No output	Same as 2	Same as 25	
31.	No. 12 breaker[(c)] - same as 13	Same as 25 except for auxiliary, fuel handling, and NSCW chemical control building and tunnel areas	B	Inadvertent open	Same as 19	Partial loss of essential lighting in auxiliary, fuel handling, and NSCW chemical control building and tunnel areas. 8-h battery-backed emergency lighting available, except for fuel handling building	1NBS12 is feeder for both 1NLP07 and 1NLP11
32.	1NBS12X - same as 14	Same as 14	B	No output	Same as 2	Same as 31	
33.	1NLP07 - same as 15	Same as 27 except in fuel handling building	B	No output	Same as 2	Partial loss of essential lighting in fuel handling building	
34.	1NLP11 - same as 15	Same as 27 except auxiliary and NSCW chemical control building and tunnel areas	B	No output	Same as 2	Partial loss of essential lighting in auxiliary building, NSCW chemical control building, and tunnel areas. 8-h battery-backed emergency lighting available.	

TABLE 9.5.3-1 (SHEET 5 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [d]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
35.	For Unit 1: No. 29 breaker[c] - same as 16 For Unit 2: No. 11 breaker[c] - same as 16	Same as 25 except for auxiliary building, RMWST/RWST, outage support structure and tunnel areas	B	Inadvertent open	Same as 19	Same as 31 in auxiliary building, RMWST/RWST, outage support structure and tunnel areas.	For Unit 1: 1NBR29 is feeder for both 1NLP12 and 1NLP08. For Unit 2: 2NBR11 is feeder for both 2NLP12 and 2NLP08.
36.	1NBR29X (Unit 1) 2NBR11X (Unit 2) same as 14	Same as 14	B	No output	Same as 2	Same as 35	
37.	1NLP12 - same as 15	Same as 27 except in auxiliary building, RMWST/RWST, and tunnel areas	B	No output	Same as 2	Same as 31 except in auxiliary building, RMWST/RWST, and tunnel areas.	
38.	1NLP08 - same as 15	Same as 27 except in auxiliary building and outage support structure	B	No output	Same as 2	Same as 34 except in auxiliary building and outage support structure.	
39.	No. 14 breaker[c] - same as 13	Same as 25	B	Inadvertent open	Same as 19	Same as 25	1NBS14 is feeder for both 1NLP19 and 1NLP15.
40.	1NBS14X - same as 14	Same as 14	B	No output	Same as 2	Same as 25	
41.	1NLP19 - same as 15	Same as 27	B	No output	Same as 2	Same as 25	
42.	1NLP15 - same as 15	Same as 27	B	No output	Same as 2	Same as 25	
43.	No. 12 breaker[c] - same as 16	Same as 25	B	Inadvertent open	Same as 19	Same as 25	
44.	1NBR12X - same as 14	Same as 14	B	No output	Same as 2	Same as 25	
45.	1NLP16 - same as 15	Same as 27	B	No output	Same as 2	Same as 25	

TABLE 9.5.3-1 (SHEET 6 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [d]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
46.	No. 23 breaker[c] - same as 16	Same as 25	B	Inadvertent open	Same as 19	Same as 25	
47.	1NBR23X - same as 14	Same as 14	B	No output	Same as 2	Same as 25	
48.	1NLP20 - same as 15	Same as 27	B	No output	Same as 2	Same as 25	
49.	No. 47 - breaker[c] - same as 13	Same as 1 except for DG building (Train A), auxiliary feedwater pumphouse building and tunnel areas	B	Inadvertent open	Operator observation	Loss of essential lighting in DG building (Train A), auxiliary feedwater pumphouse building and tunnel areas. 8-h battery-backed emergency lighting available.	
50.	1NBS47X - same as 14	Same as 14	B	No output	Same as 2	Same as 49	
51.	1NLP120 - same as 15	Distribute essential lights in DG building (Train A), auxiliary feedwater pumphouse building and tunnel areas	B	No output	Same as 2	Same as 49	
52.	No. 47 breaker[c] - same as 16	Same as 1 except for DG building (Train B), auxiliary feedwater pumphouse building and tunnel areas.	B	Inadvertent open	Operator observation	Loss of essential lighting in DG building (Train B), auxiliary feedwater pumphouse building and tunnel areas. 8-h battery-backed emergency lighting available.	
53.	1NBR47X - same as 14	Same as 14	B	No output	Same as 2	Same as 52	
54.	1NLP121 - same as 15	Distribute essential lights in DG building (Train B), auxiliary feedwater pumphouse building and tunnel areas.	B	No output	Same as 2	Same as 52	

TABLE 9.5.3-1 (SHEET 7 OF 7)

Item No.	Description of Component	Safety Function	Plant Operating Mode [d]	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
55.	SBO transfer switches	Provide power from alternate unit or from a vital train D instrumentation panel, in the event of SBO, to main control room lighting.	A	No output	No alarm or indicator	None. 90-min battery-powered lighting available in MCR. 8-h battery-backed emergency lighting available.	

a. Emergency - provide sufficient illumination in areas manned for a safe shutdown and for access and egress routes to and from all areas upon loss of normal lighting.

b. Essential - provide required illumination levels throughout the plant upon loss of offsite power.

c. Circuit breaker with thermal magnetic overload trip coil. The failure of any one circuit breaker to open when required under fault conditions will result in the loss or partial loss of only the associated train with the redundant train still available.

d. Plant operating modes:

   A - all plant operating modes, including loss of offsite power, with or without a safety injection signal.
   B - all plant operating modes, including loss of offsite power, without a safety injection signal.

e. Unit 2 transformer numbers are suffixed by "RX" in lieu of "X."

TABLE 9.5.3-2 (SHEET 1 OF 2)

ILLUMINATION LEVELS OF EMERGENCY LIGHTING FOR THE MAIN CONTROL BOARD AND REMOTE SHUTDOWN PANELS[g]

Operating Conditions	Main Control Board[a][b]	Remote Shutdown Panels[a]	Access Routes from Control Room to Shutdown Rooms	Remarks
With offsite or onsite ac power available	50 fc (min) (panel lighting levels are adjustable)	30 fc (min)	10 fc (min)	Illumination level of emergency lighting for the main control board conforms with NUREG-0700 minimum requirements
With active failure one emergency diesel generator	25 fc (min)[d]	10 fc (min)	0.5 fc (min)	Illumination level of emergency lighting for the main control board conforms with NUREG-0700 minimum requirements
Design basis earthquake coincident with loss of all nonseismic equipment (including offsite power)[d]	(e)	(f)	(c)	---

TABLE 9.5.3-2 (SHEET 2 OF 2)

a. Vertical face of switchboards are 66 in. above floor level facing operator.

b. Control room luminous ceiling also has additional 90-min rated battery-backed power systems to provide lighting during loss of ac conditions.

c. 8-h sealed beam modular units are seismically tested and mounted, powered from essential lighting panels.

d. The emergency lighting power distribution system is class 1E from the 4.16-kV to the 480-V level. Fully qualified class 2E isolation transformers reduce the voltage to the 120-V level. Beyond the isolation transformers the system is non-class 1E. Within the non-class 1E portion of the emergency lighting system, the distribution panel boards are seismically qualified. All other components, including raceways and lighting fixtures, while not Seismic Category 1, have been mounted in accordance with Seismic Category 1 requirements.

It should be noted that in areas where emergency lighting is provided, fixtures are powered from alternate distribution systems; i.e., diversity in distribution is provided.

e. The main control board area luminous ceiling is designed and qualified to Seismic Category 1 requirements. Lamps within the fixtures are not guaranteed to function during or following a DBE. Test results have shown that lamps remain functional, however. Should all lamps fail during a DBE, the illumination levels can be restored by replacing the lamps, and/or portable dc units can be used until lighting is restored.

f. The lighting fixtures are not seismically qualified to function during or after a DBE. However, the fixtures are mounted in accordance with Seismic Category 1 requirements. Failed lamps within the fixtures (if any) can be replaced and/or portable dc units can be used until lighting is restored.

g. Lighting levels shown in the above table are approximate and may vary. Lighting levels lower than those shown are verified as being acceptable for the task at hand by operating personnel.

TABLE 9.5.4-1 (SHEET 1 OF 2)

STANDBY DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM COMPONENT DATA (QUANTITIES PER UNIT)

Underground storage tanks	
Quantity	2
Type	Horizontal, cylindrical
Capacity (gal) (each)	80,000
Operating pressure/temperature	Atmospheric/ambient
Design pressure/temperature (psig/°F)	16/200
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic design	Category 1
Fuel oil transfer pumps	
Quantity	4
Type	Vertical, centrifugal submersible
Capacity (gal/min) (each)	25
Total differential head (TDH) (ft)	95
Net positive suction head (NPSH)	Flooded suction
Material	
Case	Type 316L stainless steel
Impeller	Bronze ASTM B 584, alloy 954
Pump shaft	Type 416 stainless steel (ASTM A 582)
Design code	ASME Section III, Class 3
Driver	
Type	Electric motor/Siemens-Allis VSS
Horsepower	1.5 hp at 1800 rpm
Power supply	460-V, 60-Hz, 3-phase Class 1E
Source of power	MCC 1ABF/2ABF, 1BBF/2BBF
Seismic design	Category 1
Emergency fuel oil day tanks	
Quantity	2
Type	Horizontal, cylindrical
Capacity (gal) (each)	1250
Operating pressure/temperature	Atmospheric/ambient

TABLE 9.5.4-1 (SHEET 2 OF 2)

Design pressure/temperature (psig/°F)	14/200
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic design	Category 1
Piping, fittings, and valves	
Design pressure (psig)	10-50
Design temperature (°F)	100
Material	Carbon steel
Design code	
Safety-related portion	ASME Section III, Class 3
Truck fill line (to the first valve connection)	ANSI B31.1
Flame arrestors (storage and day tanks)	Manufacturer's standards

TABLE 9.5.4-2 (SHEET 1 OF 6)

FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
1.	Diesel fuel oil (DFO) storage tank, train A, tag No. 1-2403T4001 and 2-2403T4001	Stores DFO supply	All	Leaks	• Low level DFO storage tank light and alarm on engine control panel PDG2 and on QEAB in control room • Periodic inspection	Loss of insignificant oil supply. DFO can be transferred from train B storage tank to train A DFO day tank.	Tank can be filled at truck fill inlet. Tank has extra margin. A normally deenergized cross-tie cable was installed between “A” & “B” train pump rooms to facilitate emergency DFO transfer.
2.	DFO transfer/pump 1a, train A, normally deenergized, tag No. 1-2403P4001 and 2-2403P4001	Pumps DFO to day tank to maintain required day tank level	All	Fails to operate (pump or motor)	• 480-V MCC 1/2ABF alarm • High/low level day tank light and alarm on PDG2 and QEAB • Visual level gauge on day tank	None; DFO transfer pump 2a will be automatically energized by pressure transmitter (PT-9014) and by day tank level switch (LS-9020) at low-low level	DFO transfer pumps 1a and 2a are set to operate at different levels in the day tank and start alternately
3.	DFO transfer pump 2a, train A, normally deenergized, tag No. 1-2403P4002 and 2-2403P4002	Pumps DFO to day tank if the transfer pump 1a fails to operate	All	Same as item 2	Same as item 2 except 1a pump is also not available.	No pumping capability. Utilize train B EDG.	Train B can be utilized.
4.	DFO day tank, train A, tag No. 1-2403T4003 and 2-2403T4003	Stores ≈ 2 h of DFO for the engine driven fuel oil pump.	All	Same as item 1	• Same as item 2 except 480-V MCC 1/2ABF alarms • Periodic inspection	Initially low-low level in day tank will not degrade engine operation. In the longer term, utilize train B.	DFO can be transferred from train B storage tank to train A DFO day tank.

TABLE 9.5.4-2 (SHEET 2 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
5.	Engine-driven fuel oil pump, train A, operates whenever the engine operates	Provide motive force to inject fuel to the engine	All	Fails to operate	• Low-pressure fuel oil light and alarm on PDG2 and QEAB • Low-pressure fuel oil gauge on PDG2	None; loss of train A, train B available	Engine will not start or engine will stall.
6.	DFO transfer pump 1a discharge check valve (044), train A, normally closed	Prevents backflow when pump 1a is not operating and when pump 2a is operating	All	a. Fails to open	a. Same as item 2 except no 480-V MCC 1ABF alarm	a. Same as item 2	
				b. Fails to close	b. Same as item 6a	b. Same as item 3	b. Fuel oil will recirculate back into the storage tank when pump 2a is operating
7.	DFO transfer pump 2a discharge check valve (047), train A, normally closed	Prevents backflow when pump 2a is not operating and when pump 1a is operating	All	a. Same as item 6a	a. Same as item 6a	a. Same as item 3	a. Same as item 1
				b. Same as item 6b	b. Same as item 6a	b. Same as item 2	b. Fuel oil will recirculate back into the storage tank when pump 1a is operating
8.	Duplex fuel strainer, train A	Removes fine particles from the fuel oil before it enters the engine-driven fuel oil pump and the duplex fuel filter	All	Complete blockage of one of the strainers	• High differential pressure across the strainer. Gauge mounted on engine auxiliary skid • Low-pressure fuel oil light and alarm on PDG2 and QEAB • Low-pressure fuel oil gauge on PDG2	Same as item 5	Same as item 5; manual valve on duplex fuel strainer to divert fuel oil flow to the other strainer

TABLE 9.5.4-2 (SHEET 3 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
9.	Duplex fuel filter, train A	Removes finer particles from fuel oil before it enters the engine	All	Same as item 8 except filters	• High differential pressure across the filter gauge mounted on engine auxiliary skid • High differential pressure fuel oil filter gauge on PDG2 • High differential pressure fuel oil filter light and alarm on PDG2 and QEAB • Low-pressure fuel oil light and alarm on PDG2 and QEAB • Low-pressure fuel oil gauge on PDG2	Same as item 5	Same as item 5; manual valve on duplex fuel filter to divert fuel oil flow to the other filter
10.	Pressure regulating valve (PSV-9082), train A	Maintains set pressure on fuel oil supply header	All	a. Completely open b. Completely closed	a. Same as item 5 b. High fuel oil pressure gauge on PDG2	a. Same as item 5 b. None; high fuel oil pressure will not degrade engine operation	a. Same as item 5 b. Excess fuel oil due to high pressure will be diverted back to the day tank through the eductor
11.	Pneumatic shutoff valve (HV-9086), train A, normally closed when engine is not operating	Shuts off fuel oil inlet to the eductor from the engine drip header	All	a. Fails to open b. Fails to close	a. Periodic inspection small amount of fuel oil will come out from the engine drip header b. None; check valve upstream of this shutoff valve will prevent leakage of fuel oil from the supply header to the drip header	a. None; the eductor cannot pick up fuel oil drips from the drip header and return dripped fuel to the day tank	a. The fuel oil drip rate is of the order of 0.02 to 0.05 gal/h

TABLE 9.5.4-2 (SHEET 4 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
12.	Check valve upstream of shutoff valve (HV-9086), train A, normally closed when engine is not operating	Prevents leakage of fuel oil from the supply header to the drip header	All	a. Same as item 11a b. Same as item 11b	a. Same as item11a b. Same as item11b	a. Same as item11a b. None; shutoff valve (HV-9086) will prevent leakage of fuel oil from the supply header to the drip header	a. Same as item 11a
13.	Eductor, train A	Uses pressurized fuel oil from the supply header to eductor fuel oil drips back to the day tank	All	Malfunction	Same as item 11a	Same as item 11a	Same as item 11a
14.	Pressure relief valve (PSV-9010) on fuel oil transfer pump 1a recirculating line, train A, normally closed	Recirculates fuel oil back to the fuel oil storage tank in the event of excessive pressure in the pump discharge piping between the pump and the daytank	All	Fails to close	Same as item 6a	Same as item 2	Same as item 2
15.	Pressure relief valve (PSV-9012) on fuel oil transfer pump 2a recirculating line, train A, normally closed	Same as item 14	All	Same as item 14	Same as item 6a	Same as item 3	Same as item 1
16.	Fuel oil strainer (F-004) on fuel oil transfer pump 1a discharge line, train A	Removes dirt in the fuel oil before it gets to the day tank	All	Plugged strainer	Same as item 6a	Same as item 2	Same as item 2
17.	Fuel oil strainer (F-010) on fuel oil transfer pump 2a discharge line, train A	Same as item 16	All	Same as item 16	Same as item 6a	Same as item 3	Same as item 1

TABLE 9.5.4-2 (SHEET 5 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
18.	Fuel oil day tank level switch (LS-9020), train A	Controls start and stop of fuel oil transfer pumps 1a and 2a	All	a. Fails to start pumps	a. Same as item 6a	a. Same as item 1	a. Same as item1
				b. Fails to stop pumps	b. Same as item 6a	b. None; fuel oil in day tank will recirculate back to the storage tank via the overflow line	
19.	Fuel oil supply piping between day tank and engine, train A	Supplied fuel oil to engine operation	All	Pipe breaks	Same as item 5	Same as item 5	Same as item 5
20.	Same as item 1 except train B, tag No. 1-2403T4002 and 2-2403T4002	Same as item 1	All	Same as item 1	Same as item 1 except PDG4	Same as item 1	Same as item 1 except fuel oil transfers from train A to train B
21.	Same as item 2 except train B, tag No. 1-2403P4004 and 2-2403P4004	Same as item 2	All	Same as item 2	Same as item 2 except 480-V MCC1/2BBF alarm	Same as item 2 except PT-9015 and LS-9021	Same as item 2
22.	Same as item 3 except train B, tag No. 1-2403P4003 and 2-2403P4003	Same as item 3	All	Same as item 2	Same as item 21	Same as item 3	Same as item 20
23.	Same as item 4 except train B, tag No. 1-2403T4004 and 2-2403T4004	Same as item 4	All	Same as item 1	Same as item 4 except PDG4	Same as item 3	
24.	Same as item 5 except train B	Same as item 5	All	Same as item 5	Same as item 5 except PDG4 available	None; loss of train B, train A	Same as item 5
25.	Same as item 6 except train B and check valve (050)	Same as item 6	All	a. Same as item 6a	a. Same as item 21 except no 480-V MCC1/2BBF alarm	a. Same as item 21	
				b. Same as item 6b	b. Same as item 25a	b. Same as item 21	b. Same as item 6b

TABLE 9.5.4-2 (SHEET 6 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
26.	Same as item 7 except train B and check valve (053)	Same as item 7	All	a. Same as item 6a b. Same as item 6b	a. Same as item 25a b. Same as item 25a	a. Same as item 3 b. Same as item 21	a. Same as item 1 b. Same as item 7b
27.	Same as item 8 except train B	Same as item 8	All	Same as item 8	Same as item 8 except PDG4	Same as item 24	Same as item 8
28.	Same as item 9 except train B	Same as item 9	All	Same as item 9	Same as item 9 except PDG4	Same as item 24	Same as item 9
29.	Same as item 10 except train A and PSV-9083	Same as item 10	All	a. Same as item 10a b. Same as item 10b	a. Same as item 24 b. Same as item10b except PDG4	a. Same as item 24 b. Same as item10b	a. Same as item 5
30.	Same as item 11 except train B and HV-9087	Same as item 11	All	a. Same as item 11a b. Same as item 11b	a. Same as item 11a b. Same as item 11b	a. Same as item11a b. Same as item 11b	a. Same as item 11a
31.	Same as item 12 except train B and HV-9087	Same as item 12	All	a. Same as item 11a b. Same as item 11b	a. Same as item 11a b. Same as item 11b	a. Same as item 11a b. Same as item12b except HV-9087	a. Same as item 11a
32.	Same as item 13 except train B	Same as item 13	All	Same as item 13	Same as item 11a	Same as item 11a	Same as item 11a
33.	Same as item 14 except train B and PSV-9013	Same as item 14	All	Same as item 14	Same as item 21	Same as item 21	Same as item 2
34.	Same as item 15 except train B and PSV-9011	Same as item 14	All	Same as item 14	Same as item 21	Same as item 3	Same as item 1
35.	Same as item 16 except train B and F-003	Same as item 16	All	Same as item 16	Same as item 21	Same as item 21	Same as item 2
36.	Same as item 17 except train B and F-009	Same as item 16	All	Same as item 16	Same as item 21	Same as item 3	Same as item 20
37.	Same as item 18 except train B and LS-9021	Same as item 18	All	a. Same as item 18a b. Same as item 18b	a. Same as item21 b. Same as item 21	a. Same as item 1 b. Same as item 18b	a. Same as item 1
38.	Same as item 19 except train B	Same as item 19	All	Same as item 19	Same as item 24	Same as item 24	Same as item 5

TABLE 9.5.4-3

STANDBY DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM
INDICATING AND ALARM DEVICES

	Indication		Alarm	
Parameter	Control Room	Local	Control Room	Local
Storage tank level	Yes	Yes	Yes	Yes
Day tank level	Yes	Yes	Yes	Yes
Transfer pump motor-running lights	Yes	No	No	No
Fuel oil pressure	No	Yes	Yes	Yes
Filter differential pressure	No	Yes	Yes	Yes
Strainer differential pressure	No	Yes	No	No

TABLE 9.5.5-1 (SHEET 1 OF 2)

EMERGENCY DIESEL ENGINE COOLING WATER SYSTEM COMPONENT DATA
(PER DIESEL ENGINE)

Jacket cooling water pump	
Quantity (per engine)	1
Type	Horizontal centrifugal
Capacity (gal/min)	1800
Total differential head (TDH) (ft)	117
Design code	Manufacturer's standard
Driver	Engine-driven/1470 rpm
Seismic design	Category 1
Jacket coolant keep-warm pump	
Quantity (per engine)	1
Type	Horizontal centrifugal
Capacity (gal/min)	50
TDH (ft)	50
Design code	ASME Section III, Class 3
Driver	
Type	Electric motor
Horsepower	3
Revolutions per minute	1800
Power supply	480-V, 60-Hz, 3-phase
Source of power	MCC 1NBI/2NBI, 1NB0/2NBO
Design code	NEMA
Seismic design pump/motor	Category 1/2
Jacket cooling water heat exchanger	
Quantity (per engine)	1
Type	Horizontal shell and tube
Design duty (Btu/h)	18.8×10^6
Seismic design	Category 1
Codes and standards	ASME Section III, Class 3 TEMA R
Tube side:	
Fluid	Nuclear service cooling water
Temperature in/out (°F)	95/120
Flowrate (gal/min)	1500
Design pressure (psig)	150
Design temperature (°F)	200

TABLE 9.5.5-1 (SHEET 2 OF 2)

Material:	
Tubes	Cupro-nickel 90/10
Tube sheet	Muntz metal SB-111
Shell side:	
Fluid	Jacket cooling water
Temperature in/out (°F)	180/125
Flowrate (gal/min)	683 (786 max)
Design pressure (psig)	150
Design temperature (°F)	200
Material	Carbon steel SA-106-B
Jacket coolant keep-warm heater	
Quantity	1
Type	Electric
Design rating (kW)	75
Power supply	480-V, 60-Hz, 3-phase
Source of power	MCC 1NBI/2NBI, 1NB0/2NBO
Code (pressure boundary)	ASME Section VIII
Seismic design	Category 1
Surge tank (jacket water standpipe)	
Quantity (per engine)	1
Type	Vertical, cylindrical
Capacity (gal)	600
Operating pressure/ temperature (psig/°F)	atm/165
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic design	Category 1
Piping, fittings, and valves	
Material	Carbon steel
Design code Safety-related portion	ASME Section III, Class 3
Seismic design	Category 1

TABLE 9.5.5-2 (SHEET 1 OF 4)

DIESEL GENERATOR COOLING WATER SYSTEM FAILURE MODES AND EFFECTS ANALYSIS
(PRELIMINARY)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
1	Engine-driven jacket water (JW) pump, train A, operates whenever the engine operates.	Provides motive force to circulate JW through engine jacket, engine lube oil heat exchanger, governor lube oil cooler, turbocharger air cooling system, and JW heat exchanger.	All	Fails to operate.	• Low-pressure JW light and alarm. • Trip low-pressure JW light and alarm. • JW pressure gauge. • High-temperature JW light and alarm. On engine control panel PDG2 and on QEAB in control room (except JW pressure gauge).	None; loss of train A, train B available.		
2	Engine-driven JW pump discharge check valve, train A, normally closed.	Prevents backflow during standby and enables JW to circulate properly.	All	Fails to open.	Same as item 1.	Same as item 1.		
3.	Thermostatic bypass valve (TCV 19096), train A	Maintains preset JW temperature by modulating flow to the JW heat exchanger.	All	a. Fails to allow JW to flow through the JW	a. • High-temperature JW light and alarm. • High-temperature JW in light and alarm • High-temperature JW out light and alarm.	a. Same as item 1.	a. Engine will start and operate for about 3 min when all of the JW bypasses the JW heat exchanger.	See note a.

TABLE 9.5.5-2 (SHEET 2 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
					On engine control panel (PDG2) and on QEAB in control room.			
				b. Fails to allow JW to bypass JW heat exchanger.	b. • Low-temperature JW in light and alarm. • Low-temperature JW out light and alarm. On PDG2 and QEAB panels.	b. None; low temperature will not degrade engine operation.		
4.	Jacket water keep-warm (JWKW) pump, train A, normally energized (non-1E power).	Circulates warm water through the engine jackets when the engine is not operating. Deenergized during engine operation.	All	Fails to operate	• Low-temperature JW in light and alarm. • Low-temperature JW out light and alarm. On PDG2 and QEAB panels.	None; low temperature will not degrade engine start capability.	Engine room temperature is maintained at 50°F minimum (above JW freezing temperature).	
5.	JWKW pump check valve, train A, normally open during pump operation.	Prevents backflow during engine operation and enables JW to circulate properly.	All	a. Fails to open.	a. Same as item 4.	a. Same as item 4.	a. Same as item 4.	
				b. Fails to close.	b. • High JWKW pump pressure gauge. On engine auxiliary skid, train A.	b. None; high JWKW pump pressure will not degrade engine operation.	b. JWKW pump will see pressure of engine-driven JW pump.	

TABLE 9.5.5-2 (SHEET 3 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
6.	JW standpipe, train A.	Expansion chamber air and vapor eliminator and keeps constant suction head on engine-driven JW pump and JWKW pump.	All	Leaks water	• Low-level JW light and alarm on PDG2 and QEAB panels. • Level Instrumentation	None; low level in JW standpipe will not degrade engine operation.	Demineralized water system (1418) can supply makeup water.	
7.	JW heater, train A, normally energized (non-IE power).	Warms the JW during engine standby.	All	Fails to operate.	Same as item 4.	Same as item 4.	Same as item 4.	
8.	JW heat exchanger, train A.	Cools JW to desired temperature level.	All	Leaks water	Same as item 6.	Same as item 6.	Same as item 6.	
9.	Lube oil heat exchanger, train A.	Cools lube oil to desired temperature level during engine operation.	All	Heat exchanger tube leaks water.	None.	None.	Can be detected by periodic inspection. 1. Water present in lube oil sump tank drain. 2. Oil scum in JW standpipe.	See note b.
10.	Cooling water system piping, train A.	Conveys JW to engine and associated equipment in a closed loop and maintains pressure boundary.	All	Pipe break.	Same as item 1.	Same as item 1.	Same as item 1.	
11.	Same as item 1, except train B.	Same as item 1.	All	Same as item 1.	Same as item 1, except engine control panel PDG4.	None; loss of train B, train A available.		
12.	Same as item 2, except train B.	Same as item 2.	All	Same as item 2.	Same as item 11.	Same as item 11.		

TABLE 9.5.5-2 (SHEET 4 OF 4)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
13.	Same as item 3, except train B valve (TCV19097).	Same as item 3.	All	a. Same as item 3a. b. Same as item 3b.	a. Same as item 3a), except engine control panel PDG4. b. Same as item 3b), except engine control panel PDG4.	a. Same as item 11. b. Same as item 3b.	a. Same as item 3a.	See note a.
14.	Same as item 4, except train B.	Same as item 4.	All	Same as item 4.	Same as item 4, except on PDG4.	Same as item 4.	Same as item 4.	
15.	Same as item 5, except train B.	Same as item 5.	All.	a. Same as item 5a. b. Same as item 5b.	a. Same as item 4. b. Same as item 5b, except train B.	a. Same as item 4. b. Same as item 5b.	a. Same as item 4. b. Same as item 5b.	
16.	Same as item 6, except train B.	Same as item 6.	All	Same as item 6.	Same as item 6, except PDG4.	Same as item 6.	Same as item 6.	
17.	Same as item 7, except train B.	Same as item 7.	All	Same as item 7.	Same as item 4, except PDG4.	Same as item 4.	Same as item 4.	
18	Same as item 8, except train B.	Same as item 8.	All	Same as item 8.	Same as item 6, except PDG4.	Same as item 6.	Same as item 6.	
19	Same as item 9, except train B.	Same as item 9.	All	Same as item 9.	Same as item 9.	Same as item 9.	Same as item 9.	See note b.
20.	Same as item 10, except train B.	Same as item 10.	All	Same as item 10.	Same as item 1, except PDG4.	Same as item 11.		

a. Cooling water to the JW heat exchanger is also covered in nuclear service cooling water system failure modes and effects analysis (table 9.2.1-2).

b. Lube oil heat exchanger is also covered in the engine lubrication system failure modes and effects analysis (table 9.5.7-2).

TABLE 9.5.6-1 (SHEET 1 OF 2)

STANDBY DIESEL GENERATOR STARTING SYSTEM
COMPONENT DATA

Compressors

Quantity (per engine)	2
Type	Reciprocating, air cooled
Capacity (sf^3/min)	76/72.5 (1A, Compressor #2)
Discharge pressure (psig)	250
Air temperature leaving cooler (°F)	120-135
Number of stages/cylinders	2/3 (2 low pressure, 1 high pressure)
Revolutions per minute	790/900 (1A, Compressor #2)
Regulation	Dual control
Design code	Manufacturer's standard
Driver	
Type	Electric motor TEFC
Horsepower	30
Revolutions per minute	1800
Power supply	460-V, 60-Hz, 3-phase
Source of power	MCC 1NBI/2NBI, 1NBO/2NBO
Seismic design	Category 2

Dryers

Quantity (per engine)	2
Type	Membrane
Flow capacity (sf^3/min)	61 minimum
Design pressure (psig)	250
Air inlet temperature (°F)	max. 150°F
Dew point of air leaving dryer (°F)	-20°F
Design code	Manufacturer's standard
Maximum working pressure (psig)	300
Maximum Dp at rated flow (psi)	5
Seismic design	Category 2

TABLE 9.5.6-1 (SHEET 2 OF 2)

Air start receivers	
Quantity (per engine)	2
Type	Vertical, cylindrical
Capacity (ft^3)	305
Design pressure/temperature	275/400 (psig/°F)
Operating pressure/temperature	240/110 (psig/°F)
Material	Carbon steel SA 516-70
Code	ASME Section III, Class 3
Seismic design	Category 1
Piping, fittings, and valves (safety related)	
Material	Carbon steel and stainless
Design code	ASME Section III, Class 3
Seismic design	Category 1
Piping, fittings, and valves (nonsafety related)	
Material	Carbon steel and stainless steel
Design code	Manufacturer's standard or ANSI B31.1

TABLE 9.5.6-2 (SHEET 1 OF 5)

DIESEL GENERATOR STARTING SYSTEM
FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
1	Air receiver VO1 inlet check valve, train A, normally closed	Prevents backflow when compressor CO1 is not operating	All	a. Fails to open	a. Periodic testing	a. None		
				b. Fails to reclose	b. • Low-pressure starting air light and alarm on PDG2 and QEAB • Pressure gauge (low) on air receiver	b. None; loss of air receiver due to air blowdown. Air receiver VO2 available to start engine.		
2	Air pressure relief valve (PSV-9032), train A, normally closed	Prevents overpressure of air receiver V01	All	a. Fails to open	a. • Starting air pressure gauge (high) on PDG2 and air receiver • High-pressure starting air light and alarm on PDG2 and QEAB	a. None; high-pressure starting air will not degrade engine starting capability		
				b. Fails to reclose	b. • Low-pressure starting air light and alarm on PDG2 and QEAB • Starting air pressure gauge (low) on PDG2 and air receiver	b. None; loss of air receiver VO1, air receiver V02 available to starting engine		

TABLE 9.5.6-2 (SHEET 2 OF 5)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
3.	Air receiver V01, train A	Stores compressed air capable of five consecutive engine starts without compressor assistance	All	Leaks	• Same as item 2b • Air compressor $C0_1$ will cycle on and off frequently or stays on all the time	Same as item 2b		
4	Starting air valve (HV-9070A), train A, opens whenever engine is signaled to start (valve energized by Class IE dc power to open)	Enables air flow from a receiver V01 to engine the starting effort	All	a. Fails to open due to mechanical failure	a. Periodic testing	a. None; active redundant starting -air valves HV-9070B, HV-9068A, and HV-9068B are all opened to admit air to the engine for the starting effort	a. Due to active redundancy in the four starting air valves, failure of any three of the four valves will not degrade engine starting capability	
				b. Fails to open due to dc power supply failure	b. • Failed to start light and alarm on PDG2 and QEAB • The dc feeder breaker open light and alarm on QEAB	b. None; loss of train A, train B available		
5.	Same as item 4, except (HV-9070B)	Same as item 4	All	a. Same as item 4a	a. Same as item 4a	a. Same as item 4a, except valves HV-9070A, HV-9068A, and HV-9068B are opened	a. Same as item 4a	
				b. Same as item 4b	b. Same as item 4b	b. Same as item 4b		

TABLE 9.5.6-2 (SHEET 3 OF 5)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
6	Same as item 4, except (HV-9068A)	Same as item 4, except air receiver V02	All	a. Same as item 4a	a. Same as item 4a	a. Same as item 4a, except valves HV-9070A, HV-9070B, and HV-9068B are opened	a. Same as item 4a	
				b. Same as item 4b	b. Same as item 4b	b. Same as item 4b		
7	Same as item 4, except (HV-9068B)	Same as item 6	All	a. Same as item 4a	a. Same as item 4a	a. Same as item 4a, except valvesHV-9070A, HV-9070B, and HV-9068A are opened	a. Same as item 4a	
				b. Same as item 4b	b. Same as item 4b	b. Same as item 4b		
8	Air receiver V02 inlet check valve, train A, normally closed	Same as item 1, except compressor $C0_2$	All	a. Fails to open	a. Periodic testing	a. None		
				b. Fails to reclose	b. Same as item1b	b. Same as item 1b, except air receiver V01		
9	Same as item 2, except (PSV-9028)	Prevents overpressure of air receiver V02	All	a. Fails to open	a. Same as item 2a	a. Same as item 2a		
				b. Fails to reclose	b. Same as item 2b	b. None; loss of air receiver V02, air receiver V01 available to start engine		
10	Air receiver V02, train A	Same as item 3	All	Leaks	Same as item 3, except air compressor $C0_2$	Same as item 9b		
11	Deleted.							
12	Deleted.							

TABLE 9.5.6-2 (SHEET 4 OF 5)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
13	Same as item 1, except train B	Same as item 1	All	a. Fails to open b. Fails to reclose	a. Periodic inspection b. Same as item 1b, except PDG4	a. None b. Same as item 1b		
14	Same as item 2, except PSV-9033 and train B	Same as item 2	All	a. Fails to open b. Fails to recluse	a. Same as item 2a, except PDG4 b. Same as item 2b, except PDG4	a. Same as item 2a b. Same as item 2b		
15	Air receiver V01, train B	Same as item 3	All	Leaks	Same as item 3, except PDG4	Same as item 2b		
16	Same as item 4, except HV-9071A and train B	Same as item 4	All	a. Fails to open due to mechanical failure b. Fails to open due to dc power supply failure	a. Periodic inspection b. • Failed to start light and alarm on PDG4 and QEAB • The dc feeder breaker open light and alarm on QEAB	a. Same as item 4a, except HV-9071B, HV-9069A, and HV-9069B b. None; loss of train B, train A available	a. Same as item 4a	
17	Same as item 4, except HV-9071B and train B	Same as item 4	All	a. Same as item 16a b. Same as item 16b	a. Periodic inspection b. Same as item 16b	a. Same as item 4a, except HV-9071A, HV-9069A, and HV-9069B b. Same as item 16b	a. Same as item 4a	

TABLE 9.5.6-2 (SHEET 5 OF 5)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
18	Same as item 4, except HV-9069A and train B	Same as item 4, except V02	All	a. Same as item 16a	a. Periodic inspection	a. Same as item 4a, except HV-9071A, HV-9071B, and HV-9069B	a. Same as item 4a	
				b. Same as item 16b	b. Same as item 16b	b. Same as item 16b		
19	Same as item 4, except HV-9069B and train B	Same as item 4, except V02	All	a. Same as item 16a	a. Periodic inspection	a. Same as item 4a, except HV-9071A, HV-9071B, and HV-9069A	a. Same as item 4a	
				b. Same as item 16b	b. Same as item 16b	b. Same as item 16b		
20	Same as item 8, except train B	Same as item 8	All	a. Fails to open	a. Periodic testing	a. None		
				b. Fails to reclose	b. Same as item 13b	b. Same as item 1b		
21	Same as item 2, except PSV-9029 and train B	Same as item 9	All	a. Fails to open	a. Same as item 14a	a. Same as item 2a		
				b. Fails to recluse	b. Same as item 14b	b. Same as item 9b		
22	Air receiver V02, train B	Same as item 3	All	Leaks	Same as item 3, except PDG4 and air compressor C02	Same as item 9b		
23	Deleted							
24	Deleted							

TABLE 9.5.7-1 (SHEET 1 OF 3)

EMERGENCY DIESEL ENGINE LUBRICATION SYSTEM COMPONENT DATA

Main oil pump	
Quantity (per engine)	1
Type	Positive displacement, rotary
Capacity (gal/min)	500
Relief valve set pressure (psig)	70
Design code	Manufacturer's standards
Driver	Engine-driven/1960 rpm
Seismic design	Category 1
Keep-warm pump	
Quantity (per engine)	1
Type	Positive displacement, rotary
Capacity (gal/min)	99
Relief valve set pressure(psig)	50
Design code	ASME Section III, Class 3
Driver	
Type	Electric motor
Horsepower	15
Revolutions per minute	1800
Power supply	460-V, 60-Hz, 3-phase
Source of power	MCC 1NBI/2NBI, 1NBO/2NBO
Design code	NEMA
Seismic design	Category 1 (pump), Category 2 (motor)
Oil cooler	
Quantity (per engine)	1
Type	Horizontal shell and tube
Design duty (Btu/h)	3.21×10^6
Codes and standards	ASME Section III, Class 3 TEMA R
Seismic design	Category 1
Tube side:	
Fluid	Jacket cooling water
Temperature in/out (°F)	146.6/153.7
Flowrate (gal/min)	900
Design pressure (psig)	125
Design temperature (°F)	200
Material	

TABLE 9.5.7-1 (SHEET 2 OF 3)

Tubes	90/10 Cupro nickel
Tubesheet	Muntz metal SB-171
Shell side:	
Fluid	Lubricating oil SAE-40
Temperature in/out (°F)	180/151.5
Flowrate (gal/min)	500
Design pressure (psig)	125
Design temperature (°F)	200
Material	Carbon steel SA-106 B
Keep-warm heater	
Quantity (per engine)	1
Type	Electric
Design rating (kW)	45
Power supply	480-V, 60-Hz, 3-phase
Source of power	MCC 1NBI/2NBI, 1NBO/2NBO
Code (pressure boundary)	ASME Section VIII
Seismic design	Category 1
Lube oil sump	
Quantity (per engine)	2 (interconnected)
Type	Vertical, cylindrical
Capacity, each (gal)	350
Operating pressure/temperature (psig/°F)	atm/170-180
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic design	Category 1
Main oil filter	
Quantity (per engine)	1
Type	Full-flow, duplex, cartridge
Flowrate (gal/min)	500
Particle retention capability (μm)	10
Design pressure/temperature (psig/°F)	150/200
Material	
Filter	Pleated paper
Housing	Carbon steel SA-285-C
Code (pressure boundary)	ASME Section III, Class 3
Seismic design	Category 1

TABLE 9.5.7-1 (SHEET 3 OF 3)

On-engine main lube oil strainer	
Quantity (per engine)	2
Type	Basket-type, simplex
Flowrate (gal/min)	500
Design pressure/temperature (psig/°F)	150/200
Filtering capacity (μm)	80 (nominal)
Material	
Housing	Carbon steel
Screen	Stainless steel
Code (pressure boundary)	ASME Section VIII
Seismic design	Category 1
Piping, fittings, and valves	
Material	Carbon steel
Design code, safety-related portion	ASME Section III, Class 3
Seismic design	Category 1

TABLE 9.5.7-2 (SHEET 1 OF 6)

DIESEL GENERATOR LUBRICATION SYSTEM
FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
1.	Engine-driven lube oil (LO) pump, train A, operates whenever the engine operates	Pumps pressurize LO to the engine	All	Fails to operate	• Low-pressure LO light and alarm • Trip - low-pressure LO light and alarm • Trip - high-temperature engine bearing light and alarm • LO pressure gauge (low) on engine control panel PDG2	None; loss of train A, train B is available	
2.	Engine-driven LO pump suction line check valve in LO sump tank, train A is normally closed. (Opens whenever the engine-driven LO pump operates.)	Maintains LO in the suction line of the engine-driven LO pump during standby and prevents LO blowback into the LO sump tank in case of engine rollback	All	a. Fails to open b. Fails to close	a. Same as item 1 b. None	a. Same as item 1 b. None	b. Engine-driven LO pump suction line elevation in the LO sump tank is Just below the pump elevation. Therefore, it will not degrade pump performance.
3.	LO heat exchanger, train A	Cools LO to desired temperature level during engine operation	All	a. Heat exchanger shell cracks b. Tube leaks	a. Same as item 1 b. None	a Same as item 1 b. None	a. See note 1 b. Engine LO pressure is higher than jacket water pressure

TABLE 9.5.7-2 (SHEET 2 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
4.	Duplex LO filter, train A	Removes fine particles from the LO before it enters the duplex LO strainer and to the engine	All	Complete blockage of one of the filters	Same as item 1 • High differential pressure across the LO filter light and alarm on PDG2 and QEAB • High differential pressure across the LO filter gauge mounted on pDG2 and on engine auxiliary skid	Same as item 1	Manual valve on duplex LO filter to divert LO flow do the other filter
5	LO strainers downstream of duplex LO filter (two are provided; one is for spare), train A	Protects the engine against large solids and parts of cartridges should the duplex filter cartridge disintegrate	All	Same as item 4, except strainer	Same as item 1 and high differential pressure across the LO strainer gauge mounted on engine auxiliary skid	Same as item 1	Manual 3-way valve on inlet side to the two strainers can divert LO flow to the spare strainer
6.	LO sump tank, train A	Allows for adequate deaerating retention time and holds LO for proper engine operation	All	Cracks	• Low-level LO light and alarm on PDG2 and QEAB • Low-level LO gauge on PDG2	Same as item 1	Engine will run for a period of time until LO high temperature and low LO pressure trip
7.	LO pressure regulators, train A	Regulate LO pressure in the engine and bypass oil back to the LO sump tank in case of high LO pressure in the discharge header of the engine driven LO pump	All	a. Fails in open position b. Fails in closed position	a. Same as item 1 b. None	a. Same as item 1 b. None	b. During normal engine operation, no LO will be required to be bypassed back to the LO sump tank through the regulators

TABLE 9.5.7-2 (SHEET 3 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
8.	Pressure relief valve (PSV-9098) on engine-driven LO pump suction bypass. Train A is normally closed.	Prevents overpressure of engine-driven LO pump suction line in case of LO blowback during engine rollback	All	Fails to relieve overpressure in the line	a. LO pressure gauge (high) on PDG2 Engine-driven LO pump “in” pressure gauge (high) on engine auxiliary skid	None; the LO pressure regulators will act as relief valves and bypass oil back to the LO sump tank	
				b. Fails to reclose	b. None	b. None	
9.	Lube oil keep-warm (LOKW) pump, train A, tag No. 1-2403G4001-P07 and 2-2403G4001-P07, normally energized (non-1E power)	Circulates heated oil to the engine to keep engine warm when the engine is not operating. Deenergized during engine operation.	All	Fails to operate	• Low temperature LO in light and alarm • Low temperature LO out light and alarm on PDG2 and QEAB	None; low temperature LO will not degrade engine at start capability	Engine room temperature is maintained 50°F, minimum. Also, jacket water keep-warm system will keep the engine warm. See note 2.
10.	LO heater, train A, tag No. 1-2403G4001-H02 and 2-2403G4001-H02, normally energized (non-1E power)	Warms the LO during engine standby. Deenergized during engine operation.	All	Fails to operate	Same as item 9	Same as item 9	Same as item 9. See note 2.
11.	LOKW filter, train A	Remove foreign matter from the LO as it circulates through the keep-warm system	All	Complete blockage	• High differential pressure across the filter gauge mounted on engine auxiliary skid • LO pressure gauge (low) on PDG2 • Same as item 9	Same as item 9	Same as item 9. See note 2.

TABLE 9.5.7-2 (SHEET 4 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
12.	LOkW strainer, train A	Remove fine particles from the LO as it circulates through the keep-warm system	All	Complete blockage	• High differential pressure across the strainer gauge mounted on engine auxiliary skid • LO pressure gauge (low) on PDG2 • Same as item 9	Same as item 9	Same as item 9. See note 2.
13.	Pressure relief valve (PSV-9096) on LOKW pump; train A is normally closed	Prevents overpressure of LOKW pump discharge piping	All	Same as item 8	• LO pressure gauge (high) on PDG2 • LOKW pump “out” pressure gauge (high) on engine auxiliary skid	None; overpressure of the LOKW pump discharge piping will be relieved by pressure relief valve (PSV-9098)	
14.	LOKW strainer outlet check valve, train A, is normally open when LOKW pump is operating	Prevents LO backflow when engine-driven LO pump is operating	All	a. Fails to open b. Fails to reclose	a1. LO pressure gauge (low) on PDG2 a2. Same as item 9 b. LOKW pump “out” pressure gauge (high) on engine auxiliary skid	a. Same as item 9 b. None; a small portion of the LO will circulate back to the LO sump tank from the engine through the LOKW system. This will not degrade engine operation.	a. Same as item 9 See note 2. b. Manual 3-way valve on LOKW pump discharge can be closed to stop LO from recirculating back to the LO sump tank during engine operation
15.	LO strainer outlet check valve 1a, train A, is normally open when engine-driven LO pump is operating	Prevents LO backflow during engine operation and prevents LO backflow to the other LO strainer	All	a. Fails to open b. Fails to reclose	a. Same as item 1 b. LO strainer outlet pressure gauge (high) during engine standby on engine auxiliary skid	a. Same as item 1 b. None; check valve on the engine driven LO pump suction will prevent LO backflow to the LO sump tank during LOKW pump operation.	a. Same as item 5

TABLE 9.5.7-2 (SHEET 5 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
16.	LO strainer outlet check valve 2a, train A, is normally closed.	Prevents LO backflow to the strainer (spare) during engine operation	All	Does not close	LO strainer (spare) outlet pressure gauge (high) on engine auxiliary skid	None; manual 3-way valve is closed and LO will not circulate through the LO strainer (spare)	
17.	Same as item 1, except train B	Same as item 1	All	Fails to operate	Same as item 1, except PDG4	None; loss of train B; train A is available.	
18.	Same as item 2, except train B	Same as item 2	All	a. Fails to open	a. Same as item 17	a. Same as item 17	
				b. Fails to reclose	b. None	b. None	b. Same as item 2b
19.	Lo heat exchanger, train B	Same as item 3	All	a. Same as item 3a	a. Same as item 17	a. Same as item 17	
				b. Tube leaks	b. None	b. None	b. Same as item 3b. See note 1.
20.	Duplex LO filter, train B	Same as item 4	All	Same as item 4	Same as item 4, except PDG4	Same as item 17	Same as item 4
21.	Same as item 5, except train B	Same as item 5	All	Same as item 5	Same as item 5, except PDG4	Same as item 17	Same as item 5
22.	LO sump tank, train B	Same as item 6	All	Cracks	Same as item 6, except PDG4	Same as item 17	Same as item 6
23.	Same as item 7, except train B	Same as item 7	All	a. Same as tem 7a	a. Same as item 17	a. Same as item 17	
				b. Same as item 7b	b. None	b. None	b. Same as item 7b
24.	Same as item 8. except (PSV-9099) and train B	Same as item 8	All	a. Same as item 8a	a. Same as item 8a, except PDG4	a. Same as item 8a	
				b. Fails to reclose	b. None	b. None	
25.	Same as item 9, except train B, tag No. 1-2403G4002-P07 and 2-2403G4002-P07	Same as item 9	All	Fails to operate	Same as item 9, except PDG4	Same as item 9	Same as item 9. See note 2.

TABLE 9.5.7-2 (SHEET 6 OF 6)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
26.	Same as item 10, except train B, tag No. 1-2403G4002-H02 and 2-2403G4003-H02	Same as item 10	All	Fails to operate	Same as item 25	Same as item 9	Same as item 9. See note 2.
27.	LOKW filter, train B	Same as item 11	All	Complete blockage	Same as item 11, except PDG4	Same as item 9	Same as item 9. See note 2.
28.	LOKW strainer, train B	Same as item 12	All	Complete blockage	Same as item 12, except PDG4	Same as item 9	Same as item 9. See note 2.
29.	Same as item 13, except (PSV-9097) and train B	Same as item 13	All	Same as item 8	Same as item 13, except PDG4	Same as item 13, except (PSV-9099)	
30.	Same as item 14, except train B	Same as item 14	All	a. Fails to open	a. Same as item 14a, except PDG4	a. Same as item 9	a. Same as item 9. See note 2.
				b. Fails to reclose	b. Same as item 14b	b. Same as item 14b	b. Same as item 14b
31.	Same as item 15, except train B	Same as item 15	All	a. Fails to open	a. Same as item 17	a. Same as item 17	a. Same as item 5
				b. Fails to reclose	b. Same as item 15b	b. Same as item 15b	
32.	Same as item 16, except train B	Same as item 16	All	Does not close	Same as item 16	Same as item 16	

NOTES:

1. Lube oil heat exchanger is also covered in table 9.5.5-2.
2. Jacket water keep-warm system is also covered in table 9.5.5-2.

TABLE 9.5.7-3

EMERGENCY DIESEL GENERATOR LUBRICATION SYSTEM
INDICATING DEVICES

Indication	Local Panel Mounted	Engine Skid Mounted
Oil pressure at engine header	Yes	No
Oil temperature at engine header	Yes	No
Oil cooler inlet temperature	No	Yes
Oil cooler outlet temperature	No	Yes
Main oil strainer differential pressure	No	Yes
Keep-warm filter differential pressure	No	Yes
Sump oil level	Yes	No
Crankcase pressure	Yes	No
Keep-warm strainer differential pressure	No	Yes
Main oil filter differential pressure	Yes	Yes
Oil temperature at engine drain	Yes	No
Main oil pump inlet pressure	No	Yes
Main oil pump outlet pressure	No	Yes
Keep-warm pump inlet pressure	No	Yes
Keep-warm pump outlet pressure	No	Yes
Right bank turbocharger oil pressure	Yes	No
Left bank turbocharger oil pressure	Yes	No

TABLE 9.5.8-1

EMERGENCY DIESEL ENGINE COMBUSTION AIR INTAKE AND EXHAUST SYSTEM COMPONENT DATA

Air intake filter	
Quantity (per engine)	1
Make/model/size	AAF, P01-V Cycoil, 84
Type	Oil bath
Design flow at 100°F (ft^3/min)	25,100
Design pressure/temperature (psig/°F)	Atmospheric/120
Material	Carbon steel
Quantity of oil (gal)	109
Code	Manufacturer's standard design
Pressure drop at rated load (in. WG)	3
Seismic design	Category 1
Intake silencer	
Quantity (per engine)	2
Make/model/size	AAF, 4R, 24
Type	Pulsco tubular duct
Design flow at 100°F (ft^3/min)	14,030
Design pressure/temperature (psig/°F)	Atmospheric/120
Material	Carbon steel
Code	Manufacturer's standard design
Pressure drop at rated load (in. WG)	0.65
Seismic design	Category 1
Exhaust silencer	
Quantity (per engine)	1
Type	Horizontal
Design flow at 900°F (ft^3/min)	27,000
Design pressure/temperature (psig/°F)	Atmospheric/900
Material	Carbon steel
Code	Manufacturer's standard design
Pressure drop at rated load (in. WG)	5.0
Seismic design	Category 1
Piping	
Material	Carbon steel
Design code	
Intake piping (except flexible connectors)	ASME Section III, Class 3
Exhaust piping (except flexible connectors)	ANSI B31.1
Flexible connectors (intake and exhaust)	Manufacturer's standard design
Seismic design	Category 1

TABLE 9.5.8-2 (SHEET 1 OF 2)

DIESEL GENERATOR COMBUSTION AIR INTAKE AND EXHAUST SYSTEM FAILURE MODES AND EFFECTS ANALYSIS

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
1	Intake air filter (oil bath-type), train A	Removes dust and dirt from air before it enters the engine	All	Low oil level	Sight gauge on air filter	None	Drop in dust and dirt removal efficiency will not restrict air flow to engine	
2	Intake air silencers, train A	Conveys filtered air to engine at an acceptable noise level	All	Blockage	Low combustion air pressure gauge on PDG2	None; loss of train A, train B available	Blockage of intake air silencers is unlikely due to the silencers being installed downstream of the intake air filter which is installed inside the building	
3	Exhaust silencer, train A	Conveys exhaust gas to outside atmosphere at an acceptable noise level	All	Same as item 2	High exhaust stack temperature on PDG2	Same as item 2		
4	Intake piping, train A	Conveys filtered air to engine	All	Pipe breaks	Visual and/or high noise level	Same as item 1		
5	Exhaust piping, train A	Conveys engine exhaust gas to outside atmosphere	All	a. Same as item 4 b. Complete blockage of exhaust pipe opening at outside the diesel generator building	a. Same as item 4 and odor b. Periodic inspection	a. Same as item 1 b. None; loss of train A, train B available	b. Engine will start and run for a short time then stop	
6	Same as item 1, except train B	Same as item 1	All	Same as item 1	Same as item 1	Same as item 1	Same as item 1	
7	Same as item 2, except train B	Same as item 2	All	Same as item 2	Same as item 2, except PDG4	Same as item 2		
8	Same as item 3, except train B	Same as item 3	All	Same as item 2	Same as item 3 except PDG4	Same as item 2		

TABLE 9.5.8-2 (SHEET 2 OF 2)

Item No.	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks	Go to Item No.
9.	Same as item 4, except train B	Same as item 4.	All	Same as item 4.	Same as item 4.	Same as item 1.		
10.	Same as item 5, except train B	Same as item 5	All	a. Same as item 4 b. Same as item 5b	a. Same as item 5a b. Same as item 5b	a. Same as item 1 b. None; loss of train B, train A available	Same as item 5b	

TABLE 9.5.9-1

EQUIPMENT SUPPLIED BY AUXILIARY STEAM SYSTEM

Steam jet air ejector

Moisture separator reheaters

Condenser spargers

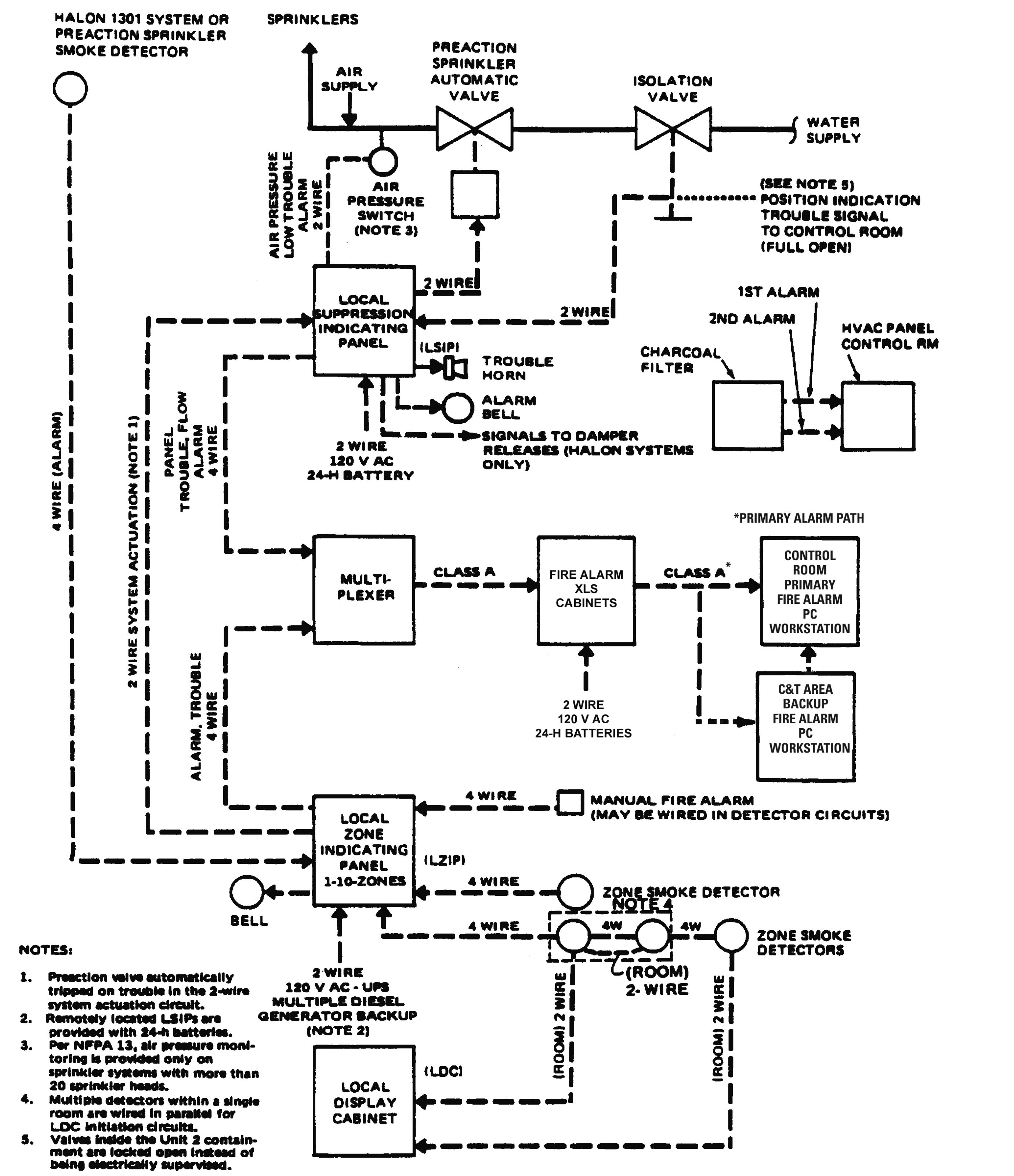
Low-pressure heater 5

Turbine seal steam system

Auxiliary feedwater turbine-driven pump

Steam generator feedpump turbines

Main turbine via main steam lines



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VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

CIRCUIT ARRANGEMENT FOR LOCAL AND REMOTE DISPLAY OF DETECTION AND SUPPRESSION SYSTEMS

FIGURE 9.5.1-1

9A.1.1 FIRE AREA 1-AB-LD-A

A. Location: Auxiliary Building Central Area, Levels D, C, B, A, 1, 2

Auxiliary Building Wing Area, Levels D, C, A

B. Drawings: AX4DJ8007, AX4DJ8008, AX4DJ8010, AX4DJ8011, AAX4DJ8012, AX4DJ8015, AX4DJ8016, AX4DJ8017, and AX4DJ8019

C. Description: Includes fire zones 9, 11B

Train B pipe chase, train B RHR pump room, nontrain pipe chase, train B electrical chase, HVAC chase.

D. Description of Boundaries

1. Level D - Central

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-AB-LD-D.
- East - 3-h-rated barrier separates area from 1-AB-LD-I, 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-F, and stairwell No. 3.
- West - 3-h-rated barrier separates area from 1-AB-LD-C, 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates train B RHR pump room from 1-AB-LC-A.

2. Level D - Wing (el 135 ft - 2 in.)

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LD-J.
- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- Ceiling - 3-h-rated barrier separates from area 1-AB-LD-G, 1-AB-LC-D.

3. Level C - Central

- North - 3-h-rated barrier separates area from fuel building 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LD-I.
- South - 3-h-rated barrier separates area from 1-AB-LD-F and stairwell No. 3.
- West - 3-h-rated barrier separates area from 1-AB-LC-C, 1-AB-LC-A, 1-AB-LD-B.
- Floor - 3-h-rated barrier separates area from 1-AB-LD-D.

4. Level C - Wing (el 158 ft - 0 in.)

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LC-D, 1-AB-LC-E.
- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G
- East - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LC-D, 1-AB-LC-E.
- West - 3-h-rated barrier separates area from 1-AB-LD-G
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-A.

5. Level B - Central

- North - 3-h-rated barrier separates area from fuel building 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LB-B, 1-AB-LD-I, 1-AB-LB-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-F and stairwell No. 3.
- West - 3-h-rated barrier separates area from 1-AB-LC-A, 1-AB-LD-B, 1-AB-LC-C.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LA-A

6. Level A - Central

- North - 3-h-rated barrier separates area from 1-AB-LA-A, 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-I, 1-AB-LA-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-F and stairwell No. 3.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L1-C, 1-AB-LD-B, 1-AB-L1-B.

7. Level A - Wing (el 211 ft - 5 in.)

- North - 3-h-rated barrier separates area from 1-AB-LB-B, 1-AB-LA-D, 1-AB-LA-E.
- East - 3-h-rated barrier separates area from 1-AB-LA-D.
- South - 3-h-rated barrier separates area from 1-AB-LA-D, 1-AB-LA-E, 1-AB-LB-B, 1-AB-LD-I, 1-AB-LA-C.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LA-E, 1-AB-LD-G.
- Floor - 3-h-rated barrier separates area from 1-AB-LA-D, 1-AB-LD-I, 1-AB-LA-E, 1-AB-LA-C.

8. Level 1 - Central (Electrical chase)

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-AB-L1-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-L1-B.

9. Level 1 - Central (HVAC chase)

- North - 3-h-rated barrier separates area from 1-AB-L1-C.
- East - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LD-I.

- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-L1-C.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-C, 1-AB-L2-A.

10. Level 2 - Central

- North - 3-h-rated barrier separates area from 1-AB-L2-C.
- South - 3-h-rated barrier separates area from 1-AB-L1-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-L1-B.
- Ceiling - Unrated exterior fire area boundary.

E. Area Access

1. Level D

- West - Unrated watertight door from 1-AB-LD-B.
- West - Class A door [a] from 1-AB-LD-B.

2. Level C

- West - Class A door [a] from 1-AB-LD-B.

3. Level B

- West - Class A door [a] from 1-AB-LD-B.

4. Level A

- West - Class A door [a] from 1-AB-LD-B.

5. Level 1

- West - Class A door from 1-AB-L1-B.

---

a. Indicated fire door is normally open, but is released when smoke is detected.

6. Level 2

- West - Class A door from 1-AB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8716B - Residual heat removal discharge header cross connection valve.
- HV8812B - RWST to RHR pump "B" valve.
- TE12212 - Fan 1-1555-A7-008 interlock.
- 1-1205-P6-002 - Residual heat removal pump "B".
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 9

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Oil/grease

- Heat release

  - Fixed combustibles ≤ 9,120,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

Zone No. 11B

- Fixed combustible quantities

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 664,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 280,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 210 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   a. Fire damage to cables for both boric acid transfer pump discharge valves may require use of the refueling water storage tank and RCS letdown to achieve RCS boration.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   b. Train A residual heat removal (RHR) system vent, HV-10465, may open due to a fire in this fire area.

   c. The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

d. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

e. RHR to safety injection pumps valve, HV-8804B, may open due to a fire in this fire area.

f. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area.

g. Safety injection may occur due to fire damage to the steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 9
- Zone 11B

N. Fire Suppression

1. Automatic

   - Zone 9 preaction sprinkler system - total zone coverage.
   - Zone 11 preaction sprinkler system – partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zone 11B.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

Watertight door D36 separates fire zone 9 in fire area 1-AB-LD-A from fire zone 12 in fire zone area 1-AB-LD-B. Fire zone 9 is the train B RHR pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 12 is the level D central part of the auxiliary building which includes corridors and various tank and equipment rooms.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LD-A and 1-AB-LD-B is acceptable because (also see Appendix 9B, Section C.5.a.(5)):

a. Within fire area 1-AB-LD-B (fire zone 12) approximately 14 horizontal ft of separation distance with no intervening combustibles exists between watertight door D36 and the closest safe shutdown component (including electrical cables). This separation path is a heavy concrete construction labyrinth which provides access to fire area 1-AB-LD-A.

b. Fire zones 9 and 12 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 9 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

d. Fire zone 12 is provided with an independent automatic fire suppression system for the train A-related cable trays in the corridor adjacent to the labyrinth. This system also provides coverage of the labyrinth entrance and exterior walls.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

1. Unlabeled oversize fire dampers:

See Appendix 9B, Section C.5.a.(4).

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

3. No fire damper in a rated fire area boundary:

   No fire dampers are installed in the two ventilation duct penetrations in the north auxiliary building wall of this fire area between column lines A14 and A16 at el 215 ft (approximately). This wall is a 3-h-rated fire area boundary barrier which separates this fire area from the seismic gap between the auxiliary building and the fuel handling building. This deviation is acceptable because:

   a. Fire dampers are installed in these ventilation ducting penetrations in the south wall of the fuel handling building which will isolate fire area 1-FB-LC-A (adjoining fire area) from the seismic gap and from this fire area.

   b. The interconnecting ducting between the fuel handling building fire damper sleeve and the ventilation ducting penetration through the 3-h-rated fire barrier of this area is noncombustible flexible material or sheet metal ducting.

   c. There is no combustible material in the immediate vicinity of the ventilation penetrations within this fire area.

   d. While the seismic gap does contain some combustible material (exposed electrical cable insulation) it is a small quantity (relative), and an exposure fire within this area is not considered credible as the area is not accessible (seismic gap is approximately 5-1/2 in. wide).

   e. Safe shutdown capability is not jeopardized. Only train B safety-related cables exist inside the seismic gap, and train B safe shutdown cables and equipment exist in fire area 1-AB-LD-A.

   Modifications of the plant to provide rated fire dampers in these ventilation penetrations would not significantly increase the level of protection provided by the existing design.

4. Oversized P-90 penetration seals:

   Within fire area 1-AB-LD-A (fire zone 11B), seal number 1-08-312-B and number 1-08-320-B exist. See Appendix 9B, Section C.5.a.(3).

9A.1.2 FIRE AREA 1-AB-LD-B

A. Location: Auxiliary Building, Central Area, Level D, C, B, A, 1, 2

Control Building, Levels C, B, A, 1, 2, 3

Fuel Handling and Equipment Building, Levels C, B, A, 1, 2, 3

B. Drawings: AX4DJ8007, AX4DJ8009, AX4DJ8010, AX4DJ8014, AX4DJ8012, AX4DJ8015, AX4DJ8017, AX4DJ8019, AX4DJ8021, AX4DJ8023, AX4DJ8025, AX4DJ8026, AX4DJ8027, AX4DJ8028, AX4DJ8030, AX4DJ8031, and AX4DJ8032

C. Description: Includes fire zones 12, 24, 25, 27, 28, 38, 40, 41, 42A, 46, 47, 81A, 139, 142, 191, 192

1. Level D - Auxiliary Building

Laundry and hot shower tank room, electric boiler room, floor drain tank room, filter area, sump and sump pump area, spent resin storage tank rooms, waste hold-up tank room, nontrain vertical electric chase, valve gallery, boron recycle hold-up tank room, waste evaporator feed pump room, waste monitor tank and pump rooms, horizontal and vertical utility chases.

2. Level C - Auxiliary Building

Recycle and waste evaporator rooms, valve galleries, boron recycle hold up tank room, SGB spent resin storage tank and pump rooms, waste monitor tank rooms, nontrain vertical electric chase, horizontal and vertical utility chases.

2a. Level C - Control Building

Piping tunnel.

2b. Level C - Fuel Handling Building

Piping tunnel.

3. Level B - Auxiliary Building

Decay tank rooms, valve galleries, filter chambers, waste gas compressor rooms, catalytic recombiner rooms, nontrain vertical electric chase, horizontal and vertical utility chases.

3a. Level B - Control Building

Mechanical chase.

3b. Level B - Fuel Handling Building

Access tunnel corridor.

3c. Level B - Control Building

Piping shaft.

4. Level A - Auxiliary Building

Volume control tank room, demineralizer rooms, spent fuel pit heat exchanger rooms, MCC room, switchgear room, valve galleries, condensate hold-up tank room, nontrain vertical electric chase, horizontal and vertical utility chases.

4a. Level A - Control Building

Mechanical chase.

5. Deleted.

6. Level 1 - Auxiliary Building

Demineralizer rooms, CVCS chiller pumps room, corridors, nontrain vertical electric chase, hot instrument decontamination shop, railroad unloading area, sample chase (including horizontal section).

6a. Level 1 - Control Building

Mechanical chase and sample chase.

7. Level 1 - Fuel Handling Building

Spent fuel pools, new fuel storage pit, cask washdown area.

8. Level 2 - Auxiliary Building

Crane operating area.

8a. Level 2 - Control Building

Mechanical chase and sample chase (including horizontal section at el 249 ft - 0 in.).

8b. Level 2 - Fuel Handling Building

Sample chase (at el 240 ft - 0 in. and 249 ft - 0 in.).

9. Level 3 - Fuel Handling Building

Crane operating area, normal exhaust filter rooms.

D. Description of Boundaries

1. Level D - Auxiliary Building

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-AB-LD-C (el 135 ft - 2 in. utility chase).
- North - Unrated below-grade exterior area boundary.
  - 2-h-rated barrier separates area from stairwell No. 1 and elevator No. 1.
- East - 3-h-rated barrier separates area from 1-AB-LD-D, 1-AB-LD-A, 1-AB-LD-G, 1-AB-LD-E, 1-AB-LD-C.
  - 2-h-rated barrier separates area from stairwell No. 3.
- South - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B (including el 135 ft - 2 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-C, 1-AB-LD-E, 1-AB-LC-B, 1-AB-LD-F, 2-AB-LD-B (including el 135 ft - 2 in. utility chase).

2. Level C - Auxiliary Building

- North - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from -AB-LC-B, 1-AB-LC-C, 1-AB-LC-A, 1-FB-LC-A.
  - 2-h-rated barrier separates area from Stairwell No. 1 and elevator No. 1
- East - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LD-F, 1-AB-LD-G.
  - 2-h-rated barrier separates area from stairwell No. 3.
- South - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B (including el 161 ft - 1 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B (including el 161 ft - 1 in. utility chase).

- Floor - 3-h-rated barrier separates area from 1-AB-LD-C, 1-AB-LD-E, 2-AB-LD-B (el 161 ft - 1 in. utility chase).

2a. Level C - Control and Fuel Handling Buildings

- North - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary
- West - 3-h-rated barrier separates area from 2-CB-LC-A.
- Floor - Unrated concrete base mat.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B, 2-CB-LC-B, 2-CB-LB-I, 2-CB-LB-J, 2-CB-LB-P, 2-CB-LB-C, 2-CB-LB-0, 2-CB-LB-Q, 2-CB-LB-N, 2-CB-LB-M, 2-CB-LB-K, 2-CB-LB-A, 1-CB-LB-R.

2b. Level C - Auxiliary Building (inside 2-AB-LD-B)

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B.

3. Level B - Auxiliary and Fuel Handling Buildings

- North - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-LB-D, 2-CB-LB-D.
- East - 3-h-rated barrier separates area from 1-AB-LC-C, 1-AB-LC-A, 1-AB-LD-A, 1-AB-LD-F, 1-AB-LB-A, 1-FB-LC-A.
  - Unrated barrier separates area from 1-CTB.
  - 2-h-rated barrier separates area from stairwell No. 3.
- South - 3-h-rated barrier separates area from 2-AB-LD-B (el 186 ft - 8 in. utility chase).
  - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B (including el 186 ft – 8 in. utility chase), 2-FB-LC-A.
  - Unrated barrier separates area from 2-CTB.

- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B (including el 186 ft - 8 in. utility chase).

- Floor - 3-h-rated barrier separates area from -AB-LC-B, 2-AB-LD-B (including el 186 ft - 8 in. utility chase).

- Interior - 3-h-rated barrier separates area from 1-AB-LC-B.

  - 2-h-rated barrier separates area from stairwell No. 1 and elevator No. 1.

3a. Level B - Control Building

- North - 3-h-rated barrier separates area from 1-CB-LC-B.

- East - 3-h-rated barrier separates area from 1-CB-LC-B.

- South - 3-h-rated barrier separates area from 1-CB-LC-B.

- West - 3-h-rated barrier separates area from 1-CB-LB-S.

3b. Level B - Auxiliary Building (inside 2-AB-LD-B)

- North - 3-h-rated barrier separates area from 2-AB-LD-B.

- East - 3-h-rated barrier separates area from 2-AB-LD-B.

- South - Unrated below-grade exterior area boundary.

- West - 3-h-rated barrier separates area from 2-AB-LD-B.

3c. Level B - Control Building (Piping Shaft)

- North -Unrated below-grade exterior area boundary.

- East -Unrated below-grade exterior area boundary.

- South -Unrated below-grade exterior area boundary.

- West -3-h-rated barrier separates area from 2-CB-LC-A.

- Ceiling -3-h-rated barrier separates area from 1-CB-LA-E.

4. Level A - Auxiliary and Fuel Handling Buildings

- North - 3-h-rated barrier separates area from 1-CB-LA-U.

- East - 3-h-rated barrier separates area from 1-AB-LA-A, 1-AB-LD-A, 1-AB-LD-F, 1-AB-LA-B, 1-FB-LC-A.

- 2-h-rated barrier separates area from stairwell No. 3.

- South - 3-h-rated barrier separates area from 2-AB-LD-B, 1-RB-LA-A (el 211 ft - 5 in. utility chase).
  - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B (includes el 211 ft 5 in. utility chase), 2-FB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L1-G, 1-RB-L1-H.
- Floor - 3-h-rated barrier separates area from 1-AB-LC-C, 1-AB-LC-A, 2-AB-LD-B (including el 211 ft – 5 i. utility chase).
- Interior - 3-h-rated barrier separates area from 1-AB-LC-B.
  - 2-h-rated barrier separates area from stairwell No. 1 and elevator No. 1.

4a. Level A - Control Building

- North -3-h-rated barrier separates area from 1-CB-LA-U.
- East -3-h-rated barrier separates area from 1-CB-LA-U.
- South -3-h-rated barrier separates area from 1-CB-LA-U.
- West- -3-h-rated barrier separates area from 1-CB-LB-S.

4b. Level A - Auxiliary Building (inside 2-AB-LD-B)

- North -3-h-rated barrier separates area from 2-AB-LD-B.
- East -3-h-rated barrier separates area from 2-AB-LD-B.
- South -Unrated below-grade exterior area boundary.
- West -3-h-rated barrier separates area from 2-AB-LD-B.

5. Level 1 - Auxiliary Building

- North - 3-h-rated barrier separates area from 1-AB-L2-A, 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-A (HVAC and electrical chases), 1-AB-L1-C, 1-AB-L1-B, 1-AB-LD-G, 1-AB-LA-B, 1-AB-LD-F.
  - 2-h-rated barrier separates area from stairwell No. 3.
- South - 3-h-rated barrier separates area from 1-AB-L1-G, 1-RTB-L1-A.

- Unrated exterior area boundary.

- West - 3-h-rated barrier separates 1-AB-L1-H, 2-AB-LD-B (including el 240 ft - 0 in. sample chase in fuel handling building) 2-AB-LC-B.

- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L1-B, 1-AB-L2-C, 2-AB-L2-A.

- Floor - 3-h-rated barrier separates area from 1-AB-LD-A, 2-AB-LD-B (including el 211 ft - 5 in. utility chase).

- Interior - 3-h-rated barrier separates area from 1-AB-LC-B.

  - 2-h-rated barrier separates area from stairwell No. 1 and elevator No. 1.

5a. Levels 1 and 2 - Fuel Handling Building

- North - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L2-E, 1-AB-L2-A, 2-AB-L2-A.

- East - 3-h-rated barrier separates area from 1-AB-L2-A, 1-FB-LC-A.

- South - 3-h-rated barrier separates area from 2-AB-L2-A.

- West - 3-h-rated barrier separates area from 2-AB-L2-A, 2-FB-LC-A, 2-AB-LD-B (sample chase).

- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A (sample chase), 2-AB-LD-B (el 249 ft - 0 in. sample chase), 1-FB-L3-A, 1-FB-L3-B.

- Floor - 3-h-rated barrier separates area from 1-AB-L2-A (sample chase), 1-FB-LC-A (sample chase).

5b. Level 1 - Control Building

- North - 3-h-rated barrier separates area from 1-CB-L1-B.

- East - 3-h-rated barrier separates area from 1-CB-L1-B.

- South - 3-h-rated barrier separates area from 1-CB-L1-B.

- West - 3-h-rated barrier separates area from 1-CB-LB-S.

- Interior - 3-h-rated barrier separates area (sample chase) from 1-CB-L1-B.

5c. Level 2 - Auxiliary Building

- East - 3-h-rated barrier separates area from 1-AB-L2-A.

  - Unrated exterior area boundary above el 260 ft.

- South - Unrated exterior area boundary.

- West - 3-h-rated barrier separates area from 2-AB-L2-A

  - Unrated exterior area boundary above el 260 ft.

- Ceiling - Unrated exterior area boundary.

5d. Level 2 - Control Building

- North - 3-h-rated barrier separates area from 1-CB-L2-E (including horizontal and vertical sample chase).

- East - 3-h-rated barrier separates area from 1-CB-L3-M.

  - Unrated exterior area boundary.

- South - 3-h-rated barrier separates area from 1-CB-L2-E (including vertical sample chase).

- West - 3-h-rated barrier separates area from 1-CB-LB-S, 1-CB-L2-E (sample chase), 2-AB-L2-A (sample chase), 2-AB-LD-B.

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-L, 1-CB-L3-M (sample chase).

6. Level 3 - Fuel Handling Building

- North - 3-h-rated barrier separates area from 1-CB-L3-L, 1-CB-L4-A.

- East - 3-h-rated barrier separates area from 1-FB-L3-A.

- South - Unrated exterior area boundary.

- West - Unrated exterior area boundary.

- Ceiling - Unrated exterior area boundary.

6a. Level 3 - Control Building

- North - 3-h-rated barrier separates area from 1-CB-L3-K.

- East - 3-h-rated barrier separates area from 1-CB-L3-K, 1-CB-L3-L.

- South - 3-h-rated barrier separates area from 1-CB-L3-L.

- West - 3-h-rated barrier separates area from 1-CB-LB-S.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.

E. Area Access

1. Level D - Auxiliary Building

- North - Class B door from stairwell No. 1.
- East - Unrated watertight doors from 1-AB-LD-D, 1-AB-LD-A. Class A door from 1-AB-LD-A.[a]
  - Class A door from 1-AB-LD-A.
  - Class A doors from 1-AB-LD-C, 1-AB-LD-E.
  - Certified class A door from 1-AB-LD-G.
  - Certified class B door from stairwell No. 3.
- West - Two certified class A doors from 2-AB-LD-B.
  - Class A door from 2-AB-LD-B (el 135 ft 2 in.)
- Ceiling - Concrete plug provides access to level D of the pipe chase from level C of the auxiliary building. Access to other levels of the pipe chase is provided by ladders within the chase. Since the amount of combustibles in the pipe chase is insufficient to support a fire (pipes and inorganic insulating materials), access to the chase for firefighting is not required.

2. Level C - Auxiliary Building

- North - Certified class B door from stairwell No. 1.
  - Certified class A door from 1-AB-LC-B.
- East - Class A doors from 1-AB-LD-A(a), 1-AB-LC-A, 1-AB-LC-C.
  - Certified class A door from 1-AB-LD-G.
  - Class B door from stairwell No. 3.

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a. Indicated fire door is normally open, but is released when smoke is detected.

- West - Two certified class A doors from 2-AB-LD-B.
  - Class A door from 2-AB-LD-B (el 161 ft 1 in.)

2a. Level C - Control Building

- West - Class A door from 2-CB-LC-A.

3. Level B - Auxiliary and Fuel Handling Buildings

- North - Two class A doors from 1-CB-LC-B.
- East - Two class A doors from 1-FB-LC-A.
  - Class A doors from 1-AB-LD-A[a], 1-AB-LB-A.
  - Class B door from stairwell No. 3.
- West - Two class A doors from 2-AB-LD-B.
  - Class A door from 2-FB-LC-A.
- Interior - Class A door from 1-AB-LC-B.
  - Class B door from stairwell No. 1.
  - Class A door from 2-AB-LD-B.

3a. Level B - Control Building

- South - Class A door from 1-CB-LC-B.
- East - Class A door from 1-CB-LC-B.

3b. Level B - Control Building (Piping Shaft)

- West - Class A door from 2-CB-LC-A.

4. Level A - Auxiliary and Fuel Handling Buildings

- East - Class A doors from 1-FB-LC-A, 1-AB-LD-A(a), 1-AB-LA-B.
  - Class B door from stairwell No. 3.
- West - Three class A doors from 2-AB-LD-B.
  - Class A door from 2-FB-LC-A.

a. Indicated fire door is normally open, but is released when smoke is detected.

- Class A door from 2-AB-LD-B (el 211 ft 5 in.)

- Interior - Class B door from stairwell No. 1.

4a. Level A - Control Building

- South - Class A door from 1-CB-LA-U.

5. Level 1 and 2 - Auxiliary and Fuel Handling Buildings

- East - Two class A doors from 1-AB-L2-A.
  - Class A doors from 1-AB-L1-C, 1-AB-LD-G, 1-AB-L1-B.
  - Certified class A door from 1-AB-LA-B.
  - Unrated watertight door from 1-AB-LA-B.
  - Two class B doors from stairwell No. 3.
- South - Two certified class A doors from 1-AB-L1-G.
  - Missile shield sliding door in unrated exterior boundary.
  - Missile shield door in unrated exterior boundary.
- West - Class A doors from 1-AB-L1-H, 2-AB-L2-A.
  - Two class A doors from 2-AB-LD-B.
- Interior - Two class B doors from stairwell No. 1 and elevator No. 1.
  - Class A door from 1-AB-LC-B.

5a. Level 1 - Control Building

- South - Class A door from to 1-CB-L1-B.

5b. Level 2 - Control Building

- North - Class A door from 1-CB-L2-E.

6. Level 3 - Fuel Handling Building

- North - Class A door from 1-CB-L3-L.

6a. Level 3 - Control Building

- North- Class A door from 1-CB-L3-K.

- West - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HY0607 - HV0607 I/P converter.
- HY0606 - HV0606 I/P converter.
- FIS0610 - Residual heat removal "A" miniflow interlock
- FY0618 - FV0618 I/P converter.
- FY0619 - FV0619 I/P converter.
- FT0618 - Residual heat removal "A" flow.
- FT0619 - Residual heat removal "B" flow.
- FIS0611 - Residual heat removal "B" miniflow interlock.
- PT0418 - Residual heat removal valve pressure interlock.
- PT0428 - Residual heat removal valve pressure interlock.
- LV0112B - VCT isolation valve.
- LV0112C - VCT isolation valve.
- HV8104 - BAST to charging pump "A" valve.

- TSH12206 - Fan 1-1555-A7-007 interlock.
- TSH12212 - Fan 1-1555-A7-008 interlock.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

Unit 2

- PT-0418 - Residual heat removal valve pressure interlock.
- PT-0428 - Residual heat removal valve pressure interlock.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1213-E6-001 - Train A spent fuel pit heat exchanger.
- 1-1213-P6-002 - Train A spent fuel pit pump.
- 1-1208-T6-001 - Volume control tank.
- 1-1555-A7-017 - Spent fuel pit heat exchanger and pump room cooler.
- ARV0014 - Plant vent radioactive waste gas valve.
- PV0115 - Volume control tank to waste gas valve.
- HV7805 - Gas decay tank header bypass valve.
- FV0110A - Boric acid injection to blender valve.
- FV0111A - Makeup water to boric acid blender valve.
- LV0112A - Letdown to volume control tank.
- Train A safety-related cables.
- Train B safety-related cables.
- Boron recycle holdup tank.
- Waste gas compressors.
- Waste gas decay tanks.
- 1-1206-V4-002 - Encapsulation vessel.

J. Nonsafety-Related Equipment

- CVCS chillers.
- Electric steam boiler (abandoned).
- Electric steam boiler condensate receiver tank (abandoned).

- Chemical drain tank and pump.
- Spent fuel pit skimmer pump.
- Clean and radioactive sumps and pumps.
- Resin charging tank.
- Waste monitor tank and pumps.
- Spent resin sluice pump and storage tank.
- CVCS chiller surge tank.
- Waste evaporator pumps.
- Floor drain tank and pump.
- CVCS chiller pumps.
- Recycle evaporator feed pumps.
- Fuel pool area recirculation fan.
- Radioactive and nonradioactive filters.
- Recycle evaporator package. (Abandoned in place)
- Refueling water purification pump.
- Waste evaporator package. (Abandoned in place)
- Absorption tower.
- Crud tank pumps.
- Chemical mixing tank.
- Waste evaporator concentrates holdup tank and pump (Abandoned in place).
- Waste evaporator condensate tank and pump.
- SGB spent resin storage tank and sluice pump.
- Liquid nitrogen receiving tank.
- Boron meter tank.
- Waste evaporator feed pump.

- Catalytic hydrogen recombiners.
- Recycle evaporator feed pump.
- Waste gas decay tank drain pump.
- Gas traps.
- Demineralizers.
- Waste holdup tank.
- Steam generator blowdown to condenser valves.
- Crud tank pump inlet valves.
- Crud tank pump outlet valves.
- Crud tank pump recirculation valve.
- Waste process control panels.
- Heat tracing cabinets.
- Light panels.
- Lighting distribution transformer.
- Fire protection isolation header.
- Nonsafety-related cables.
- Nontrain MCC.
- Nontrain SWGR.

K. Combustibles Loading

1. Zone No. 12

   - Fixed combustible material
     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods
   - Heat release
     - Fixed combustibles ≤ 1,029,200,000 Btu

- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

2. Zone No. 24

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 763,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

3. Zone No. 25

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles $\leq$ 131,786,640 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 1,841,148 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 1381 min

4. Zone No. 27

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 127,680,000 Btu

- Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

5. Zone No. 28

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 73,720,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

6. Zone No. 38

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 809,680,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

7. Zone No. 40

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

-	Fixed combustibles	≤ 352,120,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

8. Zone No. 41

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	≤ 10,760,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

8a. Zone No. 42A

- Fixed combustible material

  - Cable insulation

- Heat release

-	Fixed combustibles	≤ 85,680,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

9. Zone No. 46

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles ≤ 933,760,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

10. Zone No. 47

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
  - Oil/grease

- Heat release

  - Fixed combustibles ≤ 496,880,000 Btu
  - Transient combustibles 4,400,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

10a. Zone No. 81A

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles ≤ 5,840,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

11. Zone No. 139

- Fixed combustible material

  - Cable insulation
  - Rubber goods
  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 251,720,000	Btu
- Transient combustibles	4,400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

12. Zone No. 142

- Fixed combustible material

  - Charcoal

- Heat release

- Fixed combustibles	≤ 504,140,000	Btu
- Transient combustibles	304,900,000	Btu

- Combustible loading ≤ 240,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 180 min

12a. Zone No. 192

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 1,087,600,000	Btu
- Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

13. Zone No. 191

- Fixed combustible material

  None.

- Heat release

- Fixed combustibles	$\leq$ 3,880,000	Btu
- Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B with the operational considerations of paragraph L.2.

1b. Deleted.

1c. For a fire in this area, shutdown Unit 2 using safe shutdown train A.

2. Special operational and design considerations (Unit 1 only):

a. Remote operation of RHR suction valves, HV-8702A and HV-8702B, from the remote shutdown panel may be required due to fire damage to PT-0418 and PT-0428 pressure interlock circuits in this fire area.

b. Remote starting of the train B RHR pump room cooler, 1-1555-A7-008, from the remote shutdown panel may be required due to a fire in this fire area.

c. Fire damage to both boric acid transfer pump discharge valves or their associated cables may require use of the refueling water storage tank and RCS letdown to achieve RCS boration.

d. Fire damage to the train B RHR miniflow valve interlock switch, FIS-0611, or its circuits may require verification of the position of FV-0611 during RHR system operation.

e. Deleted.

3a. Spurious actuation considerations (Unit 1):

a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

b. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this area.

c. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

d. Train B RHR heat exchanger outlet valve, HV-0607, may close due to a fire in this fire area.

e. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

f. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

g. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

h. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

i. Train B RHR heat exchanger bypass valve, FV-0619, may open due to a fire in this fire area.

j. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 12
- Zone 24
- Zone 25
- Zone 27
- Zone 28
- Zone 38
- Zone 40
- Zone 46
- Zone 47
- Zone 81A
- Zone 139
- Zone 142

N. Fire Suppression

1. Automatic

   - Zone 12 preaction sprinkler system - partial zone coverage.
   - Zone 24 - no zone coverage.
   - Zone 25 preaction sprinkler system - total zone coverage.
   - Zone 27 - no zone coverage.
   - Zone 28 - no zone coverage.
   - Zone 38 preaction sprinkler system – partial zone coverage.
   - Zone 41 - no zone coverage.
   - Zone 42A - no zone coverage.
   - Zone 46 preaction sprinkler system – partial zone coverage.
   - Zone 47 - no zone coverage.
   - Zone 81A - no zone coverage.
   - Zone 139 - no zone coverage.
   - Zone 142 - no zone coverage.
   - Zone 192 - no zone coverage.

2. Manual

   Zone 40 manual sprinkler system - partial zone coverage.

   Hose stations with portable extinguishers are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids and solids in process equipment and piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be

used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zones 24, 25, 38, 40, and 46.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

   a. See Section 9A.1.1.S.1.

   b. See Section 9A.1.4.S.

   c. See Section 9A.1.23.S.4.

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a.(5).

3. Unlabeled oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

4. Unrated containment building fire area boundary:

   See Section 9A.1.111.S.1.

5. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

6. Deleted.

7. Embedded Conduit:

   Conduits 1DE411RX001, 1DE421RX001, and 1DE413RX001 are embedded in the walls of fire zone 40 of this fire area. Conduit 1DE403RX002 is embedded in a wall of fire zone 139 of this fire area. These conduits contain circuits which could change the results of the safe shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth equivalent to a 3-h fire barrier, only 4 in. of concrete cover over these conduits can be verified.

   Modification of the facility to relocate the circuits in these embedded conduits, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduits (equivalent to 100 min per figure 7-

8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible loading fire severity for the location.

9A.1.3 FIRE AREA 1-AB-LD-C

A. Location: Auxiliary building, central area level D (el 128 ft - 1 in)

B. Drawing: AX4DJ8007

C. Description: Includes fire zone 190

Train B RHR pump room ESF cooler room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-AB-LD-B
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h rated barrier separates area from 1-AB-LD-B.

E. Area Access

- North - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1555-A7-008 - Residual heat removal pump "B" room cooler.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 190

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	$\leq$ 3,560,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational considerations:

   None

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 190

N. Fire Suppression

1. Automatic

   - Zone 190 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe egress/ingress of personnel.

S. Deviations and Justifications

None.

9A.1.4 FIRE AREA 1-AB-LD-D

A. Location: Auxiliary Building, Central Area, Level D

B. Drawing: AX4DJ8007

C. Description: Includes fire zones 8, 10

Train A RHR pump room and train A pipe chase

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-I.
- South - 3-h-rated barrier separates area from 1-AB-LD-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LC-C, 1-AB-LD-A.

E. Area Access

- West - Unrated watertight door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8716A - Residual heat removal discharge header cross connection valve.
- HV8812A - RWST to RHR pump "A" valve.
- TE12206 - Fan 1-1555-A7-007 interlock.
- 1-1205-P6-001 - Residual heat removal pump "A".
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone 8

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 35,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 10

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles ≤ 30,640,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. RHR to CVCS charging pumps valve, HV-8804A, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 8
- Zone 10

N. Fire Suppression

1. Automatic

   - Zone 8 preaction sprinkler system - Total zone coverage.
   - Zone 10 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and pipes.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

Watertight door D34 separates fire zone 10 in fire area 1-AB-LD-D from fire zone 12 in fire area 1-AB-LD-B. Fire zone 10 is the train A RHR pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 12 is the level D central part of the auxiliary building, which includes corridors and various tank and equipment rooms. Fire zone 12 does not contain train B safe shutdown components (including electrical cables) of concern.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LD-D and 1-AB-LD-B is acceptable because (also see Appendix 9B, Section C.5.a.(5)):

a. The capability to achieve safe shutdown using Train B is not jeopardized for a fire in either location.

b. Fire zones 10 and 12 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 10 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

d. Fire zone 12 is provided with an independent automatic fire suppression system for the Train A cable trays in the access corridor to zone 10, including coverage in the immediate vicinity of the watertight door.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by existing design.

9A.1.5 FIRE AREA 1-AB-LD-E

A. Location: Auxiliary Building, Central Area, Level D (el 128 ft - 1 in.)

B. Drawing: AX4DJ8007

C. Description: Includes fire zone 189.

Train A RHR pump room ESF cooler room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-D.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B.

E. Area Access

- South - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1555-A7-007 - Residual heat removal pump "A" room cooler.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment

K. Combustibles Loading

1. Zone No. 189

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	$\leq$ 3,600,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational design considerations:

   None

3. Spurious actuation considerations:

   None

M. Fire Detection

Early warning fire detectors are installed with the following zone:

- Zone 189

N. Fire Suppression

1. Automatic

   - Zone 189 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category I dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.6 FIRE AREA 1-AB-LD-F

A. Location: Auxiliary Building Central Area, Levels D, C, B, A, 1, 2

B. Drawings: AX4DJ8008, AX4DJ8010, AX4DJ8012, AX4DJ8015, AX4DJ8017, and AX4DJ8019

C. Description: Includes fire zones 184

HVAC shaft

D. Description of Boundaries

1. Level D (el 135 ft - 2 in.)

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-AB-LD-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from stairwell No. 3.

2. Level C

- North - 3-h-rated barrier separates area from 1-AB-LD-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from stairwell No. 3.

3. Level B

- North - 3-h-rated barrier separates area from 1-AB-LD-A.
- East - 3-h-rated barrier separates area from 1-AB-LB-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from stairwell No. 3.

4. Level A

- North - 3-h-rated barrier separates area from 1-AB-LD-A.
- East - 3-h-rated barrier separates area from 1-AB-LA-B.

- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from stairwell No. 3.

5. Level 1

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LA-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from stairwell No. 3.

6. Level 2

- North - 3-h-rated barrier separates area from 1-AB-L1-B.
- East - 3-h-rated barrier separates area from 1-AB-LA-B.
- South - 3-h-rated barrier separates area from 1-AB-L2-A.
- West - 3-h-rated barrier separates area from stairwell No. 3
- Ceiling - Unrated exterior area boundary.

E. Area Access

The HVAC shaft contains no combustibles and is not an operating area; consequently, no access is required.

F. Sealed Penetrations

None.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

None.

J. Nonsafety-Related Equipment

None.

K. Combustible Loading

1. Zone No. 184

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	$\leq$ 1,440,000	Btu
-	Transient combustibles	0	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations.

   None.

3. Spurious actuation considerations.

   None.

M. Fire Detection

Zone 184 - None

N. Fire Suppression

1. Automatic

   - Zone 184 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

There are no combustibles in this area, consequently smoke removal need not be considered.

Q. Drainage

None.

R. Emergency Lighting

Because this area is not accessible, no ingress/egress lighting is required.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.7 FIRE AREA 1-AB-LD-G

A. Location: Auxiliary Building, Wing Area, Levels D, C, B, A, 1, 2.

B. Drawings: AX4DJ8008, AX4DJ8011, AX4DJ8013,AX4DJ8016,AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 3, 5, 14A, 14B, 14C, 14D, 21, 22, 26A, 30, 32, 36, 48, 49, 54

1. Level D

   Train B Containment spray pump room and boric acid transfer pump room, boric acid storage tank room, sumps, component cooling water drain tank room.

2. Level C

   Train A pipe penetration room, pull-out area, SGB heat exchanger room, motor control center room, boric acid batching tank room, vestibule, CVCS normal charging pump room.

3. Level B

   SGB heat exchanger room, train A auxiliary component cooling water pump room, train A safety injection pump room.

4. Level A

   Train A CCW pumps room.

5. Level 1

   Train A ACCW heat exchanger room, moderating heat exchanger room.

6. Level 2

   Train A CCW heat exchanger room.

D. Description of Boundaries

1. Level D

   - Floor - Unrated concrete basemat.
   - North - 3-h-rated barrier separates area room 1-AB-LD-I.
   - East - Unrated below-grade area boundary.
     - 3-h rated barrier separates area room 1-AB-LD-I.
   - South - Unrated below-grade area boundary.

- West - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LD-B.
- Interior - 3-h-rated barriers separate area from 1-AB-LD-J.
  - 2-h-rated wall separates area from stairwell No. 5.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LC-D, 1-AB-LC-E.

2. Level C

- Floor - 3-h-rated barrier separates area from 1-AB-LD-H, 1-AB-LD-I.
- North - Unrated containment wall separates area from 1-CTB.
- East - Unrated below-grade exterior area boundary.
  - 2-h-rated barriers separate area from elevator No. 3.
- South - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area 1-AB-LD-B, 1-AB-LD-F, 1-AB-LD-A, 1-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LB-B, 1-AB-LB-A, 1-AB-LD-A
- Interior - 3-h-rated barriers separate area from 1-AB-LC-D, 1-AB-LC-E.
  - 2-h-rated barriers separates area from stairwell No. 5.
  - 3-h-rated barrier separates zone 14D from zone 14C.
  - 3-h-rated barrier separates zone 14C from zone 3.

3. Level B

- Floor - 3-h-rated barrier separates area from 1-AB-LC-D, 1-AB-LC-E.
- North - 3-h-rated barrier separates area from 1-AB-LB-B, 1-AB-LB-A.
- East - Unrated below-grade exterior area boundary.
  - 2-h-rated barriers separate area from stairwell No. 5 and elevator No. 3.
- South - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area room 1-AB-LB-A.

- West - 3-h-rated barrier separates area from 1-AB-LB-A, 1-AB-LB-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LA-D, 1-AB-LA-E, 1-AB-LA-B with unrated equipment hatch.

4. Level A

- Floor - 3-h-rated barrier separates area from 1-AB-LB-A.
- North - 3-h-rated barrier separates area from 1-AB-LA-E, 1-AB-LA-C.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LA-B.
  - 2-h-rated barrier separates area from stairwell No. 5.
- West - 3-h-rated barrier separates area from 1-AB-LA-B.

5. Level 1

- Floor - 3-h-rated barrier separates area from 1-AB-LA-C, 1-AB-LD-I, 1-AB-LA-B.
- North - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-LA-E, 1-AB-LD-I
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LA-B.
  - 2-h-rated barrier separates area from stairwell No. 5.
- West - 3-h-rated barrier separates area from 1-AB-L1-B, 1-AB-LD-A (HVAC and electrical chase), 1-AB-LD-B, 1-AB-L1-C, 1-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-E.

6. Level 2

- North - 3-h-rated barrier separates area from 1-AB-L2-E, 1-AB-LA-E.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LA-B.
  - 2-h-rated barrier separates area from stairwell No. 5.

- West - 3-h-rated barrier separates area from 1-AB-L1-B, 1-AB-LD-A, 1-AB-L2-C.

- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level D

- North - Class A door from 1-AB-LD-I.

  - Unrated watertight door from 1-AB-LD-I.

- West - Certified class A door from 1-AB-LD-B.

- Interior - Two class B doors from stairwell No. 5.

  - Unrated watertight door from 1-AB-LD-J.

2. Level C

- East - Two class B doors from stairwell No. 5.

- West - Class A door from 1-AB-LD-I.

  - Certified class A door from 1-AB-LD-B.

- Interior - Class A door from 1-AB-LC-D, 1-AB-LC-E.

  - Class A door separates zone 14D from zone 14C.

3. Level B

- North - Certified class A door from 1-AB-LB-B.

- East - Two class B doors from stairwell No. 5.

- West - Three class A doors from 1-AB-LB-A, 1-AB-LB-B.

- Ceiling - Unrated equipment hatch.

4. Level A

- South - Class B door from stairwell No. 5.

- West - Class A door from 1-AB-LA-B.

- North - Unrated watertight door from 1-AB-LA-E.

5. Level 1

    - South - Class B door from stairwell No. 5.
    - West - Class A door from 1-AB-LD-B, 1-AB-L1-C, 1-AB-LD-I.

6. Level 2

    - North - Class A door from 1-AB-L2-E.
    - South - Class B door from stairwell No. 5.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- LV0112D - RWST to charging pump valve.
- LV0112E - RWST to charging pump valve.
- LT0102 - BAST level.
- LT0104 - BAST level.
- PT0408 - Residual heat removal valve pressure interlock.
- PT0438 - Residual heat removal valve pressure interlock.
- PT0544 - S/G 4 pressure.
- PT0545 - S/G 4 pressure.
- PT0546 - S/G 4 pressure.
- FT0121 - Charging line flow.
- FV0121 - Centrifugal charging pump flow control valve.
- FY0121A - FV0121 I/P converter.
- PT3030 - Atmospheric dump valve pressure transmitter.
- LSLL1852 - Component cooling water pump 001 interlock

- LSLL1854 - Component cooling water pump 003 interlock.
- LSLL1856 - Component cooling water pump 005 interlock.
- PT1956 - Auxiliary component cooling water pump interlock.
- TISH12202 - Fan 1-1555-A7-003 interlock.
- TSH12209 - Fan 1-1555-A7-013 interlock.
- TISH12208 - Fan 1-1555-A7-011 interlock.
- HY0190B - HV0190B I/power converter.
- HY0190A - HV0190A I/power converter.
- 1-1203-E4-001 - Component cooling water heat exchanger "A".
- 1-1203-P4-001 - Component cooling water pump 001.
- 1-1203-P4-003 - Component cooling water pump 003.
- 1-1203-P4-005 - Component cooling water pump 005.
- 1-1203-T4-001 - Component cooling water surge tank.
- 1-1208-P6-007 - Boric acid transfer pump.
- 1-1208-T4-003 - Boric acid storage tank.
- 1-1217-P4-001 - Auxiliary component cooling water pump.
- 1-1555-A7-011 - Component cooling water pump "A" room cooler.
- 1-1805-S3-ABD - Class 1E 480-V MCC 1ABD.
- 1-1217-E4-001 - Auxiliary component cooling water heat exchanger.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1206-P6-002 - Train B containment spray pump.
- 1-1555-A7-010 - Train B containment spray pump ESF room cooler.
- 1-1208-P4-001 - CVCS normal charging pump.

- 1-1205-V4-001 - Train A RHR encapsulation vessel.
- 1-1206-V4-002 - Train A containment spray encapsulation vessel.
- 1-1555-A7-015 - SI pump room cooler.
- 1-1208-E6-006 - Letdown chiller heat exchanger.
- 1-1208-E6-005 - Moderating heat exchanger.
- 1-1206-V4-001 - Encapsulation vessel.
- HV9017B - Containment spray pump P6002 to RWST inlet.
- HV8109 - Normal charging pump minimum flow isolation.
- HV9002A - Containment spray pump suction.
- HV9003A - Containment spray pump suction.
- HV8811A - Containment sump isolation.
- HV8923A - Train A safety injection pump suction.
- HV8924 - Charging pump header to/from SI pump A.
- HV8814 - Train A safety injection miniflow isolation.
- HV8807A - Safety injection pump suction header.
- HV7022 - Moderating heat exchanger outlet.
- HV7002A - Letdown chiller heat exchanger isolation.
- HV7041 - Letdown chiller heat exchanger bypass.
- LV1848 - Component cooling water surge tank makeup.
- LV1850 - Component cooling water surge tank makeup.
- HV8821A - Safety injection pump to RCS cold leg isolation.
- HV7054 - Boron thermal regenerative system valve.
- HV7040 - Letdown chiller heat exchanger return.
- HV7002B - Letdown chiller heat exchanger isolation.
- Train A safety-related cables.

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1215-T4-001 - CCW drain tank (not required for CCW operation).
- 1-1215-P4-001 - CCW drain tank pump (not required for CCW operation).
- 1-1407-E6001-E6008 - SGB heat exchangers.
- Sumps and sump pumps.
- 1-1817-U3-001A - Heat tracing panel.
- 1-1817-U3-003A - Heat tracing panel.
- 1-1805-S3-B21 - 480-V switchgear 1NB21.
- A-1208-T6-004 - Boric acid batching tank.
- 1-1407-P5-SBP - SGB process panel.
- 1-1407-P4-004 - SG drain pump.
- 1-1407-P5-SG1 - SGB instrument rack.
- 1-1217-T4-002 - Chemical addition feeder tank.
- 1-1407-E6-009 - S.G. blowdown trim heat exchanger.
- PV1151 - S.G. blowdown heat exchanger outlet header.
- FV1150 - S.G. blowdown heat exchanger outlet header.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 3

   - Fixed combustible material

     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods

   - Heat release

- Fixed combustibles	≤ 151,400,000	Btu
- Transient combustibles	800,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 5

   - Fixed combustible material
     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods
     - Oil/grease
   - Heat release

- Fixed combustibles	≤ 26,000,000	Btu
- Transient combustibles	800,000	Btu

   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 14A

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 109,200,000	Btu
- Transient combustibles	800,000	Btu

   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

4. Zone No. 14B

   - Fixed combustible material
     - Cable insulation
     - Cellulosic materials
     - Rubber goods
     - Plastics

- Heat release

  - Fixed combustibles ≤ 132,320,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

5. Zone No. 14C

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles ≤ 53,280,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

6. Zone No. 14D

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 25,040,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

7. Zone No. 21

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Oil/grease

- Heat release

  - Fixed combustibles ≤ 18,700,000 Btu
  - Transient combustibles 4,940,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

8. Zone No. 22

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles ≤ 59,440,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

9. Zone No. 26A

- Fixed combustible material

  - Cable insulation

- Heat Release

  - Fixed combustibles ≤ 91,000,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

10. Zone No. 30

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

- Fixed combustibles ≤ 18,760,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

11. Zone No. 32

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Oil/grease
  - Rubber goods

- Heat Release

  - Fixed combustibles ≤ 12,260,000 Btu
  - Transient combustibles 860,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

12. Zone No. 36

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

  - Fixed combustibles ≤ 246,400,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

13. Zone No. 48

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

  - Fixed combustibles $\leq$ 26,080,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

14. Zone No. 49

- Fixed combustible material

  - Cable insulation

- Heat Release

  - Fixed combustibles $\leq$ 99,480,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

15. Zone No. 54

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat Release

  - Fixed combustibles $\leq$ 96,800,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area:

   a. Use safe shutdown train A if the fire is in fire zone 14C.

   b. Use safe shutdown train B if the fire is not in fire zone 14C.

2. Special operational and design considerations:

Fire damage to cables for both boric acid transfer pumps may require use of the refueling water storage tank and RCS letdown to achieve RCS boration if the fire is not in fire zone 14C.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this area (fire not in fire zone 14C).

   b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this area (fire not in fire zone 14C).

   c. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area (fire not in fire zone 14C).

   d. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area (fire in fire zone 14C).

   e. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area (fire not in fire zone 14C).

   f. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area (fire in fire zone 14C).

   g. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area (fire not in fire zone 14C).

   h. Safety injection actuation may occur due to a fire damage to steam line pressure circuits in this fire area (fire not in fire zone 14C).

   i. RHR to CVCS charging pumps valve, HV-8804A, may open due to a fire in this fire area.

   j. RHR to safety injection pumps valve, HV-8804B may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 3
- Zone 5
- Zone 14D
- Zone 14A
- Zone 14B
- Zone 14C

- Zone 21
- Zone 22
- Zone 26A
- Zone 30
- Zone 32
- Zone 36
- Zone 48
- Zone 49
- Zone 54

N. Fire Suppression

1. Automatic

   - Zone 3 preaction sprinkler system - Partial zone coverage.
   - Zone 5 preaction sprinkler system - Total zone coverage.
   - Zone 14D preaction sprinkler system - Total zone coverage.
   - Zone 14A - No zone coverage.
   - Zone 14B - No zone coverage.
   - Zone 14C preaction sprinkler system - Total zone coverage.
   - Zone 21 preaction sprinkler system - Total zone coverage.
   - Zone 22 - No zone coverage.
   - Zone 26A preaction sprinkler system – Partial zone coverage.
   - Zone 30 preaction sprinkler system - Total zone coverage.
   - Zone 32 preaction sprinkler system – Partial zone coverage.
   - Zone 36 preaction sprinkler system - Total zone coverage.
   - Zone 48 preaction sprinkler system – Partial zone coverage.
   - Zone 49 preaction sprinkler system – Partial zone coverage.

- Zone 54 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for a post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zones 14A, 14C, 54.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V MCC 1ABD.

S. Deviations and Justifications

1. Unrated watertight doors:

   a. See section 9A.1.9.S.1

   b. See section 9A.1.10.S.

   c. Watertight door A05 separates fire zone 36 in fire area 1-AB-LD-G from fire zone 39A in fire area 1-AB-LA-E. Fire zone 36 is the train A component cooling water pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 39A is the level A vestibule for access to chase UC-A12 and restraint room A20 and contains no equipment. Fire zone 39A does not contain train B safe shutdown components, including electrical cables.

      The existence of an unrated watertight door in the rated fire area

boundary separating fire areas 1-AB-LD-G and 1-AB-LA-E is acceptable because (also see Appendix 9B, section C.5.a.(5)):

1. The capability to achieve safe shutdown using train B is not jeopardized for a fire in either location.

2. The combustible loading in zones 36 and 39A is negligible in the area of the door.

3. Fire zones 36 and 39A are both provided with fire detection systems which would provide early warning of a fire at either location.

4. Fire zone 36 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated hatch:

   See section 9A.1.23.S.

3. Separation by distance without full area suppression:

   Fire zone 14C contains train B safe shutdown cables for the train B safe shutdown centrifugal charging pump and associated valves. Fire zones 14D and 22 contain the cables for the redundant train A counterparts. Fire zone 14C is bounded by 3-h-rated barriers (walls, floors, and ceilings) except for the wall adjoining fire zone 14A. Fire zone 14A does not contain safe shutdown equipment or cables nor does it contain any significant fire hazards. While fire area 1-AB-LD-G is not provided with a full area automatic suppression system, fire zone 14C, which contains the train B safe shutdown cables, is provided with a fire detection and automatic preaction suppression system. Upgrading the wall between fire zones 14A and 14C to a 3-h-rated barrier or providing a full area automatic suppression system would not significantly increase the existing level of protection provided.

4. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a.(1).

5. Unlabeled door:

   See Appendix 9B, section C.5.a.(5).

6. Oversized P-90 prevention seal:

   Within fire area 1-AB-LD-6 (fire zone 48) seal number 1-08-132-1 exists. See Appendix 9B, section C.5.a.(3).

9A.1.8 FIRE AREA 1-AB-LD-H

A. Location: Auxiliary Building, Wing Area, Level D

B. Drawing: AX4DJ8008

C. Description: Includes fire zone 2 train A Switchgear room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated barrier separates area from containment building 1-CTB.
- East - Unrated below-grade area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LD-I.
- West - 3-h-rated barrier separates area from 1-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-G and stairwell No. 6.

E. Area Access

- South - Class A door from 1-AB-LD-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- TISH12200 - Fan 1-1555-A7-001 interlock.
- 1-1805-S3-B15 - Class 1E 480-V switchgear 1AB15.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 2

- Fixed combustible material

  - Cable insulation

- Heat Release

- Fixed combustibles	$\leq$ 32,800,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	$\leq$ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 2

N. Fire Suppression

1. Automatic

   - Zone 2 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials.

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h rated battery fixture(s) provide safe ingress/egress of personnel.

8-h rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 1AB15.

S. Deviations and Justifications

1. Unrated containment building fire area barrier:

   See section 9A.1.111.S.1.

2. Oversized P-90 penetration seal:

   Within fire area 1-AB-LD-H (fire zone 2), seal number 1-08-134-0 exists. See Appendix 9B, Section C.5.a.(3).

9A.1.9 FIRE AREA 1-AB-LD-I

A. Location: Auxiliary Building Wing Area, Levels D, C, B, A, 1, 2

B. Drawings: AX4DJ8008, AX4DJ8011, AX4DJ8013, AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 1, 4, 23

Train A piping penetrations room, train A containment spray pump room, spray additive tank room, train A electrical chase.

D. Description of Boundaries

1. Level D

- Floor - Unrated concrete basemat.
- North - Unrated barrier separates area from containment building.
  - 3-h-rated barrier separates area from 1-AB-LD-H.
- East - Unrated below-grade area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LD-D.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-G.

2. Level C

- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LD-A.

3. Level B

- North - 3-h-rated barrier separates area from 1-AB-LB-B.
- East - 3-h-rated barrier separates area from 1-AB-LB-B.
- South - 3-h-rated barrier separates area from 1-AB-LB-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-A.

4. Level A

- North - 3-h-rated barrier separates area from 1-AB-LA-C.
- East - 3-h-rated barrier separates area from 1-AB-LA-C.
- South - 3-h-rated barrier separates area from 1-AB-LA-C.
- West - 3-h-rated barrier separates area from 1-AB-LD-A.

5. Level 1

- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LD-A (HVAC chase).

6. Level 2

- North - 3-h-rated barrier separates area from 1-AB-L2-E.
- East - 3-h-rated barrier separates area from 1-AB-L2-E.
- South - 3-h-rated barrier separates area from 1-AB-L2-E.
- West - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L2-C.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level D

- North - Class A door from 1-AB-LD-H
- South - Unrated watertight door from 1-AB-LD-G.
  - Class A door from 1-AB-LD-G.

2. Level C

- South - Class A door from 1-AB-LD-G.

3. Level B

- South - Class A door from 1-AB-LB-B.

4. Level A

   - South - Class A door from 1-AB-LA-C.

5. Level 1

   - North - Class A door from 1-AB-LD-G.

6. Level 2

   - North - Class A door from 1-AB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1555-A7-001 - Train "A" MCC room cooler.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1206-P6-001 - Train A containment spray pump.
- 1-1206-T6-001 - Spray additive tank (abandoned in place).
- 1-1555-A7-009 - Train A containment spray pump ESF room cooler.
- HV8994A - Spray additive tank outlet (abandoned in place).
- HV8994B - Spray additive tank outlet (abandoned in place).
- HV9017A - Train A containment spray pump to RWST.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 1

   - Fixed combustible material

     - Cable insulation
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles ≤ 199,000,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 120,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 4

   - Fixed combustible material

     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods
     - Oil/grease

   - Heat release

     - Fixed combustibles ≤ 15,800,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 23

   - Fixed combustible material

     - Cable insulation

   - Heat release

     - Fixed combustibles (≤ 155,800,000Btu)
     - Transient combustibles 800,000 Btu

   - Combustible loading (≤ 1,080,000 Btu/ft^2)

- Fire severity (wood equivalent) ≤ 810 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

   c. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   d. CVCS volume control tank outlet valve, LV-0112B, may close due to fire in this fire area.

   e. RHR to CVCS charging pumps valve, HV-8804A, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 1
- Zone 4
- Zone 23

N. Fire Suppression

1. Automatic

   - Zone 1 Preaction sprinkler system - Total zone coverage.
   - Zone 4 Preaction sprinkler system - Total zone coverage.
   - Zone 23 Preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water

stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight door:

Watertight door D47 separates fire zone 4 in fire area 1-AB-LD-I from fire zone 3 in fire area 1-AB-LD-G. Fire zone 4 is the train A containment spray pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 3 is in the level D wing area of the auxiliary building which includes the train B containment spray pump room, the train B boric acid transfer pump room, and various tank rooms.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LD-I and 1-AB-LD-G is acceptable because (also see Appendix 9B, section C.5.a.(5)):

a. Within fire area 1-AB-LD-I, approximately 32 horizontal ft of separation distance exists between watertight door D47 and any significant safe shutdown components (including electrical cables). An alternate means of RCS boration is available (RWST and RCS letdown); therefore, protection of the boric acid transfer pumps is not a significant concern when defining the separation distance.

b. Fire zones 3 and 4 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 4 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

d. Fire zone 3 is provided with an independent automatic fire suppression system for the train B related cable trays, including coverage in the immediate vicinity of the watertight door.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated containment building fire area boundary:

See Section 9A.1.111.S.1.

3. Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

4. Oversized P-90 penetration seal:

Within fire area 1-AB-LD-I (fire zone 23), seal number 1-08-409-B exists. See Appendix 9B, Section C.5.a.(3).

9A.1.10 FIRE AREA 1-AB-LD-J

A. Location: Auxiliary Building, Wing Area, Level D

B. Drawing: AX4DJ8008

C. Description: Includes fire zone 6

Train A boric acid transfer pump room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LD-G.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-A.

E. Area Access

- West - Unrated watertight door from 1-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1208-P6-006 - Boric acid transfer pump
- PI-10115 - Boric acid transfer pump "A" suction pressure.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 6

- Fixed combustible material
  - None.
- Heat release

-	Fixed combustibles	$\leq$ 2,400,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 6

N. Fire Suppression

1. Automatic

   - Zone 6 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to read the local boric acid storage tank pressure indicator PI-10115.

S. Deviations and Justifications

Unrated watertight door:

Watertight door D49 separates fire area 1-AB-LD-J (fire zone 6) from fire zone 3 in fire area 1-AB-LD-G. Fire area 1-AB-LD-J is the train A boric acid transfer pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 3 is the level D wing area of the auxiliary building which includes the train B boric acid transfer pump room, the train B containment spray pump room and various tank rooms.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LD-J and 1-AB-LD-G is acceptable because (also see Appendix 9B, Section C.5.a.(5)).

a. Within fire zone 3, approximately 35 horizontal ft of separation distance exists between watertight door D49 and any significant safe shutdown components (including electrical cables). An alternate means of RCS boration is available (RWST and RCS letdown); therefore, protection of the boric acid transfer pumps is not a significant concern.

b. Fire zones 3 and 6 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 3 is provided with an independent automatic fire suppression system for the Train B related cable trays and Train B containment spray pump room.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

9A.1.11 DELETED

9A.1.12 FIRE AREA 1-AB-LC-A

A. Location: Auxiliary Building, Central Area, Levels C, el 153 ft - 2 in., B

B. Drawings: AX4DJ8010, AX4DJ8012

C. Description: Includes fire zone 16

Train B RHR heat exchanger room

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 1-AB-LD-A.
- North - 3-h-rated barrier separates area from 1-AB-LC-C.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

2. Level C (el 153 ft - 2 in.)

- North - 3-h-rated barrier separates area from 1-AB-LC-C.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

3. Level B

- North - 3-h-rated barrier separates area from 1-AB-LC-C.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B.

E. Area Access

Level C (el 153 ft - 2 in.)

- West - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- HV0607 - Residual heat removal "B" heat exchanger outlet valve.
- FV0611 - Residual heat removal "B" miniflow valve.
- FV0619 - Residual heat removal "B" heat exchanger bypass valve.
- HV8804B - Residual heat removal train "B" to SIS valve.
- 1-1205-E6-002 - Residual heat removal heat exchanger "B".
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 16

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 9,120,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   RHR to safety injection pumps valve HV-8804B may open due to a fire in this fire area.

M. Fire Detection

The early warning fire detectors are installed within the following zone:

- Zone 16

N. Fire Suppression

1. Automatic

   - Zone 16 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.13 FIRE AREA 1-AB-LC-B

A. Location: Auxiliary Building, Central Area, Levels C, B, A, 1, 2.

B. Drawings: AX4DJ8010, AX4DJ8012, AX4DJ8015, AX4DJ8017, AX4DJ8019

C. Description: Includes fire zone 17

Train A electrical chase

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-CB-LC-A.

  Unrated below-grade exterior area boundary
  (below el 160 ft - 0 in.)
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B.

2. Level B

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

3. Level A

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from -AB-LD-B.

4. Level 1

   - North - 3-h-rated barrier separates area from 1-AB-LD-B.
   - East - 3-h-rated barrier separates area from 1-AB-LD-B.
   - South - 3-h-rated barrier separates area from 1-AB-LD-B.
   - West - 3-h-rated barrier separates area from 1-AB-LD-B.
   - Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A.

5. Level 2

   - North - 3-h-rated barrier separates area from 1-AB-L2-A.
   - East - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L2-C.
   - South - 3-h-rated barrier separates area from 1-AB-L2-A.
   - West - 3-h-rated barrier separates area from 1-AB-L2-A.
   - Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level C

   - South - Certified Class A door from 1-AB-LD-B.
   - North - Certified Class A door from 1-CB-LC-A (el 160 ft - 0 in.)

2. Level B

   - South - Class A door from 1-AB-LD-B.

3. Level A

   - South - Class A door from 1-AB-LD-B.

4. Level 1

   - South - Class A door from 1-AB-LD-B.

5. Level 2

   - West - Class A door from 1-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown cables.

J. Nonsafety-Related Equipment

- 480-V FLEX power receptacle 1NB3009R.
- 480-V FLEX junction box 1NBJB0009.
  - Phase A Transformer - 1NB3009XA.
  - Phase B Transformer - 1NB3009XB.
  - Phase C Transformer - 1NB3009XC.

K. Combustible Loading

1. Zone No. 17

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 552,117,667	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 1,241,577	Btu/ft^2
• Fire severity (wood equivalent)	≤ 931	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations.

   a. Train B RHR heat exchanger bypass valve, FV-0619, may open due to a fire in this area.

b. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

c. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

d. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

e. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

f. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

g. Train B RHR heat exchanger outlet valve, HV-0607, may close due to a fire in this fire area.

h. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 17

N. Fire Suppression

1. Automatic

- Zone 17 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and equipment associated with its operation are located in fire zone 17.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1)

9A.1.14 FIRE AREA 1-AB-LC-C

A. Location: Auxiliary Building, Central Area, Levels C, el 153 ft - 2 in., B

B. Drawings: AX4DJ8010, AX4DJ8012

C. Description: Includes fire zone 18.

Train A RHR heat exchanger room

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 1-AB-LD-D.
- North - 3-h-rated barrier separates area from 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LC-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

2. Level C (el 153 ft - 2 in.)

- North - 3-h-rated barrier separates area from 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LC-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

3. Level B

- North - 3-h-rated barrier separates area from fuel building 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-A.
- South - 3-h-rated barrier separates area from 1-AB-LC-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B.

E. Area Access

1. Level C (el 153 ft - 2 in.)

   - West - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0606 - Residual heat removal "A" heat exchanger outlet valve.
- FV0610 - Residual heat removal "A" miniflow valve.
- FV0618 - Residual heat removal "A" heat exchanger bypass valve.
- HV8804A - Residual heat removal train "A" to CVCS valve.
- 1-1205-E6-001 - Residual heat removal heat exchanger "A".
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown components.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 18

   - Fixed combustible material

     - Cellulosic materials
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles $\leq$ 9,840,000 Btu

- Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   Deleted.

3. Spurious actuation considerations:

   RHR to CVCS charging pumps valve HV-8804A may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 18

N. Fire Suppression

1. Automatic

- Zone 18 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V MCC 1ABB.

S. Deviations and Justifications

1. Embedded conduit:

Conduits 1DE403RX002 and 1DE413RX001 are embedded in the walls of fire zone 18 of this fire area. These conduits contain circuits which could change the results of the safe shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth equivalent to a 3-h fire barrier, only 4.2 in. of concrete cover over these conduits can be verified.

Modification of the facility to relocate the circuits in these embedded conduits, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduits (equivalent to 105 min per figure 7-8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible loading fire severity for the location.

9A.1.15 FIRE AREA 1-AB-LC-D

A. Location: Auxiliary Building, Wing Area, Level C

B. Drawing: AX4DJ8011

C. Description: Includes fire zone 20.

Train A CVCS charging pump room, valve gallery.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LD-J.
- North - 3-h-rated barrier separates area from 1-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LC-E.
- West - 3-h-rated barrier separates area from 1-AB-LD-G.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LB-A, 1-AB-LD-G.

E. Area Access

- West - Class A door from 1-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8111A - Train "A" miniflow valve.
- HV8471A - Charging pump "A" suction valve.
- HV8485A - Centrifugal charging pump A discharge valve.
- HV8508A - Train "A" miniflow valve.
- HV8509B - Train "B" miniflow valve.
- TE12209 - Fan 1-1555-A7-013 interlock.
- 1-1208-P6-002 - Charging pump "A".

- 1-1555-A7-013 - Charging pump "A" room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 20

   - Fixed combustible material
     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods
     - Oil/grease
   - Heat release

- Fixed combustibles	≤ 15,700,000	Btu
- Transient combustibles	7,980,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   b. RHR to CVCS charging pumps valve HV-8804A may open due to a fire in this fire area.

c. RHR to safety injection pumps valve HV-8804B may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 20

N. Fire Suppression

1. Automatic

- Zone 20 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate HV-8111A.

S. Deviations and Justifications

None.

9A.1.16 FIRE AREA 1-AB-LC-E

A. Location: Auxiliary Building, Wing Area, Level C

B. Drawing: AX4DJ8011

C. Description: Includes fire zone 19

Train B CVCS charging pump room, valve gallery.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G.
- North - 3-h-rated barrier separates area from 1-AB-LC-D.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LD-G.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LB-A, 1-AB-LD-G.

E. Area Access

- West - Class A door from 1-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0190B - Train "B" boration path valve.
- HV8111B - Train "B" miniflow valve.
- HV8438 - Charging pump to normal charging pump valve.
- HV8471B - Charging pump "B" suction valve.
- HV8485B - Train "B" boration path valve.
- HV8508B - Train "A" miniflow valve.
- HV8509A - Train "B" miniflow valve.

- TISH12215 - Fan 1-1555-A7-014 interlock.
- 1-1208-P6-003 - Charging pump "B".
- 1-1555-A7-014 - Charging pump "B" room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 19

- Fixed combustible material
  - Cellulosic materials
  - Plastics
  - Rubber goods
  - Oil/grease
- Heat release

- Fixed combustibles	≤ 15,700,000	Btu
- Transient combustibles	7,980,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   a. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this fire area.

b. RHR to CVCS charging pumps valve HV-8804A may open due to a fire in this fire area.

c. RHR to safety injection pumps valve HV-8804B may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 19

N. Fire Suppression

1. Automatic

   - Zone 19 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.17 DELETED

9A.1.18 DELETED

9A.1.19 FIRE AREA 1-AB-LB-A

A. Location: Auxiliary Building, Wing Area, Level B

B. Drawing: AX4DJ8013

C. Description: Includes fire zones 31, 33, 34, 35

Train B MCC room, train B SI pump room, ACCW pump room, seal water heat exchanger room, reactor makeup water pump room, valve galleries, piping enclosure room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LC-E, 1-AB-LC-D, 1-AB-LD-G.
- North - 3-h-rated barrier separates area from 1-AB-LB-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
  - Unrated below grade area boundary.
- West - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-F, 1-AB-LD-A.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-B.

E. Area Access

- North - Class A door from 1-AB-LB-B.
- East - Three class A doors from 1-AB-LB-G.
- West - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT1957 - Auxiliary component cooling water pump interlock.
- HV8110 - Seal water heat exchanger valve.

- TISH12203 - Fan 1-1555-A7-004 interlock.
- 1-1217-P4-002 - Spare (train B) auxiliary component cooling water pump.
- 1-1555-A7-004 - Train "B" MCC room cooler.
- 1-1805-S3-BBD - Class 1E 480-V MCC 1BBD.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1208-E6-004 - Seal water heat exchanger.
- 1-1204-P6-004 - Train B safety injection pump.
- 1-1555-A7-016 - Train B SI pump ESF room cooler.
- HV8806 - Train B safety injection pump suction isolation.
- HV8923B - Train B safety injection pump inlet.
- HV8821B - Train B safety injection pump to RCS cold leg isolation.
- HV8920 - Train B safety injection pump miniflow.
- HV8807B - Train B safety injection pump suction header.
- HV8813 - Train B safety injection pump miniflow isolation.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1228-P4-001 - Reactor makeup pump.
- 1-1228-P4-002 - Reactor makeup pump.
- 1-1311-P5-SGC - SGB local conductivity panel.
- HV7760B - Reactor makeup water gravity flow bypass.
- HV7760A - Reactor makeup water gravity flow bypass.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 31

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
  - Oil/grease

- Heat Release

- Fixed combustibles	≤ 12,260,000	Btu
- Transient combustibles	860,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

2. Zone No. 33

- Fixed combustible material
  - Cable insulation
  - Oil/grease

- Heat Release

- Fixed combustibles	≤ 18,760,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

3. Zone No. 34

- Fixed combustible material
  - Cable insulation

- Heat Release

- Fixed combustibles	≤ 57,240,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

4. Zone No. 35

- Fixed combustible material
  - Cable insulation
- Heat Release
  - Fixed combustibles ≤ 20,080,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Opening of the alternate train A charging pump miniflow path isolation valves, HV-8508A andHV-8509B, may be required due to fire damage to charging pump common miniflow valve HV-8110 in this fire area.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

   c. RHR to CVCS charging pumps valve, HV-8804A, may open due to a fire in this fire area.

   d. RHR to safety injection pumps valve, HV-8804B, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 31
- Zone 33
- Zone 34

- Zone 35

N. Fire Suppression

1. Automatic

   - Zone 31 - preaction sprinkler system - Partial zone coverage.
   - Zone 33 - preaction sprinkler system - Total zone coverage.
   - Zone 34 - preaction sprinkler system - Partial zone coverage.
   - Zone 35 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate HV-8110 and breakers in 480-V MCC 1BBD.

S. Deviations and Justifications

1. Oversized P-90 penetration seals:

   Within fire area 1-AB-LB-A (fire zone 35), seal number 1-08-329-B and number 1-08-330-B exist. Within fire zone 31, seal number 1-08-371-B exists. See Appendix 9B, Section C.5.a.(3).

9A.1.20 FIRE AREA 1-AB-LB-B

A. Location: Auxiliary Building, Wing Area, Levels B, A

B. Drawings: AX4DJ8013 and AX4DJ8016

C. Description: Includes fire zones 26B, 39B, 171

Train A pipe penetration room, boron injection pump room, boron injection tank room, pipe chase room, sample cooler room.

D. Description of Boundaries

1. Level B

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G, stairwell No. 6.
- North - Unrated barrier separates area from containment building 1-CTB.
- East - Unrated exterior boundary.
- South - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-A.
- West - 3-h-rated wall separates area from 1-AB-LD-A, 1-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LA-D, 1-AB-LA-C, 1-AB-LA-E, 1-AB-LD-I.

2. Level B (el 180 ft - 6 in.)

- Floor - 3-h-rated barrier separates area from 1-AB-LB-A, 1-AB-LB-G.
- East - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-A.
- South - 3-h-rated barrier separates area from 1-AB-LB-A.
- West - 3-h-rated barrier separates area from 1-AB-LB-A, 1-FB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LA-E, 1-AB-LD-G.

3. Level A (Fire zones 26B, 39B)

- North - Unrated barrier separates area from containment building 1-CTB.

- East - 3-h-rated barrier separates area from 1-AB-LA-E.
- South - 3-h-rated barrier separates area from 1-AB-LA-C, 1-AB-LA-E.
- West - 3-h-rated barrier separates area from 1-AB-LA-A, 1-FB-LC-A.
- Interior - 3-h-rated barrier separates zone 39B from zone 26B.

4. Level A (Fire zone 171)

- North - 3-h-rated barrier separates area from 1-AB-LA-E.
- East - 3-h-rated barrier separates area from 1-AB-LA-E.
- South - 3-h-rated barrier separates area from 1-AB-LA-E.
- West - 3-h-rated barrier separates area from 1-AB-LA-C.

5. Level A (el 211 ft - 5 in., fire zone 39B)

- North - Unrated barrier separates area from containment building 1-CTB.
- East - 3-h-rated barrier separates area from 1-AB-LA-E.
- South - 3-h-rated barrier separates area from 1-AB-LD-A.
- West - 3-h-rated barrier separates area from 1-AB-LA-A, 1-FB-LC-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level B

- North - Class A door from tendon gallery.
- South - Three class A doors from 1-AB-LD-G.
  - Certified class A door from 1-AB-LD-G.
  - Class A door from 1-AB-LB-A.
- West - Class A door from 1-AB-LD-I.

2. Level A (Fire zones 26B, 39B)

   - South - Class A door from 1-AB-LA-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT0935 - Containment pressure.
- PT0937 - Containment pressure.
- HV8801A - BIT discharge valve.
- HV8801B - BIT discharge valve.
- HV10465 - Residual heat removal "A" vent valve.
- HV8803A - BIT inlet valve.
- HV8803B - BIT inlet valve.
- 1-1204-V6-001 - Boron injection tank (BIT).
- 1-1555-A7-003 - Train A MCC room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1204-T6-001 - Boron injection surge tank.
- 1-1513-P5-HMA - Containment hydrogen monitor.
- HV-1806 - NSCW containment isolation valve.
- HV-1808 - NSCW containment isolation valve.
- HV-1822 - NSCW containment isolation valve.
- HV-1830 - NSCW containment isolation valve.

- HV-2134 - NSCW containment isolation valve.
- HV-2138 - NSCW containment isolation valve.
- HV-5278 - Steam generator 1 wet layup containment isolation.
- HV-5279 - Steam generator 2 wet layup containment isolation.
- HV-5280 - Steam generator 3 wet layup containment isolation.
- HV-5281 - Steam generator 4 wet layup containment isolation.
- HV-7603A - Steam generator 1 blowdown containment isolation
- HV-7603B - Steam generator 2 blowdown containment isolation.
- HV-7603C - Steam generator 3 blowdown containment isolation.
- HV-7603D - Steam generator 4 blowdown containment isolation.
- HV-8840 - RHR hot leg injection crossover isolation.
- HV-9001A - Containment spray pump to spray header.
- HV-9378 - Instrument air containment isolation.
- HV-9385 - Service air containment isolation.
- 1-1204-V6-001-H01 - Boron injection tank heater.
- 1-1204-V6-001-H02 - Boron injection tank heater.
- 1-1204-Q6-001 - Boron injection tank agitator.
- 1-1407-P5-SGS - SGB isolation rack.
- HV-9451 - Steam generator 1 blowdown sample isolation.
- HV-9452 - Steam generator 2 blowdown sample isolation.
- HV-9453 - Steam generator 3 blowdown sample isolation.
- HV-9454 - Steam generator 4 blowdown sample isolation.
- HV-12976 - Containment radiation monitor isolation.
- HV-12977 - Containment radiation monitor isolation.
- HV-27901 - Fire protection header containment isolation.

- HV-2791B - Hydrogen monitor isolation.
- HV-2793B - Hydrogen monitor isolation.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1203-P5-NCA - Nuclear service cooling water containment cooler rack.
- 1-1817-U3-007B - Containment hydrogen monitor heat tracing panel(standby).
- 1-1817-T7-007B - Containment hydrogen monitor heat tracing transformer (standby).
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 26B

- Fixed combustible material
  - Cable insulation
  - Compressed gas
  - Rubber goods
- Heat Release

- Fixed combustibles	≤ 113,680,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

2. Zone No. 39B

- Fixed combustible material
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat Release

- Fixed combustibles	≤ 12,640,000	Btu
- Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 171

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat Release
  - Fixed combustibles ≤ 59,920,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   Due to fire damage to boron injection tank outlet valves, HV-8801A and HV-8801B, and their associated cables, it may be necessary to add makeup to the reactor coolant system using the train B charging pump through the train A safe shutdown charging path (HV-0190B/HV-8485B, HV-0190A and HV-8116) in this fire area.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

   c. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

   d. RHR to CVCS charging pumps, HV-8804A, may open due to a fire in this fire area.

   e. RHR to safety injection pumps, HV-8804B, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 26B
- Zone 39B
- Zone 171

N. Fire Suppression

1. Automatic

   - Zone 26B preaction sprinkler system - Partial zone coverage.
   - Zone 39B - No zone coverage.
   - Zone 171 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundaries:

   See section 9A.1.111.S.1.

2. Unlabeled door:

   See Appendix 9B, section C.5.a.(5).

3. Oversized P-90 penetration seal:

   Within fire area 1-AB-LB-B (fire zone 171) seal number 1-08-357-B exists. See Appendix 9B, Section C.5.a.(3).

4. Blind Flange Penetration Seals

   Penetrations 1-08-763-B, 1-08-764-B, 1-08-765-B, 1-08-766-B & 1-08-767-B all have a blind flanged penetration seal. These penetrations are constructed of noncombustible material and are similar to existing piping runs embedded in/routed through fire-rated barriers. These flanged embedded pipe sleeves are an integral part of the fire barrier in that they are designed to prevent the propagation of fire, smoke, and hot gases from one side of the fire barrier to the other. It is unlikely that the initiation of a fire in one of the penetration rooms will propagate smoke and hot gas through a 6-in. or 8-in. penetration sleeve provided with blind flanges or elevate the temperature on the cold side to the point where ignition can take place in a room with very low combustible loading. The defense in depth at the site, including the fire brigade team rapid response to any fire, and the fire detection and suppression systems does not make this a credible fire scenario.

9A.1.21 DELETED

9A.1.22 FIRE AREA 1-AB-LA-A

A. Location: Auxiliary Building, Central Area, Level A

B. Drawing: AX4DJ8015

C. Description: Includes fire zone 11A.

Train A electrical chase.

D. Description of boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-A.
- North - 3-h-rated barrier separates area from 1-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-AB-LA-C, 1-AB-LD-I, 1-AB-LB-B.
- South - 3-h-rated barrier separates area from 1-AB-LD-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-A.

E. Area Access

- North - Class A door from 1-FB-LC-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 11A

- Fixed combustible material
  - Cable insulation
- Heat Release

-	Fixed combustibles	≤ 32,800,000	Btu
-	Transient combustibles	800,000	Btu
•	Combustible loading	≤ 160,000	Btu/ft^2
•	Fire severity (wood equivalent)	≤ 120	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   c. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   d. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 11A

N. Fire Suppression

1. Automatic

- Zone 11A preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.23 FIRE AREA 1-AB-LA-B

A. Location: Auxiliary Building, Wing Area, Levels A, 1, 2

B. Drawings: AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 37, 52, 55

1. Level A

   Train B CCW pump room

2. Level 1

   Train B ACCW heat exchanger room.

3. Level 2

   Train B CCW heat exchanger room.

D. Description of Boundaries

1. Level A

   - Floor - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-A.
   - North - 3-h-rated barrier separates area from 1-AB-LA-C, 1-AB-LD-G.
     - 2-h-rated barrier separates area from stairwell No. 5.
   - East - Unrated below grade exterior area boundary.
   - South - Unrated below grade exterior area boundary.
     - 2-h-rated barrier separates area from elevator No. 3.
     - 3-h-rated barrier separates area from 1-NSP-LA-B.
   - West - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-F, 1-AB-LD-A.

2. Level 1

   - North - 3-h-rated barrier separates area from 1-AB-LD-G.
     - 2-h-rated barrier separates area from stairwell No. 5.
   - East - Unrated exterior area boundary.

- South - 2-h-rated barrier separates area from elevator No. 3.
  - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-RTB-L1-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-F.

3. Level 2

- North - 3-h-rated barrier separates area from 1-AB-LD-G.
  - 2-h-rated barrier separates area from stairwell No. 5.
- East - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-RTB-L1-A.
  - 2-h-rated barrier separates area from elevator No. 3.
- West - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-LD-F, 1-AB-L1-B.
- Ceiling - Unrated exterior area boundary.
  - 2-h-rated barrier separates area from elevator machine room.

E. Area Access

1. Level A

- North - Class B door from stairwell No. 5.
  - Class A door from 1-AB-LA-C.
- West - Certified class A door from 1-AB-LD-B.

2. Level 1

- North - Class B door from stairwell No. 5.
- South - Class A door from outside.
- West - Class A door from 1-AB-LD-B.
  - Certified class A door from 1-AB-LD-B.

3. Level 2

   - North - Class B door from stairwell No. 5.
   - West - Class A door from 1-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- LSLL1853 - Component cooling water pump 002 interlock.
- LSLL1855 - Component cooling water pump 004 interlock.
- LSLL1857 - Component cooling water pump 006 interlock.
- LSLL1956 - Auxiliary component cooling water pump interlock.
- LSLL1957 - Auxiliary component cooling water pump interlock.
- TISH12214 - Fan 1-1555-A7-012 interlock.
- 1-1203-E4-002 - Component cooling water heat exchanger "B".
- 1-1203-P4-002 - Component cooling water pump 002.
- 1-1203-P4-004 - Component cooling water pump 004.
- 1-1217-E4-002 - ACCW heat exchanger.
- 1-1217-T4-001 - Auxiliary component cooling water surge tank.
- 1-1203-P4-006 - Component cooling water pump 006.
- 1-1203-T4-002 - Component cooling water surge tank.
- 1-1555-A7-012 - Component cooling water pump "B" room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- LV1954 - ACCW surge tank makeup.
- LV1955 - ACCW surge tank makeup.
- LV1849 - CCW surge tank makeup.
- LV1851 - CCW surge tank makeup.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV27930 - Auxiliary building fire protection header isolation.
- 1-1203-T4-004 - Train B chemical addition feeder tank
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 37

- Fixed combustible material
  - Cable insulation
  - Oil/grease
- Heat Release
  - Fixed combustibles ≤ 232,720,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 52

- Fixed combustible material
  - Cable insulation
- Heat Release
  - Fixed combustibles ≤ 232,800,000 Btu

- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

3. Zone No. 55

- Fixed combustible material
  - Cable insulation
- Heat Release
  - Fixed combustibles $\leq$ 114,520,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Local level indicator LI-0990C is available should fire damage to the redundant refueling water storage tank level indication cables result in loss of indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 37
- Zone 52
- Zone 55

N. Fire Suppression

1. Automatic

   - Zone 37 preaction sprinkler system - Total zone coverage.

- Zone 52 preaction sprinkler system - Partial zone coverage.
- Zone 55 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unlabeled doors:

   See Appendix 9B Section C.5.a.(5).

2. Unrated hatch:

   This hatch cover is located at level A of the auxiliary building wing area and separates the train B component cooling water pump room (fire zone 37) from the level B (fire zone 26A) corridor area just east of the auxiliary cooling water and safety injection pump rooms. The level B corridor contains train A safe shutdown raceway.

   The hatch opening is used to facilitate equipment maintenance by allowing transporting of large components to and from the plant shop areas. Permanent closure of the opening cannot be tolerated from a maintenance standpoint and replacement or modification of the opening so as to obtain a rated closure is not warranted based on the low level of combustibles and the distance separating redundant safe shutdown trains.

The hatch opening is 7 ft x 12 ft and while the 1/4-in. thick A36 steel checkered plate hatch cover is not rated or designed as a fire barrier, it does represent a physical barrier and an impediment to fire propagation from one level of the auxiliary building to the other. The rest of the floor area separating the train B equipment area at level A from level B is rated as a 3-h fire barrier.

Train A safe shutdown components (includes electrical raceway) are located at least 30 horizontal ft from the underside (level B) of the hatch opening. Train B safe shutdown components (includes electrical raceway) are located at least 5 horizontal ft from the hatch opening (16 ft at level A, 12 ft at level 1 and 5 ft at level 2). The aggregate separation distance between redundant safe shutdown trains is at least 35 horizontal ft.

There are no combustible materials directly below or above the hatch as these areas are maintained free of obstruction to facilitate equipment moving. There are no intervening combustibles between the hatch opening and the train B safe shutdown components located above the unrated hatch. The only combustible which represents an intervening combustible of significance below the hatch opening is a single cable tray which is at least 15 horizontal ft from the underside of the hatch opening at level B.

A fire detection system is provided in the areas on both sides of this unrated hatch. In addition, an automatic preaction sprinkler system is provided in the fire zones immediately above and below this unrated hatch.

<u>Unrated hatch cover, Auxiliary Building Level A, Wing Area</u>

Size, ft	7 x 12
Fire area separation	1-AB-LD-G and 1-AB-LA-B
Fire zone separation	26A and 37

3. Unrated exterior fire area boundary

   See Appendix 9B, Section C.5.a.(1).

4. Unrated watertight door:

   Watertight door 105 separates fire zone 46 in fire area 1-AB-LD-B from fire zone 52 in fire area 1-AB-LA-B. Fire zone 46 is the level 1 central part of the auxiliary building which includes the CVCS chiller pumproom and the nonsafety-related switchgear/control panel room. Fire zone 52 is the wing area of the auxiliary building which contains the train B auxiliary components cooling water heat exchanger room.

   The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LD-B and 1-AB-LA-B is acceptable at this location because (also see Appendix 9B, section C.5.a(5)):

   a. Both fire zones 46 and 52 have only train B safe shutdown components. The capability to achieve safe shutdown using train A is not jeopardized for a fire in either location.

b. There are no cable trays or other combustible materials of significance in fire zone 46 in the immediate vicinity of the watertight door.

c. There are two cable trays approximately 6 horizontal ft from the watertight door and approximately 6 ft above the watertight door in fire zone 52 which do not contain any safe shutdown or other safety-related cables.

d. The closest safe shutdown cables from the watertight door in fire zone 52 are 24 horizontal ft away. It is provided with an independent automatic fire suppression system protecting the safety-related cable trays in the zone.

e. Train B safe shutdown cables in fire zone 46 are in a pull box (for embedded conduit) located approximately 70 horizontal ft from the watertight door and are spurious actuation concerns only. An independent automatic suppression system is provided between the watertight door and the pull box.

f. Fire zones 46 and 52 are both provided with fire detection systems which would provide early warning of a fire at either location.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

9A.1.24 FIRE AREA 1-AB-LA-C

A. Location: Auxiliary Building, Wing Area, Level A

B. Drawing: AX4DJ8016

C. Description: Includes fire zone 39C

Vestibule

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LB-A, 1-AB-LB-B.
- North - 3-h-rated barrier separates area from 1-AB-LB-B.
- East - 3-h-rated barrier separates area from 1-AB-LA-E, 1-AB-LB-B.
- South - 3-h-rated barrier separates area from 1-AB-LA-B, 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-LA-A, 1-AB-LD-I, 1-AB-LD-A.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-G.

E. Area Access

- North - Class A door from 1-AB-LB-B.
- West - Class A door from 1-AB-LD-I, 1-AB-LA-A.
- South - Class A door from 1-AB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown

- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 39C

   - Fixed combustible material

     - Cable insulation
     - Rubber goods

   - Heat Release

     - Fixed combustibles ≤ 82,840,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 120,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 39C

N. Fire Suppression

1. Automatic

   - Zone 39C preaction sprinkler system - Full zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water

stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Oversized P-90 penetration seals:

   Within fire area 1-AB-LA-B (fire zone 37) seal number 1-08-617-A and number 1-08-618-A exist. See Appendix 9B, Section C.5.a.(3).

9A.1.25 FIRE AREA 1-AB-LA-D

A. Location: Auxiliary Building, Wing Area, Level A

B. Drawing: AX4DJ8016

C. Description: Includes fire zone 39D

Train A piping penetration room, heat exchanger room, valve gallery.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G, 1-AB-LB-B.
- North - Unrated barrier separates area from containment building 1-CTB.
- East - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-AFB-C.
- South - 3-h-rated barrier separates area from 1-AB-LD-A.
- West - 3-h-rated barrier separates area from 1-AB-LA-C.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LA-E.
  - Unrated exterior area boundary.

E. Area Access

- South - Unrated watertight door from 1-AB-LA-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0190A - Train A boration path valve.
- PT0514 - S/G 1 pressure.
- PT0515 - S/G 1 pressure.
- PT0516 - S/G 1 pressure.
- PT3000 - Atmospheric dump valve pressure transmitter.

- HV8103A - RCP 1 seal water inlet valve.
- HV8103B - RCP 2 seal water inlet valve.
- HV8105 - Train A charging path valve.
- HV8116 - Train A boration path valve.
- HV8809A - Residual heat removal pump to cold legs valve.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1208-E6-003 - Letdown heat exchanger
- 1-1208-E6-007 - Letdown reheat heat exchanger
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 39D

   - Fixed combustible material
     - Cellulosic materials
     - Rubber goods
     - Oil/grease
     - Plastics
   - Heat Release

- Fixed combustibles	≤ 74,960,000	Btu
- Transient combustibles	400,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 39D

N. Fire Suppression

1. Automatic

   - Zone 39D - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to locally manually operate HV-8105.

S. Deviations and Justifications

1. Unrated watertight door:

   Watertight door A07 separates fire area 1-AB-LA-D (fire zone 39D) from fire zone 39A in fire area 1-AB-LA-E. Fire area 1-AB-LA-D is the train A piping penetration room and is provided with a watertight door for flooding protection of safety related equipment within the room. Fire zone 39A is the auxiliary building feedwater piping penetration area.

   The existence of an unrated watertight door in the rated fire area boundary separating fire areas 1-AB-LA-D and 1-AB-LA-E is acceptable because (also see Appendix 9B, Section C.5.(5)):

   a. The capability to achieve safe shutdown using train B is not jeopardized for a fire in either location.

   b. Fire zones 39D and 39A are both provided with fire detection systems which would provide early warning of a fire at either location.

   c. The combustible loading of both fire zones on either side of the watertight door is negligible.

   Modification of the structure to provide a fire rated door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

3. Unrated containment building fire area boundary:

   See Section 9A.1.111.S.1.

4. Blind Flange Penetration Seals

   Penetrations 1-08-763-A, 1-08-764-A, 1-08-765-A, 1-08-766-A & 1-08-767-A all have a blind flanged penetration seal. These penetrations are constructed of noncombustible material and are similar to existing piping runs embedded in/routed through fire-rated barriers. These flanged embedded pipe sleeves are an integral part of the fire barrier in that they are designed to prevent the propagation of fire, smoke, and hot gases from one side of the fire barrier to the other. It is unlikely that the initiation of a fire in one of the penetration rooms will propagate smoke and hot gas through a 6-in. or 8-in. penetration

sleeve provided with blind flanges or elevate the temperature on the cold side to the point where ignition can take place in a room with very low combustible loading. The defense in depth at the site, including the fire brigade team rapid response to any fire, and the fire detection and suppression systems does not make this a credible fire scenario.

9A.1.26 FIRE AREA 1-AB-LA-E

A. Location: Auxiliary Building, Wing Area, Levels A, 1, 2

B. Drawings: AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 39A, 45

1. Level A

   Feedwater penetration room, vestibule, restraint room.

2. Level 1

   Main steam valve room

D. Description of Boundaries

1. Level A

   - Floor - 3-h-rated barrier with unrated steel hatch cover separates area from 1-AB-LB-B, 1-AB-LD-G.
   - North - Unrated barrier separates area from containment building 1-CTB.
   - East - 3-h-rated barrier separates area from 1-AB-LB-B, 1-AB-LA-C.
   - South - 3-h-rated barrier separates area from 1-AB-LD-G.
   - West - 3-h-rated wall separates area from 1-AB-LD-B, 1-AB-LA-C.

2. Level 1

   - North - Unrated barrier separates area from containment building 1-CTB.
   - South - 3-h-rated barrier separates area from 1-AB-LD-G.
   - East - Unrated exterior area boundary.
   - West - 3-h-rated barrier separates area from 1-AB-LD-G.
     - Unrated exterior area boundary.

3. Level 2

   - North - Unrated barrier separates area from containment building 1-CTB.

- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-L2-E.
  - Unrated exterior area boundary.

E. Area Access

1. Level A

   - East - Unrated watertight door from 1-AB-LA-D.
   - South - Unrated watertight door from 1-AB-LD-G.

2. Level 1

   - East - Class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV13005A - S/G 1 steam isolation bypass valve.
- HY13005A - S/G 1 steam isolation bypass valve solenoid.
- HV13005B - S/G 1 steam isolation bypass valve.
- HY13005B - S/G 1 steam isolation bypass valve solenoid.
- HV13006A - S/G 4 steam isolation bypass valve.
- HY13006A - S/G 4 steam isolation bypass valve solenoid.
- HV13006B - S/G 4 steam isolation bypass valve.
- HY13006B - S/G 4 steam isolation bypass valve solenoid.
- HV15196 - S/G 1 feedwater isolation valve.
- HY15196A - S/G 1 feedwater isolation valve solenoid.
- HY15196B - S/G 1 feedwater isolation valve solenoid.

- HV15199 - S/G 4 feedwater isolation valve.
- HY15199A - S/G 4 feedwater isolation valve solenoid.
- HY15199B - S/G 4 feedwater isolation valve solenoid.
- HV5227 - S/G 1 feedwater isolation valve.
- HY5227A - S/G feedwater isolation valve solenoid.
- HY5227B - S/G feedwater isolation valve solenoid.
- HY5227C - S/G feedwater isolation valve solenoid.
- HY5227D - S/G feedwater isolation valve solenoid.
- HY5227G - S/G feedwater isolation valve solenoid.
- HY5227H - S/G feedwater isolation valve solenoid.
- HY5227J - S/G feedwater isolation valve solenoid.
- HY5227K - S/G feedwater isolation valve solenoid.
- PSV3031 - S/G 4 code safety valve.
- PSV3032 - S/G 4 code safety valve.
- PSV3033 - S/G 4 code safety valve.
- HV5230 - S/G 4 feedwater isolation valve.
- HY5230A - S/G feedwater isolation valve solenoid.
- HY5230B - S/G feedwater isolation valve solenoid.
- HY5230C - S/G feedwater isolation valve solenoid.
- HY5230D - S/G feedwater isolation valve solenoid.
- HY5230G - S/G feedwater isolation valve solenoid.
- HY5230H - S/G feedwater isolation valve solenoid.
- HY5230J - S/G feedwater isolation valve solenoid.
- HY5230K - S/G feedwater isolation valve solenoid.
- PSV3001 - S/G 1 code safety valve.

- PSV3002 - S/G 1 code safety valve.
- PSV3003 - S/G 1 code safety valve.
- PSV3004 - S/G 1 code safety valve.
- PSV3005 - S/G 1 code safety valve.
- PSV3034 - S/G 4 code safety valve.
- PSV3035 - S/G 4 code safety valve.
- PV3000 - S/G 1 atmospheric dump valve.
- PV3030 - S/G 4 atmospheric dump valve.
- HV3036A - S/G 4 main steam isolation valve.
- HV3036B - S/G 4 main steam isolation valve.
- HV3006A - S/G 1 main steam isolation valve.
- HV3006B - S/G 1 main steam isolation valve.
- HV1975 - Auxiliary component cooling water return isolation.
- HV1979 - Auxiliary component cooling water supply isolation.
- HV5137 - Auxiliary feedwater pump A to S/G 4 valve.
- HV5139 - Auxiliary feedwater pump A to S/G 1 valve.
- FTO510 - S/G loop 1 feedwater flow (AMSAC)
- FTO511 - S/G loop 1 feedwater flow (AMSAC)
- FTO540 - S/G loop 4 feedwater flow (AMSAC)
- FTO541 - S/G loop 4 feedwater flow (AMSAC)
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV5120 - Train C AFW pump to steam generator No. 4.
- HV5122 - Train C AFW pump to steam generator No. 1.

- LV5242 - Steam generator No. 4 startup control.
- LV5243 - Steam generator No. 1 startup control.
- HV8880 - Accumulator nitrogen supply isolation.
- HV5194 - Wet layup chemical addition steam generator No. 1.
- HV5197 - Wet layup chemical addition steam generator No. 4.
- FV0540 - Steam generator loop No. 4 feedwater valve.
- FV0510 - Steam generator loop No. 1 feedwater valve.
- HV3009 - Steam generator outlet to auxiliary turbine.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 39A

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Plastics
  - Rubber goods
- Heat Release
  - Fixed combustibles $\leq$ 63,600,000 Btu
  - Transient combustibles 1,320,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 45

- Fixed combustible material
  - Cable insulation
  - Oil/grease

- Rubber goods

- Heat Release

- Fixed combustibles	≤ 108,680,000	Btu
- Transient combustibles	16,400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational considerations:

   a. In all postulated cases for fire, the main steam isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, steam flow from steam generators 1 and 4 may require isolation by other means to preclude uncontrolled cooldown and steam generator boil dry.

   b. In all postulated cases for fire, the main feedwater isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, main feedwater flow to steam generators 1 and 4 may require isolation by other means to preclude uncontrolled cooldown and steam generator overfilling.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 39A

- Zone 45

N. Fire Suppression

1. Automatic

   - Zone 39A - No zone coverage.

- Zone 45 preaction sprinkler system – Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate PV-3000, PV-3030, HV-3009, HV-5137, and HV-5139.

S. Deviations and Justifications

1. Unrated watertight door:

   a. See section 9A.1.25.S.1.

   b. See section 9A.1.7.S.1.c.

2. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a.(1).

3. Unrated containment building fire area boundary:

   See section 9A.1.111.S.1.

4. Embedded conduit:

   Conduit 1AE424RX092 is embedded in a wall of fire zone 39A of this fire area. This conduit contains circuits which could change the results of the safe

shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this area. While it is anticipated that this conduit is embedded to a depth equivalent to a 3-h fire barrier, only 4.3 in. of concrete cover over the conduit can be verified.

Modification of the facility to relocate the circuits in this embedded conduit, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduit (equivalent to 110 min per figure 7-8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible loading fire severity for the location.

9A.1.27 FIRE AREA 1-AB-L1-B

A. Location: Auxiliary Building, Central Area, Levels 1, 2

B. Drawings: AX4DJ8017 and AX4DJ8019

C. Description: Includes fire zones 43, 149.

Train B MCC and SWGR rooms

D. Description of Boundaries

1. Level 1

- Floor - 3-h-rated barrier separates area from 1-AB-LD-A.
- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

2. Level 2

- North - 3-h-rated barrier separates area from 1-AB-L2-C.
- East - 3-h-rated barrier separates area from 1-AB-LA-B, 1-AB-LD-G, 1-AB-LD-A.
- South - 2-h-rated barrier separates area from stairwell No. 3.
  - 3-h-rated barrier separates area from 1-AB-LD-F.
- West - 3-h-rated barrier separates area from 1-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level 1

- East - Class A door from 1-AB-LD-A.
- West - Class A door from 1-AB-LD-B.

2. Level 2

- East - Class A door from 1-AB-LD-A.

- West - Class A door from 1-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TISH12201 - Fan 1-1555-A7-002 interlock.
- TISH12205 - Fan 1-1555-A7-006 interlock.
- 1-1555-A7-006 - Train B MCC room cooler.
- 1-1805-S3-BBB - Class 1E 480-V MCC 1BBB.
- 1-1805-S3-B16 - Class 1E 480-V switchgear 1BB16.
- 1-1807-Y3-IB12 - 120-V-ac vital bus inverter 1BD1I12.
- 1-1807-Q3-V16 - Vital bus distribution panel 1BDY2B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1807-Y3-RX21 - Train B regulating transformer 1BBB40RX.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 43

    - Fixed combustible material
        - Cable insulation
    - Heat Release
        - Fixed combustibles ≤ 11,760,000 Btu
        - Transient combustibles 800,000 Btu
    - Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 149

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 49,440,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation concerns:

   a. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area.

   b. The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

   c. RHR to safety injection pumps valve HV-8804B may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 43
- Zone 149

N. Fire Suppression

1. Automatic

- Zone 43 preaction sprinkler system - Partial zone coverage.

- Zone 149 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 1BB16 and 480-V MCC 1BBB.

S. Deviations and Justifications

1. See oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

2. Unrated exterior fire area boundary

   See Appendix 9B, Section C.5.a.(1).

9A.1.28 FIRE AREA 1-AB-L1-C

A. Location: Auxiliary Building, Central Area, Level 1

B. Drawing: AX4DJ8017

C. Description: Includes fire zone 44.

Train A MCC room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-A, 1-AB-LA-A.
- North - 3-h-rated barrier separates area from 1-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-G.
- South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-A (HVAC chase).
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L2-C.

E. Area Access

- South - Class A door from 1-AB-LD-B.
- East - Class A door from 1-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TISH12204 - Fan 1-1555-A7-005 interlock.
- 1-1555-A7-005 - Train "A" MCC room cooler.
- 1-1805-S3-ABB - Class 1E 480-V MCC 1ABB.
- 1-1807-Y3-IA11 - 120-V-ac vital bus inverter 1AD1I11.
- 1-1807-Q3-V15 - Vital bus distribution panel 1AY2A.

- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1807-Y3-RX22 - Train A regulating transformer 1ABB40RX.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 44

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles $\leq$ 20,800,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious Actuation Considerations

   a. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   b. RHR to CVCS charging pumps valve HV-8804A may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 44

N. Fire Suppression

1. Automatic

- Zone 44 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 120-V-ac panel 1AY2A.

S. Deviations and Justifications

None.

9A.1.29 DELETED

9A.1.30 DELETED

9.A.1.31 FIRE AREA 1-AB-L1-G

A. Location: Auxiliary Building, Central Area, Level 1

B. Drawing: AX4DJ8017

C. Description: Includes fire zone 150

Drum storage area

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-RTB-L1-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A.

E. Area Access

- East - Certified class A door from 1-AB-LD-B.
- South - Certified class A door from 1-RTB-L1-A.
- West - Certified class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

None.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 150

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	$\leq$ 279,520,000	Btu
- Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A r B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

1. Early warning fire detectors are installed within the following zone:

   - Zone 150

N. Fire Suppression

1. Automatic

   - Zone 150 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located within fire zone 150.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unlabeled doors:

See Appendix 9B, Section C.5.a.(5).

9A.1.32 FIRE AREA 1-AB-L1-H

A. Location: Auxiliary Building, Central Area, Level 1

B. Drawing: AX4DJ8017

C. Description: Includes fire zone 50.

Demineralizer access hatch area, hot machine shop, decontamination rooms.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-AB-LD-B, 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.

E. Area Access

- North - Class A door from 2-AB-LD-B.
- East - Class A door from 1-AB-LD-B.
- West - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

None.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 50

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 300,000,000	Btu
- Transient combustibles	7,960,000	Btu

• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 50

N. Fire Suppression

1. Automatic

   - Zone 50 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

System components contaminated with radioactive process materials.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.33 FIRE AREA 1-AB-L2-A

A. Location: Auxiliary Building, Central Area, Level 2 Equipment Building, West, Level 1, Level 2 (Elevation 249 ft - 0 in.)

B. Drawings: AX4DJ8019, AX4DJ8032, and AX4DJ8035

C. Description: Includes fire zones 53, 141A, 172

HVAC equipment room, train A mechanical filtration and exchanger room, purge exhaust unit area, enclosure filter and exhaust unit area.

D. Description of Boundaries

1. Levels 1 and 2 - Equipment Building

- Floor - 3-h-rated barrier separates area from 1-FB-LC-A, 1-CB-LA-I, 1-CB-LA-J, 1-CB-LA-T, 1-AB-LD-B (sample chase), 1-CB-LB-G.
- North - 3-h-rated barrier separates area from 1-CB-L1-TSC.
- East - Unrated barrier separates area from containment building 1-CTB.
  - 3-h-rated barrier separates area from 1-CB-LA-D.
- South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-L1-C.
- West - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L1-C, 1-CB-L1-D, elevator No. 2, stairwell No. 2, 1-AB-LD-B, and 1-FB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B (sample chase).
  - Unrated exterior area boundary.

2. Level 2 - Auxiliary Building

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LD-A, 1-AB-L1-G, 1-AB-LC-B, 1-AB-L1-C.
- North - 3-h-rated barrier separates area from 1-AB-LD-B (including sample chase).
- East - 3-h-rated barrier separates area from 1-AB-L2-E, 1-AB-L2-C, 1-AB-L1-B, 1-AB-LC-B, 1-AB-LD-F, 1-AB-LA-B, 1-AB-LD-I.

- 2-h-rated barrier separates area from stairwell No. 3.

- South - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-RTB-L1-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level 1 - Equipment Building

- North - Class A door from 1-CB-L1-TSC.
- West - Class A door from 1-CB-L1-B, 1-AB-LD-B, 1-FB-LC-A.
- South - Class A door from 1-AB-LD-B.

2. Level 2 - Auxiliary Building

- East - Class A door from 1-AB-L2-E.
  - Class A door from 1-AB-LC-B.
  - Class B door from stairwell No. 3.
  - Class A door from 1-AB-LA-B.
  - Class A door from 1-AB-L1-B.
  - Class A door from 1-AB-L2-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1555-A7-002 - Train B MCC room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1561-N7-001 - Train A piping penetration exhaust filter unit.
- 1-1561-E7-001 - Train A piping penetration cooler heat exchanger (NSCW)
- 1-1561-E7-002 - Train B piping penetration cooler heat exchanger (ESF chilled water).
- HV12614 - Train A piping penetration cooler unit recirculation valve.
- PV2550A - Train A piping penetration cooler unit outlet valve.
- PV2550B - Train A piping penetration cooler unit outlet valve.
- 2-1816-U3-019 - Local control station LR01.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1561-U7-001-H01 - Piping penetration unit heater.
- 1-1561-U7-001-H02 - Piping penetration unit heater.
- 1-1561-U7-001-H03 - Piping penetration unit heater.
- 1-1508-N7-001 - Containment post-LOCA purge filter unit exhaust.
- 1-1609-S5-001 - Radiation monitor plant vent.
- 1-1609-S5-023 - Radiation monitor.
- 1-1609-S5-002 - Radiation monitor containment vent.
- 1-1526-B7-002 - Equipment building ventilation fan.
- 1-1526-U7-007 - Equipment building heater.
- 1-1526-U7-004 - Equipment building unit heater.
- 1-1526-U7-005 - Equipment building unit heater.
- 1-1526-U7-006 - Equipment building unit heater.
- 1-1506-N7-001 - Containment normal purge exhaust unit.
- 1-1506-B7-002 - Mini purge fan.

- 1-1506-B7-001 - Preaccess purge fan.
- 1-1553-N7-001 - Auxiliary building continuous exhaust unit.
- 1-1553-N7-002 - Auxiliary building continuous exhaust unit.
- Normal transformer.
- 1-1551-A7-002 - Auxiliary building normal air conditioning unit.
- Normal containment exhaust units.
- 1-1551-A7-001 - Auxiliary building normal air conditioning unit.
- Chiller surge tanks.
- FV 12691 - Auxiliary building continuous exhaust unit valve.
- FV 12698 - Auxiliary building continuous exhaust unit valve.
- 1-1553-N7-003 - Auxiliary building continuous exhaust unit.
- HV 12693 - Auxiliary building continuous exhaust unit valve.
- HV 12660 - Auxiliary building continuous exhaust unit valve.
- HV 12700 - Auxiliary building continuous exhaust unit valve.
- HV 12662 - Auxiliary building continuous exhaust unit valve.
- HV 12707 - Auxiliary building continuous exhaust unit valve.
- HV 12664 - Auxiliary building continuous exhaust unit valve.
- FV 12705 - Auxiliary building continuous exhaust unit valve.
- Nonsafety-related cables.

K. Combustible Loadings

1. Zone No. 53

   - Fixed combustible material

     - Cable insulation
     - Charcoal
     - Cellulosic materials
     - Plastics
     - Rubber goods

- Heat release

- Fixed combustibles	≤ 756,790,000	Btu
- Transient combustibles	158,450,000	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 141A

- Fixed combustible material

  - Cable insulation
  - Charcoal
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 618,160,000	Btu
- Transient combustibles	87,400,000	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

3. Zone No. 172

- Fixed combustible material

  - Cable insulation
  - Charcoal

- Heat release

- Fixed combustibles	≤ 116,353,000	Btu
- Transient combustibles	79,367,000	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area:

   a. Use safe shutdown train A if the fire is located in the immediate vicinity of fire area 1-AB-L1-B (west of fire area 1-AB-L1-B and south of fire area 1-AB-L2-C) where there is a direct threat of damage to train B cooling unit 1-1555-A7-002.

   b. Use safe shutdown train B if the fire is isolated in fire zone 172 or in the immediate vicinity of fire area 1-AB-LC-B (north of the fire area 1-AB-LC-B and west of fire zone 172) where there is a direct threat of damage to train A electrical cable trays.

   c. Use safe shutdown train A or B if the fire is located in the equipment building portion of this fire area (fire zone 141A).

2. Special operational considerations:

   The plant operators may have to determine the location of the fire within this fire area and shut down the plant accordingly. The only safe shutdown equipment in this fire area is the MCC room cooling unit for fire area 1-AB-L1-B (1-1555-A7-002).

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 53
- Zone 141A
- Zone 172

N. Fire Suppression

1. Automatic

   - Zone 53 preaction sprinkler system - Partial zone coverage.
   - Zone 141A preaction sprinkler system - Partial zone coverage.
   - Zone 172 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective hose stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

3. Charcoal Filters

   Integral water deluge system is provided for charcoal filters.

O. Radioactive Materials

Radioactive solids collected in HVAC filters.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located within fire zone 53.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

   See Section 9A.1.111.S.1.

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

3. Separation by distance without full area suppression:

   Fire area 1-AB-L2-A contains train A safe shutdown cables (fire zones 53 and 172) and the train B MCC room cooler (1-1555-A7-002), and its associated electrical cables (fire zone 53) that serves adjacent fire area 1-AB-L1-B. The train B safe shutdown room cooler is approximately 75 horizontal ft from the train A safe shutdown electrical cables. While full area automatic fire suppression is not provided within fire area 1-AB-L2-A, a partial area coverage automatic preaction fire suppression system within the area protects the intervening separation distance. In addition, each charcoal filtration unit in the

fire area is provided with an integral water deluge system and the partial area automatic preaction suppression system coverage includes the train A safe shutdown cables. Providing a full area automatic fire suppression system would not significantly increase the existing level of protection provided.

4. Oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

9A.1.34 DELETED

9.A.1.35 FIRE AREA 1-AB-L2-C

A. Location: Auxiliary Building, Central Area, Level 2

B. Drawing: AX4DJ8019

C. Description: Includes fire zone 147.

Train B mechanical filtration and exchanger room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-L1-C, 1-AB-LD-B, 1-AB-LD-B (sample chase), 1-AB-LD-A.
- North - 3-h-rated barrier separates area from 1-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-L2-E, 1-AB-LD-G, 1-AB-LD-I.
- South - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L1-B, 1-AB-LD-A.
- West - 3-h-rated barrier separates area from 1-AB-LC-B, 1-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- East - Class A door from 1-AB-L2-E.
- South - Class A door from 1-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Equipment

None.

I. Safety-Related Equipment

- PV-2551B - Train B pipe penetration cooler unit outlet valve.
- HV-12616 - Train B pipe penetration cooler unit outlet valve.

- HV-12604 - Train B pipe penetration cooler unit outlet valve.
- 1-1561-N7-002 - Train B pipe penetration HVAC unit.
- PV-2551A - Train B pipe penetration cooler unit outlet valve.
- HV-12607 - Train B pipe penetration cooler unit outlet valve.
- Train B safety-related cables

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 147

- Fixed combustible material
  - Cable insulation
  - Charcoal
- Heat release
  - Fixed combustibles ≤ 156,313,000 Btu
  - Transient combustibles 79,367,000 Btu
- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 147

N. Fire Suppression

1. Automatic

- Zone 147 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive solids collected in HVAC filters.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area my not be operational because electrical cables associated with its operation are located in fire zone 147.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9.A.1.36 DELETED

9.A.1.37 FIRE AREA 1-AB-L2-E

A. Location: Auxiliary Building, Wing Area, Level 2

B. Drawing: AX4DJ8020

C. Description: Includes fire zone 148

Switchgear room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-G.
- North - 3-h-rated area boundary at column line EH.
- East - 3-h-rated barrier separates area from 1-AB-LA-E.
- South - 3-h-rated barrier separates area from 1-AB-LD-G.
- West - 3-h-rated barrier separates area from 1-AB-L2-A, 1-AB-L2-C, 1-AB-LD-I.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- South - Class A door from 1-AB-LD-G.
- West - Class A door from 1-AB-L2-A, 1-AB-L2-C, 1-AB-LD-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PY3000 - Atmospheric dump valve signal converter.
- PY3030 - Atmospheric dump valve signal converter.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 1-1805-S3-B20 - 480-V switchgear.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 148

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
   - Heat release
     - Fixed combustibles ≤ 63,600,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 148

N. Fire Suppression

1. Automatic

   - Zone 148 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located within fire zone 148.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

2. Oversized P-90 penetration seal:

   Within fire area 1-AB-L2-E (fire zone 148), seal number 1-08-105-2 exists. See Appendix 9B, Section C.5.a.(3).

9A.1.38 DELETED

9A.1.39 FIRE AREA 1-CB-LC-A

A. Location: Control Building, Levels C, B, A, 1, 2 Fuel Handling Building, Level C

B. Drawings: AX4DJ8021, AX4DJ8022, AX4DJ8024, AX4DJ8026, AX4DJ8027, AX4DJ8028, and AX4DJ8030

C. Description: Includes fire zones 42B, 81B, 126A, 151, 153

Partial train A electrical tunnel, train A electrical chase, train A mechanical shaft, train A chiller/filter room, normal electrical shaft.

D. Description of Boundaries

1. Level C - Train A electrical tunnel (Fire zone 42B)

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-FB-LC-A.
- South - 3-h-rated barrier separates area from 1-AB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
  - Unrated below-grade exterior area boundary.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LC-B, 1-CB-LB-M, 1-CB-LB-L, 1-CB-LB-N, 1-CB-LB-D, 1-CB-LB-Q, 1-CB-LB-E, 1-CB-LB-C, 1-CB-LB-J, 1-CB-LB-O, 1-CB-LB-P, 1-AB-LD-B.

2. Level B - Train A electrical shaft (Fire zone 42B)

- North - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - Unrated below-grade exterior area boundary.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-F.

3. Level B - Train A mechanical shaft (Fire Zone 81B)

- Floor - 3-h-rated barrier separates area from 1-CB-LC-B.

- Unrated concrete basemat.

- North - 3-h-rated barrier separates area from 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LC-B.
- South - 3-h-rated barrier separates area from 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-L3-M.

4. Level B - Train A electrical chase (Fire zones 15, 153)

   - North - 3-h-rated barrier separates area from 1-CB-LB-A.
   - East - 3-h-rated barrier separates area from 1-CB-LB-A.
   - South - 3-h-rated barrier separates area from 1-CB-LC-B.
   - West - 3-h-rated barrier separates area from 1-CB-LB-A.
   - Ceiling - 3-h-rated barrier separates area from 1-CB-LA-O, 1-CB-LA-P.

5. Level A - Train A electrical shaft (Fire zone 42B)

   - North - 3-h-rated barrier separates area from turbine building.
   - East - 3-h-rated barrier separates area from turbine building.
   - South - 3-h-rated barrier separates area from 1-CB-LA-F.
   - West - 3-h-rated barrier separates area from turbine building.
   - Ceiling - 3-h-rated barrier separates area from turbine building.

6. Level A - Train A mechanical shaft (Fire zone 81B)

   - North - 3-h-rated barrier separates area from 1-CB-LA-U, 1-CB-LA-M.
   - East - 3-h-rated barrier separates area from 1-CB-LA-U.
   - South - 3-h-rated barrier separates area from 1-CB-LA-U.
   - West - 3-h-rated barrier separates area from 1-CB-L3-M.

7. Level A - HVAC Shaft (Fire zone 153)

   - North - 3-h-rated barrier separates area from 1-CB-LA-N.
   - East - 3-h-rated barrier separates area from 1-CB-LA-O.

- South - 3-h-rated barrier separates area from 1-CB-LA-K.
- West - 3-h-rated barrier separates area from 1-CB-LA-K.

8. Level 1 - Train A mechanical shaft (Fire zone 81B)

- North - 3-h-rated barrier separates area from 1-CB-L1-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-B.
- South - 3-h-rated barrier separates area from 1-CB-L1-B.
- West - 3-h-rated barrier separates area from 1-CB-L3-M.

9. Level 1 - HVAC Shaft (Fire zone 153)

- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-L1-E.
- South - 3-h-rated barrier separates area from 1-CB-L1-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-A.

10. Level 2 - Train A mechanical shaft (Fire zone 81B)

- North - 3-h-rated barrier separates area from 1-CB-L2-E.
- East - 3-h-rated barrier separates area from 1-CB-L2-E.
- South - 3-h-rated barrier separates area from 1-CB-L2-E.
- West - 3-h-rated barrier separates area from 1-CB-L3-M.

11. Level 2 - HVAC Shaft (Fire zone 153)

- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-L1-E.
- South - 3-h-rated barrier separates area from 1-CB-L2-B.
- West - 3-h-rated barrier separates area from 1-CB-L2-A.

12. Level 3 - Train A filter/chiller room (Fire zone 126A)

- Floor - 3-h-rated barrier separates area from 1-CB-L2-B, 1-CB-L2-E.

- North - 3-h-rated barrier separates area from 1-CB-L3-H.
- East - 3-h-rated barrier separates area from 1-CB-L3-A, 1-CB-L3-L.
- South - 3-h-rated barrier separates area from 1-CB-L3-L.
- West - 3-h-rated barrier separates area from 1-CB-L3-M.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.

13. Level 3 - HVAC Shaft (Fire zone 153)

- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-L3-B.
- South - 3-h-rated barrier separates area from 1-CB-L3-H.
- West - 3-h-rated barrier separates area from 1-CB-L3-H.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level C

- South - Certified class A door from 1-AB-LC-B.

2. Level B (Fire zone 42B)

- South - Certified class A door from 1-CB-LB-A.

3. Level B (Fire zone 81B)

- South - Class A door from 1-CB-LC-B.

4. Level B (Fire zones 153 and 151).

- South - Four class A doors from 1-CB-LC-B.

5. Level A (Fire zone 42B)

- South - Certified Class A door from 1-CB-LA-F.

6. Level A (Fire zone 81B)

- South - Class A door from 1-CB-LC-B.

7. Level 1

   - South - Class A door from 1-CB-L1-B.

8. Level 2

   - South - Class A door from 1-CB-L2-E.

9. Level 3

   - North - Class A door from 1-CB-L3-H.
   - South - Class A door from 1-CB-L3-L.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- FT1802 - Nuclear service water cooling water to ESF chiller "A".
- TE12124 - Control room temperature control.
- TV12124 - Control room cooler valve.
- TY12124A - TV12124 signal converter.
- FT22425 - ESF chilled water flow interlock.
- TDC4170 - ESF chiller "A" interlock.
- TV11740 - Nuclear service cooling water from ESF chiller "A".
- TY11740 - Nuclear service cooling water from ESF chiller "A".
- HV12118 - Control room OSA supply damper "A".
- HY12118 - Control room OSA supply damper "A" solenoid.
- 1-1531-N7-001 - Control room cooler unit.
- 1-1592-C7-001 - ESF chiller "A".
- 1-1592-P7-001 - Chilled water pump "A".

- 1-1531-B7-002 - CBCR ESF chiller room exhaust fan.
- TIS12303 - Fan 1-1531-B7-002 interlock.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- RV-17646 - Control building sump discharge.
- 1-1592-T7-003 - Chemical feed pot.
- TV 12134 - CBCR filter unit deluge.
- TV 12193 - CBCR filter unit deluge.
- Nonsafety-related cables.

K. Combustibles Loading

1. Zone No. 42B

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	1,347,968,840 Btu	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	319,235	Btu/ft^2
• Fire severity (wood equivalent)	239	min

2. Zone No. 81B

- Fixed combustible material

  None.

- Heat release

- Fixed combustibles	≤ 4,520,000	Btu

- Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 126A

- Fixed combustible material
  - Cable insulation
  - Charcoal
- Heat release
  - Fixed combustibles 166,797,500 Btu
  - Transient combustibles 129,522,500 Btu
- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

4. Zone No. 151

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 80,312,730 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 506,955 Btu/ft^2
- Fire severity (wood equivalent) 380 min

5. Zone No. 153

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 80,825,884 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 458,572 Btu/ft^2

- Fire severity (wood equivalent) 344 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

   b. CVCS volume control tank outlet valve LV-0112B may close due to a fire in this fire area.

   c. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   e. Pressurizer PORV PV-0455A may open and it may not be possible to close its block valve HV-8000A due to a fire in this fire area.

   f. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   g. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   h. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   i. Safety injection actuation may occur due to fire damage to solid state protection cabinet 1-1605-Q5-SPA 125-V dc power feeder circuits in this fire area.

   j. Train B RHR heat exchanger outlet valve HV-0607 may close due to a fire in this fire area.

   k. Train B RHR heat exchanger bypass valve FV-0619 may open due to a fire in this fire area.

   l. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 42B
- Zone 81B
- Zone 126A
- Zone 151
- Zone 153

N. Fire Suppression

1. Automatic

   - Zone 42B preaction sprinkler system - Partial zone coverage.
   - Zone 81B - No zone coverage.
   - Zone 126A preaction sprinkler system - Partial zone coverage.
   - Zone 151 preaction sprinkler system - Total zone coverage.
   - Zone 153 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a(5).

9A.1.40 FIRE ARA 1-CB-LC-B

A. Location: Control Building, Levels C, B

B. Drawings: AX4DJ8021, AX4DJ8022, and AX4DJ8023

C. Description: Includes fire zones 58, 80, 138

Nontrain switchgear, normal HVAC, lobby, corridor.

D. Description of Boundaries

1. Level C

- Floor - Unrated concrete basemat.
- North - Unrated concrete below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-LC-A.
- South - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.

2. Level B

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B, 2-CB-LC-A, 1-CB-LC-A, 1-CB-LB-L[a], 1-CB-LB-K[a], 1-CB-LB-M[a], 1-CB-LB-N[a], 1-CB-LB-Q[a], 1-CB-LB-C[a], 1-CB-LB-J[a], 1-CB-LB-O[a].
- North - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LC-A, 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LB-K, 1-CB-LB-L, 1-CB-LB-M, 1-CB-LB-N, 1-CB-LB-D, 1-CB-LB-Q, 1-CB-LB-C, 1-CB-LB-J, 1-CB-LB-P, 1-CB-LB-I.

  \- 2-h-rated barrier separates area from stairwell No. 2 and elevator No. 2.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-CB-LB-S, 2-CB-LB-D, 1-AB-LD-B, 2-CB-LC-B, 1-CB-L3-M, 1-CB-LC-A, 2-CB-LB-I.

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a. Mezzanine at elevation 192 ft - 6 in.

- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-M, 1-CB-LA-U, 1-CB-LA-N.

E. Area Access

1. Level B

- North - Class A door from 1-CB-LB-A.

  - Four class A doors from 1-CB-LC-A.

- East - Class A door from 1-CB-LB-M, 1-CB-LB-N, 1-CB-LB-Q, 1-CB-LB-C, 1-CB-LB-J, 1-CB-LB-K, 1-CB-LB-L, 1-CB-LB-P, 1-CB-LB-I

  - Class B door from stairwell No. 2.

- South - Two class A doors from 1-AB-LD-B.

- West - Class A door from 1-CB-LC-A, 1-AB-LD-B, 2-CB-LC-B.

  - Certified class A door from 1-CB-LB-S.

- Interior - Two class A doors from 1-CB-L3-M.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1532-B7-001 - CBSF battery room fan.
- 1-1532-B7-002 - CBSF battery room fan.
- 1-1532-B7-003 - CBSF battery room fan.
- 1-1532-B7-004 - CBSF battery room fan.
- HV12727 - CBSF battery room fan damper.
- HV12742 - CBSF battery room fan damper.
- HV12749 - CBSF battery room fan damper.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12719 - CBSF electrical equipment AC unit damper.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV27902 - Fire protection header isolation.
- 1-1805-S3-BO8 - 480-V switchgear 1NB08.
- 1-1805-S3-B09 - 480-V switchgear 1NB09.
- 1-1805-S3-BL1 - 480-V switchgear 1NBL1.
- 1-1805-S3-B17 - 480-V switchgear 1NB17.
- 1-1805-S3-B10 - 480-V switchgear 1NB10.
- 1-1805-S3-B30 - 480-V FLEX switchboard 1NB30.
- 1-1805-S3-NBR - 480-V MCC 1NBR.
- 1-1225-P4-001 - Control building drain sump pump.
- 1-1225-P4-002 - Control building drain sump pump.
- A-1805-F3-04S1 - Splice box ANB1104S1.
- A-1805-F3-04S - Splice box ANB1104S.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 58

   - Fixed combustible material

     None.

   - Heat release

- Fixed combustibles	≤ 40,640,000	Btu
- Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 80

- Fixed combustible material
  - Cable insulation
  - Plastics
- Heat release
  - Fixed combustibles ≤ 504,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 138

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 56,360,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1a. For a fire in this area, shutdown Unit 1 using safe shutdown train B.

1b. For a fire in this area, shutdown Unit 2 using safe shutdown train A or B.

2a. Special operational and design considerations (Unit 1):

a. Fire damage to the train B CBSF battery room exhaust fans 1-1532-B7-002 and 1-1532-B7-004 and their associated discharge dampers HV-12727 and HV-12749 may require use of portable ventilation (not required for at least 48-h) to preclude hydrogen buildup in the train B battery rooms (B49 and B44).

b. Deleted.

c. The following raceways are covered with a 3-hour-rated fire barrier to protect essential train B safe shutdown cables from a fire in this fire area:

- 1BE311TLAM
- 1BE311RS123
- 1BE311RS124
- 1DE311RS105
- 1BE311RX146
- 1DE311RS112
- 1DE31CRS075
- 1DE311RS222
- 1BE311TSAM
- 1BE331RM161
- 1BE31DRX221
- 1BE311RT316

For a fire in this fire area, PORV block valve 1-HV-8000A may be required to be closed. If the block valve will not close, opening the feeder breaker to PORV 1-PV-0455A to remove all power to the fail close PORV may be required. Opening the feeder breaker allows the PORV to close.

2b. Special operational and design considerations (Unit 2):

None.

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV PV-0455A may open due to a fire in this fire area.

b. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

c. Safety injection actuation may occur due to fire damage to solid state protection cabinet 1-1605-Q5-SPA 125-V dc power feeder circuits in this fire area.

d. Safety injection actuation may occur due to fire damage to solid state protection cabinet 1-1605-Q5-SPB 125-V dc power feeder circuits in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 58
- Zone 80
- Zone 138

N. Fire Suppression

1. Automatic

- Zone 58 - No zone coverage.
- Zone 80 preaction sprinkler system – Partial zone coverage.
- Zone 138 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zones 80 and 138.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operated breakers in 480-V switchgear 1NB08, 1NB09, 1NB10.

S. Deviations and Justifications

Unlabeled door:

See Appendix 9B, Section C.5.a(5).

9A.1.41 DELETED

9A.1.42 FIRE AREA 1-CB-LB-A

A. Location: Control Building, Levels B, A, 1, 2, 3

B. Drawings: AX4DJ8022, AX4DJ8024, AX4DJ8026, AX4DJ8027, AX4DHJ8028, AX4DJ8037, and AX4DJ8040

C. Description: Includes fire zones 59, 69, 72, 73, 143

Train A corridor and electrical mezzanine, HVAC room, rod control equipment room, normal HVAC room, electrical tunnel 1T4A, train C dc room, HVAC duct chase mezzanine (elevation 194 ft - 6 in.).

D. Description of Boundaries

1a. Level B

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A, 1-CB-LB-D (electrical mezzanine).
  - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LC-A.
  - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LB-B, 1-CB-LB-A, 1-CB-LB-D, 1-CB-LB-F, 1-CB-LB-H, 1-CB-LB-K, 1-CB-LC-A, 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 2-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-A, 1-CB-LB-A, 1-CB-LA-N, 1-CB-LA-D, 1-CB-LA-G.
- Interior - 3-h-rated barrier separates zone 72 from zone 73.
  - 2-h-rated barrier separates area from stairwell No. 3.

1b. Level B HVAC duct chase (mezzanine level el 194 ft - 6 in., fire zone 72)

- Floor - 3-h-rated barrier separates area from 1-CB-LB-F.
  - Unrated concrete basemat.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-G, 1-CB-LA-H.
- North - 3-h-rated barrier separates area from 1-CB-LB-F.

- 2-h-rated barrier separates area from stairwell No. 3.

- East - 3-h-rated barrier separates area from 1-CB-LB-F.
- South - 3-h-rated barrier separates area from 1-CB-LB-F.

2. Level B - Electrical tunnel (1T4A)

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LB-D.
  - Unrated below-grade exterior area boundary.
- Ceiling - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.

3. Level A

- North - 3-h-rated barrier separates area from 1-CB-LA-N.
- East - 3-h-rated barrier separates area from 1-CB-LA-N.
- South - 3-h-rated barrier separates area from 1-CB-LA-N.
- West - 3-h-rated barrier separates area from 1-CB-LA-P.

4. Level 1

- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-L1-G.
- South - 3-h-rated barrier separates area from 1-CB-L1-G, 1-CB-L1-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-F.

5. Level 2

- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-L2-E.

- South - 3-h-rated barrier separates area from 1-CB-L2-E.
- West - 3-h-rated barrier separates area from 1-CB-L1-F.

6. Level 3

- North - Unrated barrier separates area from 1-CB-L3-H.
- East - Unrated barrier separates area from 1-CB-L3-H.
- South - Unrated barrier separates area from 1-CB-L3-H.
- West - Unrated barrier separates area from 1-CB-L3-H.
- Ceiling - Unrated exterior area boundary.

E. Area Access

Level B

- North - Certified class A door from 1-CB-LC-A.
- East - Class A door from 1-CB-LB-F.
- South - Two class A doors from 1-CB-LB-B, 1-CB-LB-F.
  - Three class A doors from 1-CB-LB-D.
  - Class A door from 1-CB-LC-B.
  - Class A door from 1-CB-LB-T (el 192 ft - 6 in.)
  - Certified class A door from stairwell No. 3.
- West - Class A door from 2-CB-LB-A.
- Interior - Class A door separates zone 72 from zone 73.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1532-A7-001 - CBSF electrical equipment room HVAC.

- 1-1606-S6-002 - Reactor trip switchgear.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12736 - CBSF electrical equipment room smoke removal damper.
- HV12734 - CBSF electrical equipment room intake damper.
- Train A safety-related cables.
- Train B safety-related cables.
- 1-1806-S3-DCC - 125-V-dc MCC 1CD1M.

J. Nonsafety-Related Equipment

- HV12756A - CB lighting switchgear and normal AC room smoke removal damper.
- HV2737A - CB wing area normal AC unit exhaust damper.
- HV27179 - Fire protection manual actuation valve.
- HV2737B - CB wing area normal AC unit return damper.
- 1-1606-S6-001 - Control rod disconnecting switch box.
- HV2737C - CB wing area normal AC unit inlet damper.
- 1-1606-M6-002 - Train B rod drive M-G set.
- 1-1606-T3-001 - Control power transformer.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 59
   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 43,520,000 Btu

- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 69

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles $\leq$ 141,760,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 120,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 90 min

3. Zone No. 72

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles $\leq$ 37,120,000 Btu
     - Transient combustibles 400,000 Btu
   - Combustible loading $\leq$ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 30 min

4. Zone No. 73

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
   - Heat release
     - Fixed combustibles $\leq$ 947,200,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 240,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 180 min

5. Zone No. 143

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 512,800,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 240,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 180 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   Fire damage to the reactor trip switchgear may necessitate ensuring reactor trip by some other means.

3. Spurious actuation considerations.

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage), and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 59
- Zone 69
- Zone 72
- Zone 73

- Zone 143

N. Fire Suppression

1. Automatic

   - Zone 59 - No zone coverage.
   - Zone 69 - No zone coverage.
   - Zone 72 - Total zone coverage.
   - Zone 73 preaction sprinkler system - Partial zone coverage.
   - Zone 143 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and equipment associated with its operation are located in fire zone 72.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior area boundary:

See Appendix 9B, Section C.5.a.(1).

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a.(5).

3. Separation by distance without full area suppression:

   Fire area 1-CB-LB-A (fire zone 143) and fire area 1-CB-LB-D (fire zone 144) are interconnected by a common 2-ft by 2 1/2-ft wide air shaft for ventilation of tunnels 1T4A and 1T4B. The sharing of this interconnecting air shaft is acceptable because

   a. The total horizontal separation distance between the two fire areas through the air shaft is approximately 39 ft.

   b. No intervening combustibles exist in the air shaft and the air shaft location and size precludes use of the space for storage.

   c. Fire areas 1-CB-LB-A and 1-CB-LB-D (including tunnels 1T4A and 1T4B) are provided with fire detection systems.

   d. Fire areas 1-CB-LB-A and 1-CB-LB-D (including tunnels 1T4A and 1T4B) are provided with automatic preaction fire suppression systems.

   e. Should a fire occur in one of the fire areas, the physical arrangement of the air shaft interconnections makes the passage of smoke and hot gases to atmosphere more likely than the contamination of the adjacent area.

   Modification of the structure to provide separate air shafts for each area would not significantly increase the level of protection provided by the existing design.

4. Separation of fire areas without 3-h fire resistance rating:

   Fire area 1-CB-LB-A (fire zone 73) and fire area 1-CB-L3-H (fire zone 135) are interconnected by a common 32 in. by 48 in. by 4 ft 8 in. HVAC duct to smoke removal fan A-1533-B7-002. The sharing of this interconnecting supply duct between fire areas is acceptable because:

   a. No intervening combustibles exist in the HVAC smoke removal chase and the HVAC supply duct.

   b. Fire areas 1-CB-LB-A and 1-CB-L3-H are provided with fire detection systems.

   c. Fire areas 1-CB-LB-A and 1-CB-L3-H are provided with automatic preaction fire suppression systems.

   d. Should a fire occur in one of the fire areas, the physical arrangement of the air shaft interconnecting with the HVAC duct with a fire damper on

the outlet of the HVAC duct makes the contamination of the adjacent area by the passage of smoke and hot gases unlikely.

e. A fire in either fire area 1-CB-LB-A or 1-CB-L3-H requires the use of safe shutdown train B.

9A.1.43 FIRE AREA 1-CB-LB-B

A. Location: Control Building Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 75 Train A switchgear room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- South - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LB-D.
- West - 3-h-rated barrier separates area from 1-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-S. 1-CB-LA-A.

E. Area Access

- East - Class A doors from 1-CB-LB-A.
- South - Class A door from 1-CB-LB-D.
- West - Class A doors from 1-CB-LB-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1805-S3-B04 - Class 1E 480 V switchgear 1AB04.
- 1-1805-S3-B05 - Class 1E 480 V switchgear 1AB05.
- 1-1805-S3-ABC - Class 1E 480 V MCC 1ABC.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1513-H7-001-H01 - Train A hydrogen recombiner power panel
- 1-1513-P5-ERA - Train A hydrogen recombiner control panel.
- 1-1807-Y3-RX25 - Regulating transformer 1ABC20RX

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 75

- Fixed combustible material
  - Cable insulation
  - Oil
- Heat release

-	Fixed combustibles	≤ 117,520,000	Btu
-	Transient combustibles	800,000	Btu

• Combustible loading	≤ 120,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 90	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0455A, may open, and it may not be possible to close block valve HV-8008A due to a fire in this fire area.

   b. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve, HV-8000A, due to a fire in this fire area.

   c. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0422A may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 75

N. Fire Suppression

1. Automatic

   - Zone 75 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers are conveniently located to each area). Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480 V switchgear 1AB04 and 1AB05.

S. Deviations and Justifications

None.

9A.1.44 FIRE AREA 1-CB-LB-C

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 79A

Train B channel 2 switchgear/battery room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LB-Q.
- East - 3-h-rated barrier separates area from 1-CB-LB-P, 1-CB-LB-O.
- South - 3-h-rated barrier separates area from 1-CB-LB-J, 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.
- East - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1806-B3-CBA - Battery charger 1BD1CA.
- 1-1806-B3-CBB - Battery charger 1BD1CB.
- 1-1806-S3-DCB - 125-V-dc MCC 1BD1M.
- 1-1805-D3-04T FLEX manual transfer switch 1BBA04T
- 1-1806-S3-DSB - 125-V-dc switchgear 1BD1.

- 1-1806-Q3-DB1 - 125-V-dc distribution panel 1BD11.
- 1-1806-Q3-DB2 - 125-V-dc distribution panel 1BD12.
- 1-1807-Q3-V12 - Vital bus distribution panel 1BY1B.
- 1-1807-Y3-IB2 - 120-V-ac vital bus inverter 1BD1I2.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 79A

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 10,800,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0456A, may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to a fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 79A

N. Fire Suppression

1. Automatic

- Zone 79A - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V dc panels 1BD12 and 1BD1M.

S. Deviations and Justifications

None.

9A.1.45 FIRE AREA 1-CB-LB-D

A. Location: Control Building - Level B

B. Drawings: AX4DJ8022, AX4DJ8030, and AX4DJ8040

C. Description: Includes Fire Zones 60, 62, 65, 66, 67, 68, 70, 144

Train B corridor, M.G. set room, penetration area, HVAC room, penetration room, electrical tunnel 1T4B

D. Description of Boundaries

1. Level B

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-H, 1-CB-LB-A, 1-CB-LB-F, 1-CB-LB-B, 1-CB-LB-E, 1-CB-LB-N.
- East - 3-h-rated barrier separates area from 1-CB-LB-A (electrical mezzanine).
- South - 3-h-rated barrier separates area from 1-CB-LB-T, 1-CB-LB-G, 1-CB-LB-Q, 1-CB-LB-D, 1-CB-LB-O.

  - Unrated barrier separates area from containment building 1-CTB.
- West - 3-h-rated barrier separates area from 1-CB-LB-E, 1-CB-LC-B, 1-CB-LB-0, 1-CB-LB-P, 1-CB-LB-I, elevator No. 2, stairwell No. 2.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-A, 1-CB-LA-D, 1-CB-LA-I, 1-CB-LA-G, 1-CB-LA-H, 1-CB-LA-K, 1-CB-LA-L, 1-CB-LA-J, 1-CB-LB-A (electrical mezzanine).

2. Level B - Electrical tunnel (1T4B)

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A.

  - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- South - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - Unrated below-grade exterior area boundary.

- Unrated exterior area boundary.

- Ceiling - Unrated below-grade exterior area boundary.

  - Unrated exterior area boundary.

E. Area Access

- North - Class A door from 1-CB-LB-H, 1-CB-LB-B, 1-CB-LB-E, 1-CB-LB-F.

  - Three class A doors from 1-CB-LB-A.

- South - Class A door from 1-CB-LB-T.

  - Two class A doors from 1-CB-LB-G.

- West - Class A door to 1-CB-LC-B, 1-CB-LB-O.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- HY0442B - HV0442B I/power converter.
- HY0943B - HV0943B I/power converter.
- 1-1602-P5-OIB - Regulatory Guide 1.97 neutron flux optical isolator panel.
- 1-1602-P5-NFB - Regulatory Guide 1.97 neutron flux amplifier panel.
- 1-1532-A7-002 - CBSF electrical equipment room HVAC.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12721- CBSF electrical equipment smoke removal damper.
- 1-1807-Y3-11 - Regulating transformer 1BBA07RX.
- 1-1807-Y3-13 - Regulating transformer 1BBC09RX.

- 1-1808-T3-115 - Lighting isolation transformer 1BBF13RX.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV28180 - Fire protection manual actuation valve.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 60

- Fixed combustible material
  - Cable insulation
- Heat release

-	Fixed combustibles	≤ 40,480,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 62

- Fixed combustible material
  - Cable insulation
  - Oil
  - Rubber goods
- Heat release

-	Fixed combustibles	≤ 317,440,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

3. Zone No. 65

- Fixed combustible material

- Cable insulation

- Heat release
  - Fixed combustibles $\leq$ 70,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

4. Zone No. 66

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 63,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

5. Zone No. 67

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 126,560,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

6. Zone No. 68

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 11,600,000 Btu

- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

7. Zone No. 70

   - Fixed combustible material

     - Cable insulation

   - Heat release

     - Fixed combustibles $\leq$ 38,440,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading $\leq$ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 30 min

8. Zone No. 144

   - Fixed combustible material

     - Cable insulation
     - Oil

   - Heat release

     - Fixed combustibles $\leq$ 221,800,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading $\leq$ 120,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   The following raceways are covered with a 3-hour-rated fire barrier to protect essential train A safe shutdown cables from a fire in this fire area:

   - 1CE321KPH01

   - 1CE321KXH01

- 1CE301KPH02
- 1CE301KXH02

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0456A, may open and it may not be possible to close block valve, HV-8000B, due to a fire in this fire area.

   b. Pressurizer PORVs, PV-0455A and PV-0456A, may open (PT-0456 circuit damage) and it may not be possible to close block valve, HV-8000B, due to a fire in this fire area.

   c. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

   d. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   f. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

   g. Train B RHR system vent valve, HV-10466, may open due to a fire in this fire area.

   h. Automatic starting of the train A motor-driven auxiliary feedwater pump, 1-1302-P4-003, may occur due to fire damage to steam generator 1 and 4 level transmitter circuits in this fire area.

   i. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to HV-5106 circuits in this fire area.

   j. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P5-001, may occur due to a fire damage to steam generator level transmitter circuits in this fire area.

   k. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

   l. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 60

- Zone 62
- Zone 65
- Zone 66
- Zone 67
- Zone 68
- Zone 70
- Zone 144

N. Fire Suppression

1. Automatic

   - Zone 60 preaction sprinkler system - Total zone coverage.
   - Zone 62 preaction sprinkler system - Total zone coverage.
   - Zone 65 preaction sprinkler system - Total zone coverage.
   - Zone 66 preaction sprinkler system - Total zone coverage.
   - Zone 67 preaction sprinkler system - Total zone coverage.
   - Zone 68 - No zone coverage.
   - Zone 70 - No zone coverage.
   - Zone 144 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

   See Section 9A.1.111.S.1.

2. Unrated exterior boundary:

   See Appendix 9B, Section C.5.a(1).

3. Separation by distance without full area suppression:

   See Section 9A.1.42.S.

4. Unrated penetration seal configuration in south wall separating this area from 1-CB-L1-B.

   This configuration involves the Calvert bus duct, several cable trays, conduits, and pipe passing through the diesel generator building wall, the control building wall, and the seismic gap between the two buildings. The Calvert bus duct cannot be rigidly held in place as is done with normal foam penetration seals, and a seismic gap seal cannot be installed with the existing field configuration. With these special restrictions, an alternative method was developed and evaluated that involves installing a three-hour-rated penetration seal in the north side of the control building tunnel south wall and a 1-in. noncombustible damming board in the south side of the diesel generator building north wall and then filling the entire space in between (approximately 5.5 ft) with loose penetration seal damming material. A 1-in. gap, filled with damming material, is left between the Calvert bus duct and the damming board in the diesel generator building wall only to allow for the required seismic movement of the Calvert bus duct. This deviation is justified because of the total lack of combustible material in the seismic gap and because the void between the control building penetration seal and the diesel generator building damming board (including the seismic gap) is stuffed with a significant amount of noncombustible damming material, thereby creating an effective barrier to the passage of smoke and hot gases through the seismic gap or through the 1-in. gap around the Calvert bus duct.

9A.1.46 FIRE AREA 1-CB-LB-E

A. Location: Control building - Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 76.

Non-train dc room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-L, 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LB-H and 1-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LB-D.
- West - 3-h-rated barrier separates area from 1-CB-LB-M, 1-CB-LB-N, 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-N.

E. Area Access

- South - Class A door from 1-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-1807-Y3-RX23 - Regulated transformer 1NBR32RX.
- 1-1807-Y3-RX24 - Regulated transformer 1NBS32RX.

- 1-1807-Y3-RX18 - Regulated transformer 1NBS21RX.
- 1-1807-Y3-RX17 - Regulated transformer 1NBR21RX.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 76

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 21,400,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 76

N. Fire Suppression

1. Automatic

   - Zone 76 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V-dc panels 1ND31 and 1ND32.

S. Deviations and Justifications

None.

9A.1.47 FIRE AREA 1-CB-LB-F

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 74

Non-train switchgear room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A.
  - 2-h-rated barrier separates area from stairwell No. 3.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- South - 3-h-rated barrier separates area from 1-CB-LB-D.
- West - 3-h-rated barrier separates area from 1-CB-LB-D, 1-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-G, 1-CB-LA-H, 1-CB-LB-A.

E. Area Access

- North - Class A door from 1-CB-LB-A.
- South - Class A door from 1-CB-LB-D.
- West - Class A door from 1-CB-LB-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- Train A safe shutdown cables

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-1805-S3-B01 - 480-V switchgear 1NB01.
- 1-1805-S3-NBS - 480-V MCC 1NBS.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 74

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 29,480,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   The turbine driven auxiliary feedwater pump 1-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 74

N. Fire Suppression

1. Automatic

   - Zone 74 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

   None.

P. Ventilation

   Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

   A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

   8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

   8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 1NB01.

S. Justifications and Deviations

   None.

9A.1.48 FIRE AREA 1-CB-LB-G

A. Location: Control Building, Level B

B. Drawings: AX4DJ8022, AX4DJ8024

C. Description: Includes fire zones 63, 82

MCC room, Train B electrical penetration room

D. Description of Boundaries

1. Level B

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-D.
- East - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - Unrated barrier separates area from containment building 1-CTB.
- West - 3-h-rated barrier separates area from 1-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-T.

2. Level A

- North - 3-h-rated barrier separates area from 1-CB-LA-I.
- East - 3-h-rated barrier separates area from 1-CB-LA-D.
- South - 3-h-rated barrier separates area from 1-CB-LA-T.
- West - 3-h-rated barrier separates area from 1-CB-LA-T.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A.

E. Area Access

- North - Class A door from 1-CB-LB-D.
- West - Class A door from 1-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-1805-S3-NBF - 480-V MCC 1NBF.
- Nonsafety-related cables.

K. Combustible loading

1. Zone No.63
   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 125,680,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 240,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 180 min
2. Zone No. 82
   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 21,600,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 160,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 63

- Zone 82

N. Fire Suppression

1. Automatic

   - Zone 63 - No zone coverage.

   - Zone 82 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

- MCC room

  None.

- Train B electrical penetration room.

Radioactive piping

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See section 9A.1.111.S.1.

9A.1.49 FIRE AREA 1-CB-LB-H

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 71

Train B switchgear room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A.
- East - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LB-D.
- West - 3-h-rated barrier separates area from 1-CB-LB-K, 1-CB-LB-L, 1-CB-LB-E.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-G, 1-CB-LA-H.

E. Area Access

- South - Class A door from 1-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1805-S3-B06 - Class 1E 480-V switchgear 1BB06.
- 1-1805-S3-B07- Class 1E 480-V switchgear 1BB07.
- 1-1805-S3-BBC - Class 1E 480-V MCC 1BBC.
- 1-1807-Y3-14 - Class 1E 480/120-V regulating transformer 1BBC42RX.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1513-H7-O02-H01 - Train B hydrogen recombiner power panel.
- 1-1513-P5-ERB - Train B hydrogen recombiner control panel.
- 1-1807-Y3-RX26 - Regulating transformer 1BBC20RX

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 71

   - Fixed combustible material
     - Cable insulation
     - Oil
   - Heat release
     - Fixed combustibles $\leq$ 68,000,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 71

N. Fire Suppression

1. Automatic

   - Zone 71 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 1BB06 and 1BB07 and 120-V-ac panel 1BYC1.

S. Deviations and Justifications

None.

9A.1.50 FIRE AREA 1-CB-LB-I

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 83

Non-train electrical room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-P.
- East - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LB-B, elevator No. 2.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-Q.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- Nonsafety-related spurious actuation concerns cables only.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

Nonsafety-related cables

K. Combustible Loading

1. Zone No. 83

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles 164,189,370 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 717,345 Btu/ft^2

- Fire severity (wood equivalent) 538 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. The pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   b. Train A RHR system vent valve HV-10466 may open due to a fire in this fire area.

   c. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 83

N. Fire Suppression

1. Automatic

   - Zone 83 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.51 FIRE AREA 1-CB-LB-J

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 56B

Train D channel 4 switchgear/battery room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LB-C.
- East - 3-h-rated barrier separates area from 1-CB-LC-B.
- South - 3-h-rated barrier separates area from 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1806-B3-BYD - Train D battery.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 56B

- Fixed combustible material

  - Plastics

- Heat release

-	Fixed combustibles	≤ 13,040,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 56B

N. Fire Suppression

Manual

Zone 56B manual sprinkler system - Total zone coverage.

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.52 FIRE AREA 1-CB-LB-K

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 77B

Train C channel 3 switchgear/battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A.
- East - 3-h-rated barrier separates area from 1-CB-LB-H.
- South - 3-h-rated barrier separates area from 1-CB-LB-L.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1806-B3-BYC - Battery 1CD1B.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 77B

- Fixed combustible material
  - Plastics
- Heat release

-	Fixed combustibles	≤ 14,880,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 77B

N. Fire Suppression

Manual

Zone 77B manual sprinkler system - Total zone coverage.

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.53 FIRE AREA 1-CB-LB-L

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 77A

Train C channel 3 switchgear/battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LB-K, 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LB-H.
- South - 3-h-rated barrier separates area from 1-CB-LB-E.
- West - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-LB-M.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1805-Y3-IC5 - Inverter for HV8701B.
- 1-1805-S3-RHRIA - Starter for HV8701B.
- 1-1806-B3-CCA - Battery charger 1CD1CA.
- 1-1806-B3-CCB - Battery charger 1CDICB.
- 1-1805-D3-37T - FLEX Manual Transfer Switch 1ABE37T.

- 1-1806-S3-DSC - 125-V dc switchgear 1CD1.
- 1-1807-Q3-VI3 - Vital bus distribution panel 1CY1A.
- 1-1807-Y3-IC3 - 120-V ac vital bus inverter 1CDII3.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 77A

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 11,640,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

   b. The turbine-driven auxiliary feedwater pump 1-1302-P4-O01 may Start due to fire damage to HV-5106 circuits in this area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 77A

N. Fire Suppression

1. Automatic

   - Zone 77A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.54 FIRE AREA 1-CB-LB-M

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 78B

Train A channel 1 switchgear/battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LB-L, 1-CB-LB-E.
- South - 3-h-rated barrier separates area from 1-CB-LB-N.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- TE12740 - CBSF electrical equipment AC unit A7001 CW.
- 1-1806-B3-BYA - Battery 1ADIB.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 78B

- Fixed combustible material
  - Cable insulation
  - Plastics
- Heat release

- Fixed combustibles	≤ 27,680,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operation and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer P0RV PV-0455A may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to solid state protection cabinet 1-1605-Q5-SPA 125-V dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 78B

N. Fire Suppression

Manual

Zone 78B manual sprinkler system - Total zone coverage.

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.55 FIRE AREA 1-CB-LB-N

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 78A

Train A channel 1 switchgear battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LB-M.
- East - 3-h-rated barrier separates area from 1-CB-LB-E.
- South - 3-h-rated barrier separates area from 1-CB-LB-D, 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1806-B3-CAA - Battery charger 1AD1CA.
- 1-1806-B3-CAB - Battery charge 1AD1CB.
- 1-1805-D3-38T - FLEX Manual Transfer Switch 1ABE38T.
- 1-1806-S3-DCA - 125-V-dc MCC 1AD1M.
- 1-1806-S3-DSA - 125-V-dc switchgear 1AD1.
- 1-1806-Q3-DAI - 125-V-dc distribution panel 1ADlI.

- 1-1806-Q3-DA2 - 125-V-dc distribution panel 1AD12.
- 1-18O7-Q3-VII - Vital bus distribution panel 1AY1A.
- 1-1807-Y3-IAI - 120-V-ac vital bus inverter 1AD1II.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1807-Y3-10 - Regulating transformer 1ABC09RX
- 1-1807-Y3-12 - Regulating transformer 1ABA07RX

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 78A

- Fixed combustible material
  - Cable insulation
  - Oil
- Heat release

- Fixed combustibles	≤ 14,960,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open due to a fire in this fire area.

b. Safety injection actuation may occur due to fire damage to solid state protection cabinet 1-1605-Q5-SPA 125-V-dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 78A

N. Fire Suppression

1. Automatic

   - Zone 78A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V-dc panels 1AD11, 1AD12, and 1AD1M.

S. Deviations and Justifications

None.

9A.1.56 FIRE AREA 1-CB-LB-O

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 56A

Train D channel 4 switchgear/battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-D.
- East - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LB-P.
- West - 3-h-rated barrier separates area from 1-CB-LB-C, 1-CB-LB-Q.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- North - Class A door from 1-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 1-1805-Y3-ID6 - Inverter for HV8702A.
- 1-1805-S3-RHR2A - Starter for HV8702A.
- 1-1806-B3-CDA - Battery charger 1DD1CA.
- 1-1806-B3-CDB - Battery charger 1DD1CB.
- 1-1805-D3-39T - FLEX Manual Transfer Switch 1BBE39T.
- 1-1807-Q3-VI4 - Vital bus distribution panel
- 1-1807-Y3-ID4 - 120-V-ac vital bus inverter 1DDII4.

- 1-1806-S3-DSD - 125-V-dc switchgear IDDI.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 56A

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 10,240,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 56A

N. Fire Suppression

1. Automatic

- Zone 56A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.57 FIRE AREA 1-CB-LB-P

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 152

Train B electrical room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LB-O, 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LB-I.
- West - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-LB-C.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-R.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 152

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles 64,755,570 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 246,450 Btu/ft^2

- Fire severity (wood equivalent) 185 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0456A, may open due to a fire in this fire area.

   b. Deleted.

   c. Main steam atmospheric dump valve, PV-30I0, may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

   e. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 152

N. Fire Suppression

1. Automatic

- Zone 152 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.1.58 FIRE AREA 1-CB-LB-Q

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zone 79B

Train B channel 2 switchgear/battery room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-LB-D.
- East - 3-h-rated barrier separates area from 1-CB-LB-O.
- South - 3-h-rated barrier separates area from 1-CB-LB-C.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LC-B.

E. Area Access

- West - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- TE12725 - CBSF electrical equipment AC unit A7002 CW.
- 1-1806-B3-BYB - Battery IBD1B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

None.

K. Combustible Loading

1. Zone No. 79B

- Fixed combustible material

  - Plastics

- Heat release

- Fixed combustibles	$\leq$ 18,000,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	$\leq$ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 79B

N. Fire Suppression

Manual

Zone 79B manual sprinkler system - Total zone coverage.

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.59 DELETED.

9A.1.60 FIRE AREA 1-CB-LB-S

A. Location: Control Building, Levels B, A, 1, 2, and 3

B. Drawings: AX4DJ8023, AX4DJ8025, AX4DJ8026, AX4DJ8027, AX4DJ8028

C. Description Includes fire zone 57A.

Train B mechanical chase

D. Description of Boundaries

1. Level B

   - Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
   - North - 3-h-rated barrier separates area from 1-CB-LC-B.
   - East - 3-h-rated barrier separates area from 1-AB-LD-B.
   - South - 3-h-rated barrier separates area from 1-CB-LC-B.
   - West - 3-h-rated barrier separates area from 2-CB-LB-D.

2. Level A

   - North - 3-h-rated barrier separates area from 1-CB-LA-U.
   - East - 3-h-rated barrier separates area from 1-AB-LD-B.
   - South - 3-h-rated barrier separates area from 1-CB-LA-U.
   - West - 3-h-rated barrier separates area from 2-CB-LA-I.

3. Level 1

   - North - 3-h-rated barrier separates area from 1-CB-L1-B.
   - East - 3-h-rated barrier separates area from 1-AB-LD-B.
   - South - 3-h-rated barrier separates area from 1-CB-L1-B.
   - West - 3-h-rated barrier separates area from 2-AB-L2-A.

4. Level 2

   - North - 3-h-rated barrier separates area from 1-CB-L2-E.
   - East - 3-h-rated barrier separates area from 1-AB-LD-B.

- South - 3-h-rated barrier separates area from 1-CB-L2-E, 1-AB-LD-B (horizontal sample chase).
- West - 3-h-rated barrier separates area from 2-AB-L2-A.

5. Level 3

- North - 3-h-rated barrier separates area from 1-CB-L3-K.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-CB-L3-L.
- West - Unrated exterior area boundary.

6. Level 4

- North - 3-h-rated barrier separates area from 1-CB-L4-A.
- East - 3-h-rated barrier separates area from 1-CB-L4-A.
- South - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- Floor - 3-h-rated barrier separates area from 1-CB-L3-K, 1-CB-L3-L.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level B

- North - Certified class A door from 1-CB-LC-B.

2. Level A

- North - Certified class A door from 1-CB-LA-U.

3. Level 1

- South - Certified class A door from 1-CB-L1-B.

4. Level 2

- North - Certified class A door from 1-CB-L2-E.

5. Level 3

- North - Certified class A door from 1-CB-L3-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 57A

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles $\leq$ 2,400,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

None.

M. Early warning fire detectors are installed within the following zone:

- Zone 57A

N. Fire Suppression

1. Automatic

- Zone 57A - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unlabeled doors:

See appendix 9B, section C.5.a(5).

9A.1.60A FIRE AREA 1-CB-LB-T

A. Location: Control Building, Level B

B. Drawing: AX4DJ8022

C. Description: Includes fire zones 61, 64 Train A penetration room, motor control center room.

D. Description of Boundaries:

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LB-D.
- East - Unrated below grade exterior area boundary.
- South - Unrated barrier separates area from containment building 1-CTB.
- West - 3-h-rated barrier separates area from 1-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-B, 1-CB-LA-C.

E. Area Access

- North - Class A door from 1-CB-LB-D.
  - Class A door from 1-CB-LB-A (el 192 ft 6 in.)

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HYO442A - HVO442A I/power converter.
- HYO943A - HVO943A I/power converter.
- 1-1602-P5-NFA - Regulatory Guide 1.97 neutron flux amplifier panel
- 1-1805-S3-ABE - Class 1E 480-V MCC 1ABE.
- Train A safe shutdown cables.

I. Safety Related Equipment

- 1-1807-Y3-15 - Regulating transformer 1ABE51RX.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 61

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 170,320,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

2. Zone No. 64

   - Fixed combustible material
     - Cable insulation
     - Oil
   - Heat release

- Fixed combustibles	≤ 21,200,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operation and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Automatic staring of the train A motor driven auxiliary feedwater pump 1-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level transmitter circuits in this fire area.

   d. Automatic starting of the train B motor driven auxiliary feedwater pump 1-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level transmitter circuits in this fire area.

   e. Automatic starting of the turbine driven auxiliary feedwater pump 1-1302-P4-001 may occur due to fire damage to steam generator level transmitter circuits in this fire area.

   f. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

   g. Reactor vessel head letdown path valves HV-8095A, HV-8096A and HV-0442A may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 61
- Zone 64

N. Fire Suppression

1. Automatic

   - Zone 61 preaction sprinkler system - Total zone coverage.
   - Zone 64 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See section 9A.1.111.S.1.

9A.1.61 FIRE AREA 1-CB-LA-A

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes Fire Zone 101

Train A HVAC room, corridor

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LB-D.
- North - 3-h-rated barrier separates area from 1-CB-LA-N, 1-CB-LA-S.
- East - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LA-B, 1-CB-LA-C.
- West - 3-h-rated barrier separates area from 1-CB-LA-D.
- Ceiling - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-AFB-C.

E. Area Access

- North - Class A door from 1-CB-LA-N.
- South - Class A door from 1-CB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT3010 - Atmospheric dump valve pressure transmitter.
- PT0525 - S/G 2 pressure.
- PT0524 - S/G 2 pressure.

- PT0526 - S/G 2 pressure.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV12569 - Electrical penetration unit deluge.
- TV12559 - Electrical penetration room filter/exhaust damper.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 101

- Fixed combustible material
  - Cable insulation
  - Charcoal
- Heat release

- Fixed combustibles	$\leq$ 88,572,500	Btu
- Transient combustibles	34,547,500	Btu

• Combustible loading	$\leq$ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

b. Main steam atmospheric dump valve PV-3020 may open due to fire in this fire area.

c. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 101

N. Fire Suppression

1. Automatic

   - Zone 101 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Charcoal filter media

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixtures(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.A(1).

9A.1.62 FIRE AREA 1-CB-LA-B

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes Fire Zone 89

Train A electrical pen

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-T.
- North - 3-h-rated barrier separates area from 1-CB-LA-A.
- East - 3-h-rated barrier separates area from 1-CB-LA-C.
  - Unrated below grade exterior area boundary.
- South - Unrated barrier separates area from containment building 1-CTB.
  - Unrated below grade exterior area boundary.
- West - 3-h-rated barrier separates area from 1-CB-LA-D.
- Ceiling - 3-h-rated barrier separates area from 1-EB-B.

E. Area Access

- North - Class A door from 1-CB-LA-A.
- East - Two Class A doors from 1-CB-LA-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Train B safe shutdown cables

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 89

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	$\leq$ 112,240,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	$\leq$ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 89

N. Fire Suppression

1. Automatic

- Zone 89 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry stand pipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilations

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See Section 9A.1.111.S.1.

9A.1.63 FIRE AREA 1-CB-LA-C

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes Fire Zones 90,159

Switchgear and MCC room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-T.
- North - 3-h-rated barrier separates area from 1-CB-LA-A.
- East - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LA-B.
- West - 3-h-rated barrier separates area from 1-CB-LA-B.
- Ceiling - 3-h-rated barrier separates area from 1-EB-B.

E. Area Access

- West - Two Class A doors from 1-CB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

- 1-1825-S3-AAA - Train A 13.8-kV switchgear 1AAA.
- 1-1825-S3-BAB - Train B 13.8-kV switchgear 1BAB.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1805-S3-NBE - 480-V MCC 1NBE
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 90

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 24,360,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 159

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 27,680,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 90
- Zone 159

N. Fire Suppression

1. Automatic

   - Zone 90 - No zone coverage.
   - Zone 159 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provides safe ingress/egress of personnel.

S. Deviations and Justifications

1. Embedded conduit:

   Conduits 1BE33ARL008 and 1BE33ARS009 are embedded in the ceiling of fire zones 90 and 159 of this fire area. These conduits contain circuits which could change the results of the safe shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this fire area. While it is

anticipated that these conduits are embedded to a depth equivalent to a 3-h fire barrier, only 4.3 in. of concrete cover over the conduits can be verified.

Modification of the facility to relocate the circuits in these embedded conduits, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduits (equivalent to 110 min per figure 7-8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible loading fire severity for the location.

9A.1.64 FIRE AREA 1-CB-LA-D

A. Location:

- Control building, level A, level 1

B. Drawings: AX4DJ8024, AX4DJ8035

C. Description: Includes fire zones 99, 104

Feedwater compartment, feedwater valve room, main steam valve area.

D. Description of Boundaries

1. Level A

- Floor - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LB-D.
- North - 3-h-rated barrier separates area from 1-CB-LA-N.
- East - 3-h-rated barrier separates area from, 1-CB-LA-N, 1-CB-LA-A, 1-CB-LA-B.
- South - Unrated barrier separates area from containment building 1-CTB.
- West - 3-h-rated barrier separates area from 1-CB-LA-H, 1-CB-LA-I, 1-CB-LA-T, 1-CB-LB-G.

2. Level 1

- North - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-EB-B.
- South - Unrated barrier separates area from containment building 1-CTB.
- West - 3-h-rated barrier separates area from 1-CB-LI-TSC, 1-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- Level 1 - Open passage to yard.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PSV3011 - S/G 2 code safety valve.
- PSV3012 - S/G 2 code safety valve.
- PSV3013 - S/G 2 code safety valve.
- PSV3014 - S/G 2 code safety valve.
- PSV3015 - S/G 2 code safety valve.
- PSV3021 - S/G 3 code safety valve.
- PSV3022 - S/G 3 code safety valve.
- PSV3023 - S/G 3 code safety valve.
- PSV3024 - S/G 3 code safety valve.
- PSV3025 - S/G 3 code safety valve.
- HV3016A - S/G 2 main steam isolation valve.
- HV3016B - S/G 2 main steam isolation valve.
- HV3026A - S/G 3 main steam isolation valve.
- HV3026B - S/G 3 main steam isolation valve.
- HV5228 - S/G 2 feedwater isolation valve.
- HY5228A - S/G feedwater isolation valve solenoid.
- HY5228B - S/G feedwater isolation valve solenoid.
- HY5228C - S/G feedwater isolation valve solenoid.
- HY5228D - S/G feedwater isolation valve solenoid.
- HY5228G - S/G feedwater isolation valve solenoid.

- HY5228H - S/G feedwater isolation valve solenoid.
- HY5228J - S/G feedwater isolation valve solenoid.
- HY5228K - S/G feedwater isolation valve solenoid.
- HV5229 - S/G 3 feedwater isolation valve.
- HY5229A - S/G feedwater isolation valve solenoid.
- HY5229B - S/G feedwater isolation valve solenoid.
- HY5229C - S/G feedwater isolation valve solenoid.
- HY5229D - S/G feedwater isolation valve solenoid.
- HY5229G - S/G feedwater isolation valve solenoid.
- HY5229H - S/G feedwater isolation valve solenoid.
- HY5229J - S/G feedwater isolation valve solenoid.
- HY5229K - S/G feedwater isolation valve solenoid.
- HV5132 - Auxiliary feedwater pump B to S/G 2 valve.
- HV5134 - Auxiliary feedwater pump B to S/G 3 valve.
- PV3010 - S/G 2 atmospheric dump valve.
- PV3020 - S/G 3 atmospheric dump valve.
- HV13007A - S/G 2 steam isolation bypass valve.
- HY13007A - S/G 2 steam isolation bypass valve solenoid.
- HV13007B - S/G 2 steam isolation bypass valve.
- HY13007B - S/G 2 steam isolation bypass valve solenoid.
- HV13008A - S/G 3 steam isolation bypass valve.
- HY13008A - S/G 3 steam isolation bypass valve solenoid.
- HV13008B - S/G 3 steam isolation bypass valve.
- HY13008B - S/G 3 steam isolation bypass valve solenoid.
- HV15197 - S/G 2 feedwater isolation valve.

- HY15197A - S/G 2 feedwater isolation valve solenoid.
- HY15197B - S/G 2 feedwater isolation valve solenoid.
- HV15198 - S/G 3 feedwater isolation valve.
- HY15198A - S/G 3 feedwater isolation valve solenoid.
- HY15198B - S/G 3 feedwater isolation valve solenoid.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV5125 - Turbine-driven AFW pump to steam generator No. 2.
- HV 5127 - Turbine-driven AFW pump to steam generator No. 3.
- LV5244 - Steam generator 2 startup control.
- LV5245 - Steam generator 3 startup control.
- FV0530 - Steam generator 3 feedwater valve.
- FV0520 - Steam generator 2 feedwater valve.
- HV5195 - Wet layup chemical addition steam generator 2.
- HV3019 - Steam generator outlet to auxiliary feedwater turbine.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 104
    - Fixed combustible material
        - Oil/grease
    - Heat release

-	Fixed combustibles	≤ 48,680,000	Btu
-	Transient combustibles	16,400,000	

- Combustible loading ≤ 40,000 Btu/ft²

- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 99

- Fixed combustible material

  - Oil/grease

- Heat release

-	Fixed combustibles	≤ 93,520,000	Btu
-	Transient combustibles	1,320,000	Btu

- Combustible loading ≤ 40,000 Btu/ft²

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational considerations:

   a. In all postulated cases for fire, the main steam isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, steam flow from steam generators 2 and 3 may require isolation by other means to preclude uncontrolled cooldown and steam generator boil dry.

   b. In all postulated cases for fire, the main feedwater isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, main feedwater flow to steam generators 2 and 3 may require isolation by other means to preclude uncontrolled cooldown and steam generator overfilling.

3. Spurious actuation concerns:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 99

- Zone 104

N. Fire Suppression

1. Automatic

   - Zone 99 - No zone coverage.

   - Zone 104 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to locally manually operate PV-3010, PV-3020, and HV-3019.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Section 9B, Section C.5.A(1).

2. Unrated containment building fire area boundary:

   See Section 9A.1.111.S.1.

9A.1.65 FIRE AREA 1-CB-LA-E

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes Fire Zone 195

Piping shaft

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-R.
- North - 3-h-rated barrier separates area from the turbine building.
- East - Unrated below grade exterior area boundary.
  - 3-h-rated barrier separates area from the turbine building.
- South - 3-h-rated barrier separates area from 2-CB-LA-F.
- West - 3-h-rated barrier separates area from 2-CB-LC-A.
- Ceiling - 3-h-rated barrier separates area from the turbine building.

E. Area Access

- West - Class A door from 2-CB-LC-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 195

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	$\leq$ 3,440,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

- Zone 195 - None.

N. Fire Suppression

1. Automatic

   - Zone 195 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixtures(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

9A.1.66 FIRE AREA 1-CB-LA-F

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 84

Electrical tunnel

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A.
  - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-CB-LC-A.
  - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from, 1-CB-LA-N.
- West - 3-h-rated barrier separates area from 2-CB-LC-F.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- North - Certified class A door from 1-CB-LC-A.
- South - Three class A doors from 1-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Equipment

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 84

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 568,480,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 240,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 180	min

L. Evaluation of safe shutdown capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 84

N. Fire Suppression

1. Automatic

- Zone 84 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated Exterior Fire Area Boundary:

   See Appendix 9B, Section C.5.(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.(5).

9A.1.67 FIRE AREA 1-CB-LA-G

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zones 91, 103

Train A 4.16-kV switchgear room

Train A shutdown room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LB-H, 1-CN-LB-D, 1-CB-LB-F.
- North - 3-h-rated barrier separates area from 1-CB-LA-N, stairwell No. 3.
- East - 3-h-rated barrier separates area from 1-CB-LA-H.
- South - 3-h-rated barrier separates area from, 1-CB-LA-H.
- West - 3-h-rated barrier separates area from 1-CB-LA-N.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-TSC.

E. Area Access

- North - Two Class A doors from 1-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1804-S3-A02 - Class 1E 4-kV switchgear 1AA02.
- 1-1605-P5-SDA - Shutdown panel 1ACPSDA.
- 1-1623-D5-006A - Display processing unit A.
- 1-1821-U3-001 - Sequencer board 1ACPSQ1.
- Train A Safe shutdown cables.

- Train B Safe shutdown cables.

I. Safety-Related Equipment

- HV12713A - Train A shutdown room smoke exhaust damper.
- HV12731 - Train A CBSF electrical equipment smoke exhaust damper.
- HV12713B - Train A shutdown room smoke exhaust damper.
- 1-1623-D5-001 - Remote processing unit A cabinet 1.
- 1-1623-D5-002 - Remote processing unit A cabinet 2.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 91

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 126,560,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 103

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 23,600,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of safe shutdown capacity

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. It may not be possible to close either letdown isolation valve LV-0459 and LV-0460 due to a fire in this fire area.

   c. Pressurizer spray valve PV-0455B may open due to a fire in this fire area.

   d. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve, PV-3000, may open due to fire in this fire area.

   f. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

   g. CVCS volume control tank outlet valve, LV-0112B, may close due to fire in this fire area.

   h. CVCS charging, pump common miniflow valve HV-8110 may close due to a fire in this fire area.

   i. Train A motor-driven auxiliary feedwater pump 1-1302-P4-003 may start due to a fire in this fire area.

   j. Thee turbine-driven auxiliary feedwater pump 1-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   k. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to the under voltage relay LOP signal circuits in this fire area.

   l. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

   m. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 91
- Zone 103

N. Fire Suppression

1. Automatic

   - Zone 91 preaction sprinkler system - No zone coverage.
   - Zone 103 Halon suppression system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 4.16-kV switchgear 1AA02 and control the plant shutdown from remote shutdown panel "A".

S. Deviations and Justifications

See section 9A.2.54, paragraph S, for the justification for having safety-related cable trays without automatic fire suppression in this fire area.

9A.1.68 FIRE AREA 1-CB-LA-H

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 92

Train B 4.16-kV switchgear room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-H, 1-CB-LB-D, 1-CB-LB-F.
- North - 3-h-rated barrier separates area from 1-CB-LA-G, 1-CB-LA-N.
- East - 3-h-rated barrier separates area from 1-CB-LA-D.
- South - 3-h-rated barrier separates area from 1-CB-LA-I.
- West - 3-h-rated barrier separates area from 1-CB-LA-N, 1-CB-LA-G.
  - 2-h-barrier separates area from stairwell No. 3.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-TSC.

E. Area Access

- North - Class A door from 1-CB-LA-N.
- South - Two Class A doors from 1-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 1-1804-S3-A03 - Class 1E 4-kV switchgear 1AA03.
- 1-1816-U3-018 - Auxiliary relay panel 1BCPAR9.
- 1-1821-U3-002 - Sequencer board 1BCPSQ2.
- Train A safe shutdown cables.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12716 - Train B electrical equipment smoke exhaust damper.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables

K. Combustible Loading

1. Zone No. 92

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 130,240,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train B motor driven auxiliary feedwater pump 1-1302-P4-002 may start due to fire in this fire area.

   b. The turbine driven auxiliary feedwater pump 1-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   c. Automatic starting of the turbine driven auxiliary feedwater pump 1-1302-P4-001 may occur due to fire damage to the under voltage relay LOP signal circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 92

N. Fire Suppression

1. Automatic

   - Zone 92 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 4.16-kV switchgear 1BA03.

S. Deviations and Justifications

None.

9A.1.69 FIRE AREA 1-CB-LA-I

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zones 88, 93

Train B: penetration area, pipe chase, and corridor

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-D.
- North - 3-h-rated barrier separates area from 1-CB-LA-H.
- East - 3-h-rated barrier separates area from 1-CB-LA-D, 1-CB-LA-T, 1-CB-LA-J, 1-CB-LB-G.
  - Unrated barrier separates area from containment building 1-CTB.
- South - 3-h-rated barrier separates area from 1-FB-LC-A.
- West - 3-h-rated barrier separates area from 1-CB-LA-U, 1-CB-LA-K, 1-CB-LA-N, 1-CB-LA-D, 1-CB-LA-R, 1-CB-LA-Q, elevator No. 2 and stairwell No. 2.
- Interior - 3-h-rated barrier separates fire zone 88 from fire zone 93.

E. Area Access

- North - Two Class A doors from 1-CB-LA-H.
- East - Two Class A doors from 1-CB-LA-T.
  - Class A door from 1-CB-LA-J.
- West - Class A from 1-CB-LA-K, 1-CB-LA-L.
- Interior - Class A door separates fire zone 88 from fire zone 93.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Equipment

- PT0534 - S/G 3 pressure transmitter.
- PT0535 - S/G 3 pressure transmitter.
- PT0536 - S/G 3 pressure transmitter.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

Train A safety-related cables

Train B safety-related cables

J. Nonsafety-Related Equipment

Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 88

   - Fixed combustible material

     None.

   - Heat Release

     - Fixed combustibles $\leq$ 49,200,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading $\leq$ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 93

   - Fixed combustible material

     - Cable insulation

   - Heat Release

     - Fixed combustibles $\leq$ 290,400,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading $\leq$ 160,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations.

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

   c. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

   d. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   f. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   g. CVCS volume control tank outlet valve LV-0112C may close due to fire in this fire area.

   h. CVCS Train A charging pump mini-flow valve HV-8111A may close due to a fire in this fire area.

   i. The Train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   j. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

   k. Train B motor driven auxiliary feedwater pump 1-1302-P4-002 may start due to a fire in this fire area.

   l. The turbine driven auxiliary feedwater pump 1-1302-P4-001 may start due to fire damage to HV-5106 circuits.

   m. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

n. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

o. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

p. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 88
- Zone 93

N. Fire Suppression

1. Automatic

   - Zone 88 preaction sprinkler system - Total zone coverage.
   - Zone 93 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See Section 9A.1.111.

9A.1.70 FIRE AREA 1-CB-LA-J

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 158

Motor control center room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A.
- North - 3-h-rated barrier separates area from 1-CB-LA-I.
- South - 3-h-rated barrier separates area from 1-CB-LA-I.
- East - 3-h-rated barrier separates area from 1-CB-LA-T.
- West - 3-h-rated barrier separates area from 1-CB-LA-I.

E. Area Access

- West - Class A door from 1-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1805-S3-BBE - Class 1E 480-V MCCV 1BBE.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 158

- Fixed combustible material

  - Cable insulation

- Heat release

-	Fixed combustibles	$\leq$ 18,240,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 158

N. Fire Suppression

1. Automatic

   - Zone 158 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.71 FIRE AREA 1-CB-LA-K

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 95

Train A cable spreading room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LC-B, 1-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L1-A.
- North - 3-h-rated barrier separates area from 1-CB-LA-N, 1-CB-LA-O, 1-CB-LA-P, 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-LA-U, 1-CB-LA-M.
- East - 3-h-rated barrier separates area from 1-CB-LA-N, 1-CB-LA-I, 1-CB-LA-L, 1-CB-LA-R.
- West - 3-h-rated barrier separates area from 2-CB-LA-K.

E. Area Access

- East - Class A door from 1-CB-LA-I, 1-CB-LA-N.
- West - Class A door from 1-CB-LA-K.
- North - Class A door from 1-CB-LA-N, 1-CB-LA-P.

  - Two class A doors from 1-CB-LA-O.
- South - Class A door from 1-CB-LA-U.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1601-U3-TO3 - Termination cabinet 1ACPTO3.

- 1-1601-U3-T27 - Termination cabinet 1ACPT27.
- 1-1601-U3-T15 - Termination cabinet 1ACPT15.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1601-U3-T01 - Termination cabinet 1NCPT01.
- 1-1601-U3-T05 - Termination cabinet 1ACPT05.
- 1-1601-U3-T07 - Termination cabinet 1ACPT07.
- 1-1601-U3-T09 - Termination cabinet 1NCPT09.
- 1-1601-U3-T11 - Termination cabinet 1ACPT11.
- 1-1601-U3-T19 - Termination cabinet 1CCPT19.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- 1-1601-U3-T13 - Termination cabinet 1NCPT13.
- 1-1601-U3-T17 - Termination cabinet 1NCPT17.
- 1-1601-U3-T21 - Termination cabinet 1NCPT21.
- 1-1601-U3-T23 - Termination cabinet 1NCPT23.
- 1-1601-U3-T25 - Termination cabinet 1NCPT25.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 95

   - Fixed combustible material

     - Cable insulation
     - Plastics
     - Rubber goods

   - Heat release

- Fixed combustibles	$\leq$ 2,256,160,000	Btu
- Transient combustibles	800,000	Btu

- Combustible loading ≤ 480,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 360 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0455A, may open and it may not be possible to close block valve, HV-8000A, due to a fire in this area.

   b. Pressurizer PORV, PV-0456A, may open due to a fire in this fire area.

   c. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve, HV-8000A, due to a fire in this fire area.

   d. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to fire in this fire area.

   e. Pressurizer spray valve, PV-0455B, may open due to a fire in this fire area.

   f. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

   g. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   h. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

   i. CVCS volume control tank outlet valve, LV-0112B, may close due to fire in this fire area.

   j. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   k. Train B RHR heat exchanger outlet valve, HV-0607, may close due to a fire in this fire area.

   l. Train B RHR heat exchanger bypass valve, HV-0619, may open due to a fire in this fire area.

m. Train A motor-driven auxiliary feed water pump, 1-1302-P4-003, may start due to a fire in this fire area.

n. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to fire damage to HV-5106 or AMSAC autostart circuits in this fire area.

o. Automatic starting of the train A motor-driven auxiliary feedwater pump, 1-1302-P4-003, may occur due to fire damage to steam generator 1 and 4 level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

p. Automatic starting of the train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may occur due to fire damage to steam generator 2 and 3 level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

q. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to steam generator level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

r. Safety injection actuation may occur due to fire damage to pressurized pressure circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

t. Safety injection actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

u. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPA, 125-V-dc power feeder circuits in this fire area.

v. Containment spray actuation may occur due to fire damage to the containment pressure circuits in this fire area.

x. Containment spray actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

y. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

z. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPA, 120-V-ac power feeder circuits in this fire area.

aa. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 120-V-ac power feeder circuits in this fire area.

bb. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

cc. Excess letdown valves HV-8153, HV-8154, and HV-0123 may all open due to a fire in this fire area.

dd. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 95

N. Fire Suppression

1. Automatic

    - Zone 95 preaction sprinkler system - Full zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zone 95.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.72 FIRE AREA 1-CB-LA-L

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 98

Train B shutdown room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-D, 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-A, 1-CB-L1-B.
- North - 3-h-rated barrier separates area from 1-CB-LA-K.
- South - 3-h-rated barrier separates area from 1-CB-LA-R.
- East - 3-h-rated barrier separates area from 1-CB-LA-I.
- West - 3-h-rated barrier separates area from 1-CB-LA-K.

E. Area Access

- East - Class A door from 1-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1605-P5-SDB - Shutdown panel 1ACPSDB.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV 12753A - Train B shutdown room smoke exhaust damper.
- HV 12753B - Train B shutdown room smoke exhaust damper.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 98

- Fixed combustible material

  - Cable insulation

- Heat Release

-	Fixed combustibles	≤ 18,360,000	Btu
-	Transient combustibles	800,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0456A, may open and it may not be possible to close block valve, HV-8000B, due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   c. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

   d. CVCS volume control tank outlet valve, LV-0112C, may close due to fire in this fire area.

   e. CVCS train A charging pump miniflow valve, HV-8111A, may close due to fire in this fire area.

   f. The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

g. Train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may start due to a fire in this fire area.

h. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 98

N. Fire Suppression

1. Automatic

   - Zone 98 Halon system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to control the plant shutdown from remote shutdown panel "B".

S. Deviations and Justifications

1. Embedded conduit:

Conduit 1AE31DRL007 is embedded in the ceiling of fire zone 98 of this fire area. This conduit contains circuits which could change the results of the safe shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this fire area. While it is anticipated that this conduit is embedded to a depth equivalent to a 3-h fire barrier, only 5 in. of concrete cover over this conduit can be verified.

Modification of the facility to relocate the circuits in this embedded conduit, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduit (equivalent to 150 min per figure 7-8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible-loading fire severity for the location.

9A.1.73 FIRE AREA 1-CB-LA-M

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 96

Computer room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B.
- North - 3-h-rated barrier separates area from 1-CB-LA-K.
- South - 3-h-rated barrier separates area from 1-CB-LA-U.
- East - 3-h-rated barrier separates area from 1-CB-LA-U, 1-CB-LC-A.
- West - 3-h-rated barrier separates area from 2-CB-LA-M.

E. Area Access

- East - Class A door from 1-CB-LA-U.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

Computer cabinets and equipment.

K. Combustible Loading

1. Zone No. 96

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics

- Heat release

  - Fixed combustibles $\leq$ 68,240,000 Btu
  - Transient combustibles 4,075,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 96

N. Fire Suppression

1. Automatic

   - Zone 96 Halon system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and equipment associated with its operation are located in fire zone 96.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.74 FIRE AREA 1-CB-LA-N

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zones 85, 86, 94

East and west corridors, auxiliary relays room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-A, 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-A, 1-CB-L1-G, and 1-CB-L1-B.
  - Unrated below-grade exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-LA-F.
  - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-O, 1-CB-LA-P, 1-CB-LB-A, 1-CB-LA-D, 1-CB-LA-G, 1-CB-LA-H, 1-CB-LA-A, 1-CB-LA-S.
  - 2-h-rated barrier separates area from stairwell No. 3.
- East - Unrated below-grade exterior fire area boundary.
- West - 3-h-rated barrier separates area from 2-CB-LA-N.

E. Area Access

- North - Three class A doors from 1-CB-LA-F.
- South - Two class A doors from 1-CB-LA-K, 1-CB-LA-G.
  - Class A door from 1-CB-LA-A.
  - Class A door from 1-CB-LA-H, 1-CB-LA-S.
  - Certified class A door from stairwell No. 3.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1539-A7-001 - Control building auxiliary relay room ESF cooler.
- 1-1816-U3-001 - Auxiliary relay panel 1ACPAR1.
- 1-1816-U3-002 - Auxiliary relay panel 1ACPAR2.
- 1-1816-U3-017 - Auxiliary relay panel 1ACPAR8.
- FT0520 - S/G loop 2 feedwater flow (AMSAC).
- FT0521 - S/G loop 2 feedwater flow (AMSAC).
- FT0530 - S/G loop 3 feedwater flow (AMSAC).
- FT0531 - S/G loop 3 feedwater flow (AMSAC).
- Train A safe shutdown cables.

<u>Unit 2</u>

- Train A safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- AVH12810A - CB cable spread room AC unit damper.
- 2-1533-A7-003 - CB level 4 switchgear and battery room air handling unit.
- 2-1806-S3-DN3 - 125-V-dc switchgear 2ND3.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 85

    - Fixed combustible material

        - Cable insulation
        - Rubber goods

- Heat release
  - Fixed combustibles ≤ 658,960,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 240,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 180 min

2. Zone No. 86
   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 131,680,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 120,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 90 min

3. Zone No. 94
   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 91,240,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 120,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve, HV-8000A, due to a fire in this area.

b. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to a fire in this fire area.

c. Pressurizer spray valve, PV-0455B, may open due to a fire in this fire area.

d. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

e. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

f. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

g. CVCS volume control tank outlet valve, LV-0112B, may close due to fire in this fire area.

h. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

i. Train A motor-driven auxiliary feed water pump, 1-1302-P4-003, may start due to a fire in this fire area.

j. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to fire damage to HV-5106 or AMSAC autostart circuits in this fire area.

k. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

l. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

m. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B, and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve, HV-8000A, due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 85
- Zone 86
- Zone 94

N. Fire Suppression

1. Automatic

   - Zone 85 preaction sprinkler system - Total zone coverage.
   - Zone 86 preaction sprinkler system - Total zone coverage.
   - Zone 94 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a(5).

9A.1.75 FIRE AREA 1-CB-LA-0

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 174

Normal electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-E.
- North - 3-h-rated barrier separates area from 1-CB-LA-N.
- South - 3-h-rated barrier separates area from 1-CB-LA-K.
- East - 3-h-rated barrier separates area from 1-CB-LA-P.
- West - 3-h-rated barrier separates area from 1-CB-LC-A.

E. Area Access

- South - Two class A doors form 1-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Nonsafety-related spurious actuation concern cables only.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 174

- Fixed combustible material

    - Cable insulation

- Heat release

-	Fixed combustibles	173,052,160	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading 919,853 Btu/ft^2

- Fire severity (wood equivalent) 690 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

    None.

3. Spurious actuation considerations:

    a. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to fire in this fire area.

    b. Pressurizer spray valve, PV-0455B, may open due to a fire in this fire area.

    c. Train B RHR heat exchanger outlet valve, HV-0607, may close due to a fire in this fire area.

    d. Train B RHR heat exchanger bypass valve, HV-0619, may open due to a fire in this fire area.

    e. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

    f. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this area.

    g. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 174

N. Fire Suppression

1. Automatic

    - Zone 174 preaction sprinkler system - Total zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.76 FIRE AREA 1-CB-LA-P

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 173

Train A electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-F,
- North - 3-h-rated barrier separates area from 1-CB-LA-N.
- South - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-N.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - 3-h-rated barrier separates area from 1-CB-LA-O.

E. Area Access

- South - Class A door form 1-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- Train A safe shutdown cables. (Unit 2 separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 173

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	133,434,620	Btu
- Transient combustibles	800,000	Btu

- Combustible loading 818,504 Btu/ft^2

- Fire severity (wood equivalent) 614 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV, PV-0455A, may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

b. Pressurizer PORVs, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455 circuit damage) and it may not be possible to close block valve, HV-8000A, due to a fire in this fire area.

c. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

d. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

e. CVCS volume control tank outlet valve, LV-0112B, may close due to fire in this fire area.

f. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

g. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

h. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPA, 125-V-dc power feeder circuits in this fire area.

i. Containment spray actuation may occur due to fire damage to the containment pressure circuits in this fire area.

j. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 173

N. Fire Suppression

1. Automatic

- Zone 173 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.77 FIRE AREA 1-CB-LA-Q

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 175

Normal electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-I.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-D.
- North - 3-h-rated barrier separates area from 1-CB-LA-R.
- South - 3-h-rated barrier separates area from 1-CB-LA-U, elevator No. 2.
- East - 3-h-rated barrier separates area from 1-CB-LA-I.
- West - 3-h-rated barrier separates area from 1-CB-LA-U.

E. Area Access

- West - Class A door from 1-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Nonsafety-related spurious actuation concern cable only.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 175

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles 199,893,440 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 829,312 Btu/ft^2

- Fire severity (wood equivalent) 622 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0456A, may open due to a fire in this fire area.

   b. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open due to fire damage to PT-0455/ PT-0457 circuits in this fire area.

   c. Train B RHR system vent valve, HV-10466, may open due to fire in this fire area.

   d. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

   e. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 175

N. Fire Suppression

1. Automatic

- Zone 175 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.78 FIRE AREA 1-CB-LA-R

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 97

Train B electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-P.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-C.
- North - 3-h-rated barrier separates area from 1-CB-LA-L.
- South - 3-h-rated barrier separates area from 1-CB-LA-Q.
- East - 3-h-rated barrier separates area from 1-CB-LA-I.
- West - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-U.

E. Area Access

- West - Class A door from 1-CB-LA-U.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- Train B safe shutdown cables. (Unit 2 separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 97

- Fixed combustible material

  - Cable insulation

- Heat release

-	Fixed combustibles	234,520,230	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading 898,169 Btu/ft^2

- Fire severity (wood equivalent) 674 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train A.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV, PV-0456A, may open and it may not be possible to close block valve, HV-8000B, due to a fire in this area.

b. Deleted.

c. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

d. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

e. CVCS volume control tank outlet valve, LV-0112C, may close due to fire in this fire area.

f. CVCS train A charging pump common miniflow valve, HV-8111A, may close due to a fire in this fire area.

g. Train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

h. Train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may start due to a fire in this fire area.

i. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to a fire in this fire area.

j. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in fire area.

k. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 97

N. Fire Suppression

1. Automatic

- Zone 97 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.79 FIRE AREA 1-CB-LA-S

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zone 100

Train A HVAC room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-B.
- North - 3-h-rated barrier separates area from 1-CB-LA-N.
- East - 3-h-rated barrier separates area from 1-CB-LA-A.
- South - 3-h-rated barrier separates area from 1-CB-LA-A.
- West - 3-h-rated barrier separates area from 1-CB-LA-N.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- West - Class A door from 1-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PY3010 - Atmospheric dump valve signal converter.
- PY3020 - Atmospheric dump valve signal converter.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 100

   - Fixed combustible material

     - Charcoal

   - Heat release

- Fixed combustibles	≤ 38,572,500	Btu
- Transient combustibles	34,547,500	Btu

• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 100

N. Fire Suppression

1. Automatic

   - Zone 100 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Charcoal filter media.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a.(1).

9A.1.80 FIRE AREA 1-CB-LA-T

A. Location: Control Building, Level A

B. Drawing: AX4DJ8024

C. Description: Includes fire zones 87, 102

13.8-kV switchgear, penetration area

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LB-G.
- North - 3-h-rated barrier separates area from 1-CB-LA-I.
- East - 3-h-rated barrier separates area from 1-CB-LA-D, 1-CB-LB-G.
- South - Unrated barrier separates area from containment building 1-CTB.

  - 3-h-rated barrier separates area from 1-CB-LA-I.
- West - 3-h-rated barrier separates area from 1-CB-LA-J.
- Ceiling - 3-h-rated barrier separates area from 1-AB-L2-A.

E. Area Access

- North - Class A door from 1-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PT3020 - Atmospheric dump valve pressure transmitter.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1825-S3-CAC - Train A 13.8-kV switchgear 1CAC.

- 1-1825-S3-DAD - Train B 13.8-kV switchgear 1DAD.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 87

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 26,840,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 102

- Fixed combustible material

  None.
- Heat release
  - Fixed combustibles $\leq$ 6,520,000 Btu
  - Transient combustibles 400,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational design considerations:

   None.

3. Spurious actuation considerations:

    a. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

    b. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 87
- Zone 102

N. Fire Suppression

1. Automatic

    - Zone 87 - No zone coverage.
    - Zone 102 preaction sprinkler system - Total zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area building:

See Section 9A.1.111.S.1.

9A.1.80A FIRE AREA 1-CB-LA-U

A. Location: Control Building, Level A

B. Drawings: AX4DJ8024, AX4DJ8025

C. Description: Includes fire zones 154, 169

Lobby, storage room, HVAC room, corridor

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-L3-M, 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B, 1-AB-LD-B (sample chase).
- North - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LC-A, 1-CB-L3-M.
- East - 3-h-rated barrier separates area from 1-CB-LA-R, 1-CB-LA-Q, 1-CB-LA-I.
  - 2-h-rated barrier separates area from elevator No. 2 and stairwell No. 2.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 1-CB-LA-M, 2-CB-LA-M, 2-CB-LA-K, 2-CB-LA-R, 2-CB-LA-Q, 2-CB-LA-I, 1-AB-LD-B, 1-CB-LB-S.

E. Area Access

- North - Class A door from 1-CB-LA-K, 1-CB-LA-M, 1-CB-L3-M, 2-CB-LA-K.
- East - Class A door from 1-CB-LA-R.
  - Two class A doors from 1-CB-LA-Q.
  - Class B door from stairwell No.2.
- West - Class A door from 1-CB-LB-S, 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

Nonsafety-related spurious actuation concern cables only.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- A-1539-A7-002 - CB cable spread room AC unit.
- AHV12801 - CB cable spread room AC unit damper.
- AHV12810E - CB cable spread room AC unit damper.
- AHV12810C - CB cable spread room AC recirculation.
- 1-1614-Y3-I50 - ATSI VPS dc/120-V-ac inverter.
- 2-1807-Y3-I1 - Computer inverter 2ND3I1.
- 2-1807-Y3-RX16 - Regulated transformer 2NBS18RX.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 154

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
   - Heat release
     - Fixed combustibles $\leq$ 69,040,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 169

   - Fixed combustible material

- Cable insulation
- Rubber goods

- Heat release

- Fixed combustibles	≤ 277,120,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 160,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 120	min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3a. Spurious actuation considerations (Unit 1):

   None.

3b. Spurious actuation considerations (Unit 2):

   a. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open due to fire damage to PT-0455/ PT-0457 circuits in this fire area.

   b. Train A RHR heat exchanger bypass valve, FV-0618, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 154
- Zone 169

N. Fire Suppression

1. Automatic

   - Zone 154 - No zone coverage.
   - Zone 169 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located in fire zone 169.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9.A.1.81 FIRE AREA 1-CB-L1-A

A. Location: Control Building, Level 1

B. Drawing: AX4DJ8026

C. Description: Includes fire zones 105-1, 105-2, 106, 183A

Control rooms, kitchen, and conference room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-N, 1-CB-LA-L, 2-CB-LA-K.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L2-B, 1-CB-L2-A, 1-CB-L2-E, 2-CB-LA-B, 2-CB-L2-B, 2-CB-L2-A.
- North - 3-h-rated barrier separates area from 1-CB-L1-E, 1-CB-L1-F, 1-CB-LB-A, 1-CB-LC-A, 2-CB-L1-E, 2-CB-L1-F.
  - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-G, 1-CB-L1-B, 1-CB-LC-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-B, 2-CB-L1-E.
- Interior - 1-h-rated barrier separates zone 105-1 from 183A.
  - 2-h-rated barrier separates zone 105-1 from 106.
  - 3-h-rated barrier separates zone 105-1 from south part of zone 183A.
  - 3-h-rated barrier separates north and south parts of zone 183A.

E. Area Access

- South - Class A door from 1-CB-L1-B.
- East - Class A door from 1-CB-L1-B.
- West - Class A door from 1-CB-L1-B.
- Interior - Class A door separates emergency storage from unit 1 control room.

- Class B door separates conference room from unit 1 control room.

- Class A door separates kitchen from Unit 1 control room.

- Class A door separates toilet from Unit 1 control room.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1/2-1500-Q5-HVC - HVAC panel 1ACQHVC.
- 1/2-1500-V7-001 - CBA, train A - HVAC instrument panel.
- 1/2-1500-V7-002 - CBB, train B - HVAC instrument panel.
- 1/2-1601-Q5-MCB - Main control board QMCB.
- 1/2-1604-Q5-PCP - Miscellaneous equipment panel.
- 1/2-1604-Q5-PS1 - Process protection set I.
- 1/2-1604-Q5-PS2 - Process protection set II.
- 1/2-1604-Q5-PS3 - Process protection set III.
- 1/2-1604-Q5-PS4 - Process protection set IV.
- 1/2-1604-Q5-PP1 - BOP protection channel I.
- 1/2-1604-Q5-PP2 - BOP protection channel II.
- 1/2-1604-Q5-PP3 - BOP protection channel III.
- 1/2-1604-Q5-PP4 - BOP protection channel IV.
- 1/2UI13134A - Liquid plasma display.
- 1/2UI13134B - Liquid plasma display.
- 1/2-1605-Q5-SPA - Solid state protection panel-A.
- 1/2-1605-Q5-SPB - Solid state protection panel-B.

- 1/2-1605-Q5-SPC - Solid state protection panel-C.
- 1/2-1605-Q5-SPD - Solid state protection panel-D..
- 1/2-1816-U3-007 - Electrical auxiliary board QEAB.
- 1/2-1626-Q5-AMS - AMSAC cabinet.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

Unit 2

- 2-1626-Q5-AMS - AMSAC cabinet.
- 2-1500-Q5-HVC - HVAC panel 2ACQHVC.
- 2-1500-V7-001 - HVAC instrument panel.
- 2-1500-V7-002 - HVAC instrument panel.
- 2-1601-Q5-MCB - Main control board QMCB.
- 2-1604-Q5-PCP - Miscellaneous equipment panel.
- 2-1604-Q5-PS1 - Process protection set I.
- 2-1604-Q5-PS2 - Process protection set II.
- 2-1604-Q5-PS3 - Process protection set III.
- 2-1604-Q5-PS4 - Process protection set IV.
- 2-1604-Q5-PP1 - BOP protection channel I.
- 2-1604-Q5-PP2 - BOP protection channel II.
- 2-1604-Q5-PP3 - BOP protection channel III.
- 2-1604-Q5-PP4 - BOP protection channel IV.
- 2UI13134A - Liquid plasma display.
- 2UI13134B - Liquid plasma display.
- 2-1605-Q5-SPA - Solid-state protection panel A.
- 2-1605-Q5-SPB - Solid-state protection panel B.

- 2-1605-Q5-SPC - Solid-state protection panel C.
- 2-1605-Q5-SPD - Solid-state protection panel D.
- 2-1816-U3-007 - Electrical auxiliary board QEAB.
- 1-1626-Q5-AMS - AMSAC cabinet.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

I. Safety-Related Equipment

- 1-1513-Q5-HMA - Train A containment H_2 monitoring panel.
- 1-1513-Q5-HMB - Train B containment H_2 monitoring panel.
- 1-1602-Q5-NIR - Nuclear instrument rack.
- 1-1605-Q5-STA - Train A safeguard test cabinet.
- 1-1605-Q5-STB - Train B safeguard test cabinet.
- 1-1609-Q5-RM2 - Rad S.R. display console.
- 1-1620-Q5-ESF - BOP ESF panel.
- 1-1816-U3-005 - Isolation device panel A.
- 1-1816-U3-006 - Isolation device panel B.
- 1-1816-U3-009 - Isolation device panel C.
- 1-1816-U3-010 - Isolation device panel D.
- 1-1816-U3-020 - Isolation device panel.
- 1-1816-U3-021 - Isolation device panel.
- 1-1816-U3-019 - Local control station LR01.
- 1-1823-Q5-BPS - Systems status monitor panel.
- Train A safety-related cables.

a. Alternate shutdown capability ensures that safe shutdown can be achieved in the event of a fire in this fire area (see paragraph L).

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1102-Q5-GFD - QFFD rack.
- 1-1604-Q5-ARA - Auxiliary relay rack 1.
- 1-1604-Q5-ARB - Auxiliary relay rack 2.
- 1-1604-Q5-ARC - Auxiliary relay rack 3.
- 1-1604-Q5-PC1 - Process I&C control group 1.
- 1-1604-Q5-PC2 - Process I&C control group 2.
- 1-1604-Q5-PC3 - Process I&C control group 3.
- 1-1604-Q5-PC4 - Process I&C control group 4.
- 1-1601-Q5-CBD - Control board demultiplexer.
- 1-1604-Q5-PCG - BOP control panel 1.
- 1-1604-Q5-BCP - BOP control panel 2.
- 1-1610-Q5-LPM - Metal impact monitoring panel.
- 1-1609-Q5-RM1 - Radiation monitor comm console.
- 1-1609-Q5-RM1-E11 - Radiation monitor comm console printer.
- 1-1306-Q5-FPT - SGFP Turbine A and B control panel.
- 1-1328-Q5-CMP - Remote control core monitor.
- 1-1612-Q5-MDF - Movable detect flux map racks.
- 1-1615-Q5-EHC - EHC cabinet.
- 1-1614-C5-AT - ATSI - teleprinter term 30.
- 1-1614-C5-AD - ATSI - trend and bar display.
- 1-1614-C5-TSP - ATSI - trend select control panel.
- 1-1614-C5-VPU - Vibration phase angle unit.

- 1-1618-C5-AP - Alarm printer.
- 1-1618-C5-TP - Trend printer.
- 1-1619-Q5-AR1 - Annunciator racks 1.
- 1-1619-Q5-AR2 - Annunciator racks 2.
- 1-1618-C5-AC - Alarm CRT.
- 1-1816-U3-008 - Protective relay panel.
- 1-1816-U3-012 - UNDF protection panel.
- 1-1816-U3-016 - Plant fault recorder panel.
- 1-1817-U3-AHT - Heat tracing annunciator cabinet.
- 1-2701-C5-D1A - SPDS CRT with operators and annunciator keyboard.
- 1-2701-C5-D1B - SPDS CRT with operators and annunciator keyboard.
- 1-2701-C5-D1C - SPDS CRT with operators and annunciator keyboard.
- A-1816-U3-011 - Supervisory control panel.
- A-2414-Q5-SIP - Seismic instrument panel.
- A-1813-Q3-FAC - Fire alarm PC workstation (includes printer).
- 1-1808-T3-070 - Lighting distribution transformer 1NBLH2X2.
- 1-1211-P5-NSG - Nuclear sampling system panel - gas (Unit 1).
- 1-1212-P5-NSP - Nuclear sampling system panel - liquid (Unit 1).
- 1-1531-H7-010-HCP - CBCR electric heater control panel.
- 2-1211-P5-NSG - Nuclear sampling system panel - gas (Unit 2).
- 2-1212-P5-NSP - Nuclear sampling system panel - liquid (Unit 2).
- 1-1615-C5-HMI1 Mark VIe HMI Monitor 1.
- 1-1615-C5-HMI2 Mark VIe HMI Monitor 2.
- 1-1615-C5-HMI3 Mark VIe HMI Monitor 3.
- Nonsafety-related cables.

K. Combustible Loading

1A. Zone No. 105-1

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
- Heat release

- Fixed combustibles	≤ 310,080,000	Btu
- Transient combustibles	24,400,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

1B. Zone No. 105-2

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
- Heat release

- Fixed combustibles	≤ 310,080,000	Btu
- Transient combustibles	24,400,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

2. Zone No. 106

- Fixed combustible material
  - Cellulosic materials
  - Oil/grease
- Heat release

- Fixed combustibles	≤ 17,600,000	Btu

-	Transient combustibles	9,200,000	Btu
•	Combustible loading	$\leq$ 80,000	Btu/ft^2
•	Fire severity (wood equivalent)	$\leq$ 60	min

3. Zone No. 183A

- Fixed combustible material
  - Cellulosic materials
  - Cable insulation
- Heat release

-	Fixed combustibles	$\leq$ 10,360,000	Btu
-	Transient combustibles	4,400,000	Btu
•	Combustible loading	$\leq$ 40,000	Btu/ft^2
•	Fire severity (wood equivalent)	$\leq$ 30	min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1. General Operational Considerations

   a. In the event of a control room fire, operate transfer switches and align the plant to the desired configuration from the remote shutdown panels and other local control stations to prevent a control room spurious actuation undetected system realignment. NOTE: Once a transfer switch is operated, automatic control functions will not occur (e.g., load sequencing will not occur).

   b. In the event of the control room fire, control the plant shutdown from the train B remote shutdown panel.

2. Reactor Coolant System

   a. With offsite power available (i.e., RCPs operating), a pressurizer spray valve (PV-0455B or PV-0455C) can spuriously open resulting in uncontrolled RCS depressurization.

   b. A pressurizer PORV (PV-0455A or PV-0456A) can spuriously open resulting in uncontrolled RCS depressurization and loss of RCS inventory.

   c. Fire damage to pressurizer pressure transmitter channel for PT-0455/PT-0457 can cause simultaneous opening of the pressurizer spray valves (PV-0455B and PV-0455C) and pressurizer PORV PV-0455A resulting in uncontrolled RCS depressurization and loss of RCS inventory.

d. The pressurizer auxiliary spray valve (HV-8145) can spuriously open resulting in uncontrolled RCS depressurization while a charging pump is operating.

3. Chemical and Volume Control System

a. Fire-induced spurious closure of a VCT outlet valve (LV-0112B or LV-0112C) may result in damage to an operating centrifugal charging pump. Since both pumps are automatically started in the event of a loss of offsite power, this may lead to simultaneous failure of both pumps.

b. Fire-induced spurious closure of the centrifugal charging pump minimum flow valves (HV-8111A and 8111B) may result in damage to the respective operating charging pump. Spurious closure of HV-8110 can result in a failure of either or both operating charging pumps.

c. Local breaker tripping may be necessary to ensure isolation of the excess letdown flow path as multiple valve openings may occur, and the ability to operate any of the three normally closed valves is not provided at the remote shutdown panels.

d. Fire-induced failure of charging pump discharge flow control valve (HV-190B) may occur resulting in inability to control pressurizer level (transfer of control switch does not isolate all control room circuits)

e. Automatic charging pump suction transfer to the RWST may not occur on low volume control tank (VCT) level due to fire-induced failure in a VCT level transmitter (LT-0112 or LT-0185) circuit.

4. Main Steam System

a. With offsite power available, steam generator overfilling can occur due to spurious opening (valves remain open) of the feedwater control valves or due to failure of the feedwater isolation valves to close on high level. These situations are aggravated by the following conditions:

- Turbine trip occurs.
- Feedwater pumps continue to run.
- Main steam atmospheric dump valves (ADVs) do not operate.
- No automatic turbine bypass system operation.

b. With offsite power available, steam generator boil dry can occur due to spurious closure of the feedwater isolation valves, closure of the feedwater regulating valves, or spurious opening of the turbine bypass control valves. These situations are aggravated by the following conditions:

- No turbine trip.
- No main steam isolation valve (MSIV) closure.
- No main feedwater addition.
- Main steam ADVs open.
- MSR isolation valves remain open.

- SG blowdown valves remain open.

c. Control of the main steam ADVs may be lost as a result of a control room fire. Isolated control of PV-3010 and PV-3020 is available at shutdown panel "B" by use of plug-in portable signal generating-type devices.

5. Auxiliary Feedwater System

a. Automatic auxiliary feedwater actuation may not occur.

b. One steam generator auxiliary feedwater control valve for a motor-driven AFW pump may spuriously close during automatic feedwater actuation.

c. For other considerations involving the steam generators, see the Main Steam System.

6. Residual Heat Removal System

a. One of both RHR pump suction valves (HV-8701A and B for train A or HV-8702A and B for train B) can spuriously close while the pump is operating. (Assumes plant is in shutdown cooling prior to the control room fire.)

b. Deleted.

c. Fire-induced spurious opening of RHR vent valve (HV-10465 or HV-10466) may occur resulting in loss of RCS inventory or RWST inventory.

d. Train B RHR heat exchanger outlet valve HV-0607 may spuriously close or bypass valve FV-0619 may spuriously open resulting in loss of RCS cooling control during Modes 4 and 5.

7. Nuclear Service Cooling Water System

Fire-induced spurious failures of NSCW return header temperature instruments (TE-1668/1669) could result in simultaneous closure of NSCW cooling tower spray header isolation valve HV-1668A/1669A and NSCW cooling tower bypass valve HV-1668B/1669B. NSCW return flow would then be limited to the capacity of relief valve PSV-11759/11766.

8. Diesel Generator Fuel Oil Transfer System (Unit 1 only)

The diesel generator fuel oil storage tank pumps may not be available for automatic makeup to diesel fuel oil day tank. A repair in the form of lifting leads, installation of a jumper, and replacement of a fuse may be necessary at the power source for one of the two train B pumps to ensure the availability of the train B safe shutdown equipment in the event offsite power is not available. One man can accomplish this repair, and the diesel fuel oil day tank contains sufficient volume for at least 1.4 h of diesel generator operation without makeup addition.

9. Essential Safety Features Room Coolers

   a. Loss of ventilation for the train B CBCR ESF chiller room can occur due to spurious stopping of the room exhaust fan (1-1531-B7-004) and may require use of portable ventilation (not required for at least 48 h) to preclude equipment overheating.

   b. Loss of ventilation for the train B auxiliary relay cabinet room can occur due to damage to a cable in an embedded conduit resulting in inoperability of fan 2-1539-A7-002 and may require use of portable ventilation (not required for at least 24 h) to preclude equipment overheating.

10. Containment Spray System

    Containment spray actuation may occur due to fire damage in this fire area. Racking out the containment spray pump breakers will preclude loss of RWST inventory due to spurious containment spray actuation.

11. Electrical Distribution System

    Deenergization of 480-V switchgear 1BB07 may occur, resulting in loss of diesel generator building cooling, due to spurious feeder breaker opening.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 105-1
- Zone 105-2
- Zone 106
- Zone 183A

In addition, smoke detectors are installed inside the main control panel.

N. Fire Suppression

1. Automatic

   - Zone 105-1 - No zone coverage.
   - Zone 105-2 - No zone coverage.
   - Zone 106 - No zone coverage.
   - Zone 183A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

   None.

P. Ventilation

   Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables associated with its operation are located within this area.

Q. Drainage

   A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

   1.5-h-rated battery and diesel generator powered fixture(s) provide safe ingress/egress of personnel.

   1.5-h-rated battery and diesel generator powered fixture(s) provide the capability to control the plant shutdown from the main control room.

S. Deviations and Justifications (also see Appendix 9B)

   1. Unrated exterior fire area boundary:

   2. Separation by distance without full area suppression:

      Alternate safe shutdown capability is provided in the form of remote shutdown panels and other local control stations for a fire in the control room. The analysis performed to evaluate the ability to achieve safe shutdown in the event of a control room fire identified that spurious opening of CVCS auxiliary spray valve HV-8145 could cause RCS depressurization to the safety injection actuation setpoint in approximately 3.5 min (under the worst case assumed conditions). No analysis has been performed to evaluate the consequences of this event should automatic safety injection not occur (signal generated within the main control room) because of the separation available between the circuits where fire damage could cause HV-8145 to open and the circuits which must remain intact to ensure automatic actuation of a safety injection pump.

      The HV-8145 circuits in the main control room are located only in section A02 of the main control benchboard. The train A and train B safety injection pump

hand switches are located in section A01 of the main control benchboard approximately 4 horizontal ft from the hand switch for HV-8145. Individual component switches are provided with housings and, as a minimum, the connecting cables for individual safety-related components are encased in conduit. These housings and conduit are effective Regulatory Guide 1.75 separation barriers. In addition each main control benchboard section is provided with a fire detection device. The cabinets necessary for generation of the safety injection actuation signal are separated from the HV-8145 circuits in the main control benchboard by at least 30 horizontal ft.

A fire in the main control benchboard resulting in spurious opening of HV-8145 would be readily detected by the benchboard operator before the fire could propagate to the other benchboard sections where fire damage could impact operation of both safety injection pumps. A fire causing spurious opening of HV-8145 and loss of the automatic safety injection actuation signal would have to be a full engulfing fire of the main control room complex.

On the basis that neither of these conditions can occur without early identification by the control room operators who can take prompt action to preclude or terminate the undesired event, no additional analysis or fire protection features (barriers and suppression systems) are deemed necessary to achieve safe shutdown for this concern.

3. Embedded conduit:

Conduits 1BE304RL008 is embedded in the ceiling of fire zone 105-1 of this fire area. This conduit contains a circuit which could change the results of the alternate shutdown analysis, as presented in paragraph L, if it were to be damaged by a fire in this fire area. While it is anticipated that this conduit is embedded to a depth equivalent to a 3-h fire barrier, only 3.5 in. of concrete cover over the conduit can be verified.

Modification of the facility to relocate the circuits in this embedded conduit, or to otherwise provide additional protection, is not warranted because:

- This fire area (control room) is continuously manned.

- The combustible-loading fire severity values are conservatively calculated, and even with this conservatism, the equivalent concrete cover rating (80 min) provides a considerable safety margin above the fire severity in this location (54 min).

- Per SER Supplement No. 8, this was considered an acceptable deviation from CMEB 9.5-1, since a fire in the control room would be detected in its early stages and extinguished before significant room temperature increase.

4. Embedded conduit:

Conduit 2BE343RL009 is embedded in the ceiling of fire zone 105-2 of this fire area. This conduit contains a cable which could change the results of the

alternate shutdown analysis as presented in Paragraph L if it were to be damaged by a fire in this fire area. While it is anticipated that this conduit is embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 3.5 in. of concrete coverage over the conduit can be verified to exist.

Modification of the facility to relocate the cable in this embedded conduit or to otherwise provide additional protection is not warranted because:

- The fire area is continuously manned.
- Fire brigade response is expected to be prompt.
- The combustible loadings are conservatively calculated.
- Loss of the affected safe shutdown circuit does not result in an unacceptable situation for at least 24 h.

9A.1.82 FIRE AREA 1-CB-L1-B

A. Location: Control Building, Level 1

B. Drawing: AX4DJ8026

C. Description: Includes fire zones 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 124, 183B, 185

Drum storage and first aid rooms, corridors, health physics storage, secured storage, gas bottle storage, offices, laundry and decontamination rooms, clean issue room, H.P. station, reception room, vestibules, conference, lunch and storage rooms, toilets, janitor rooms, lockers and shower facilities, whole body count room, low level laboratory, radio chem laboratory, sample room, technical work room, and instrument repair room.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LA-K, 1-CB-LA-N, 1-CB-LA-L, 1-CB-LA-U, 1-CB-LA-M, 2-CB-LA-M, 2-CB-LA-K, 2-CB-LA-L, 2-CB-LA-X, -CB-LA-I, 2-CB-LA-H, 2-CB-LA-G.

- Ceiling - 3-h-rated barrier separates area from 1-CB-L2-E.

- North - 2-h-rated barrier separates area from stairwell No. 4, elevator No. 1.

  - 3-h-rated barrier separates area from 1-CB-L1-G, 1-CB-L1-A, 2-CB-L1-A, 2-CB-L1-F, 2-CB-LC-B, 2-CB-LB-X.

  - Unrated exterior area boundary.

  - 1-h-rated barrier separates area from yard.

- South - 3-h-rated barrier separates area from 1-AB-LD-B.

- East - 3-h-rated barrier separates area from 1-CB-L1-D, 1-CB-L1-C, 1-CB-L1-TSC, 1-AB-L2-A.

  - 2-h-rated barrier separates area from elevator No. 2, stairwell No.2.

- West - 3-h-rated barrier separates area from 1-AB-LD-B, 2-CB-LA-Q, 2-CB-LA-R, 1-CB-LB-S, 2-CB-LA-D, 2-AB-L2-A.

  - Unrated exterior area boundary.

- Interior - 3-h-rated barrier separates area from 1-AB-LD-B (sample chase), 1-CB-L3-M, 1-CB-LC-A.

  - 2-h-rated barrier separates area from stairwell.

  - 3-h-rated barrier separates health physics storage from corridor.

- 1-h-rated life safety wall separates drum storage from corridor.
- 1-h-rated life safety wall separates first aid, decontamination, and storage rooms from reception and corridor.
- 1-h-rated life safety wall separates storage, personnel contamination monitoring room, and lobby from corridor.
- 1-h-rated life safety wall separates men's toilet, lockers, and shower from corridor.
- 1-h-rated life safety wall separates office, whole body count room, low level laboratory, sample room, radiochemistry lab, and technical work room from corridor.
- 1-h-rated life safety wall separates instrumentation, instrument repair room, and storage room from corridor.
- 1-h-rated life safety wall separates record storage from corridor.
- 1-h-rated life safety ceiling on personnel contamination monitoring room.
- 1-h-rated life safety ceiling on corridors (rooms 128 and 120).

- Cable trays in the concealed ceiling spaces are provided with solid covers and bottoms to limit the combustion rate and intensity of a fire should one occur.

E. Area Access

- North
  - Class A door from 1-CB-L1-G, 2-CB-L1-A, 2-CB-LB-X.
  - Two class A doors from 1-CB-L1-A.
  - Certified class A door from outside.
  - Class B doors from stairwell No. 4.
- East
  - Certified class A door from 1-CB-L1-TSC, 1-AB-L2-A.
  - Class A door from 1-CB-L1-C, 1-CB-L1-D.
  - Two class B doors from stairwell No. 2.
- West
  - Two class A doors from 2-AB-L2-A.
  - Certified class A door from 2-AB-L2-A.
  - Class A door from 1-AB-LD-B, 2-CB-L1-D, 2-CB-L1-C.

- Certified class A door from 1-CB-LB-S.

- Interior
  - Class B door separates health physics storage from corridor.
  - Class A door from 1-CB-LC-A, 1-CB-L3-M.
  - Class A door in life safety wall separates drum storage from corridor.
  - Class B door in life safety wall separates first aid room from corridor.
  - Class B door in life safety wall separates decontamination room from corridor.
  - Class A door in life safety wall separates lobby from corridor.
  - Class B door in life safety wall separates women's toilet from corridor.
  - Class B door in life safety wall separates personnel contamination monitoring room from corridor.
  - Class B door in life safety wall separates men's toilet and locker room from corridor.
  - Two class B doors from stairwell.
  - Class B door in life safety wall separates office from corridor.
  - Class B door in life safety wall separates whole body count room from corridor.
  - Class B door in life safety wall separates low level laboratory from corridor.
  - Class B door in life safety wall separates radiochemistry laboratory from corridor.
  - Two class B doors in life safety wall separate instrumentation and instrument repair room from corridors.
  - Two class B doors in life safety wall separate gas bottle storage from corridor.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

1. Unit 1

- HV12128 - Control room fan discharge damper.
- HV12129 - Control room fan discharge damper.
- HV12130 - Control room fan return damper.
- HV12131 - Control room fan return damper.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

Unit 2

- 2HV12128 - Control room fan discharge damper.
- 2HV12129 - Control room fan discharge damper.
- 2HV12130 - Control room fan return damper.
- 2HV12131 - Control room fan return damper.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1808-T3-116 - Lighting isolation transformer 1ABC23RX.
- HV3520 - Residual heat removal train A sampling.
- HV3521 - Residual heat removal train B sampling.
- HV3526 - CVCS downstream of letdown heat exchanger.
- 1-1808-T3-113 - Lighting isolation transformer 1BBC23RX.

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a. Separation concerns eliminated by the operational considerations of paragraph L.

- HV3530 - CVCS downstream of mix bed demineralizer.
- Train A safety-related cables.
- Train B safety-related cables.
- 2-1808-T3-116 - Regulated Transformer 2ABC23RX.
- 2-1808-T3-113 - Regulated Transformer 2BBC23RX.

J. Nonsafety-Related Equipment

- Main control room lighting transfer switches.
- Repair and test equipment.
- Instruments.
- Health, physics equipment.
- Laboratory equipment.
- 1-1609-E5-001 - Radiation monitor minicomp cooler CRT.
- A-1535-B7-001 - CB fume hood supply fan unit.
- A-1535-H7-001-HCP - CB service area heater control panel.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 109.

   - Fixed combustible material.

     - Cellulosic materials.

     - Plastics.

   - Heat release.

- Fixed combustibles	$\leq$ 4,187,500	Btu
- Transient combustibles	1,012,500	Btu

   - Combustible loading $\leq$ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 111

- Fixed combustible material
  - Rubber goods
  - Cellulosic materials
  - Plastics
- Heat release
  - Fixed combustibles ≤ 58,217,50 Btu
  - Transient combustibles 42,662,50 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 112

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Compressed gas
- Heat release
  - Fixed combustibles ≤ 83,365,000 Btu
  - Transient combustibles 35,435,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

4. Zone No. 113

- Fixed combustible material
  - Cable insulation
  - Charcoal
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles ≤ 54,744,000 Btu
  - Transient combustibles 9,096,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

5. Zone No. 114

- Fixed combustible material
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles ≤ 54,160,000 Btu
  - Transient combustibles 20,400,000 Btu
- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

6. Zone No. 115

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
- Heat release
  - Fixed combustibles ≤ 52,520,000 Btu
  - Transient combustibles 8,400,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

7. Zone No. 116

- Fixed combustible material
  - Cellulosic materials
  - Plastics
- Heat release
  - Fixed combustibles ≤ 29,040,000 Btu
  - Transient combustibles 4,400,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

8. Zone No. 117

- Fixed combustible material
  - Rubber goods
  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 38,480,000	Btu
- Transient combustibles	8,400,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

9. Zone No. 118

- Fixed combustible material
  - Cable insulation
  - Plastics
  - Oil
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 79,506,000	Btu
- Transient combustibles	8,534,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

10. Zone No. 119

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics

- Heat release

- Fixed combustibles	≤ 30,994,00	Btu
- Transient combustibles	3,046,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

11. Zone No. 124

- Fixed combustible material
  - Cellulosic materials
- Heat release
  - Fixed combustibles ≤ 52,696,000 Btu
  - Transient combustibles 3,704,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

12. Zone No. 183B

- Fixed combustible material

  None.
- Heat release
  - Fixed combustibles ≤ 4,080,000 Btu
  - Transient combustibles 400,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

13. Zone No. 185

- Fixed combustible material
  - Cellulosic materials
- Heat release
  - Fixed combustibles ≤ 15,560,000 Btu
  - Transient combustibles 4,400,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   a. Fire damage to the control room essential cooling system dampers HV-12128, HV-12129, HV-12130, and HV-12131 may require that the plant shutdown be achieved from the train A remote shutdown panel should the control room become uninhabitable due to lack of cooling.

   b. Fire damage to the control room ceiling lighting power sources located in this fire area may require that the plant shutdown be achieved from the train A remote shutdown panel.

3a. Spurious actuation considerations (Unit 1):

   a. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

   c. Pressurizer PORV, PV-0456A, may open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 109
- Zone 111
- Zone 112
- Zone 113
- Zone 114
- Zone 115
- Zone 116
- Zone 117
- Zone 118

- Zone 119
- Zone 124
- Zone 183B
- Zone 185
- Early warning fire detection is provided in the concealed ceiling spaces with combustible materials.

N. Fire Suppression

1. Automatic

    - Zone 109 preaction sprinkler system - Total zone coverage.
    - Zone 111 preaction sprinkler system - Partial zone coverage.
    - Zone 112 - No zone coverage.
    - Zone 113 preaction sprinkler system - Partial zone coverage.
    - Zone 114 - No zone coverage.
    - Zone 115 - No zone coverage.
    - Zone 116 - No zone coverage.
    - Zone 117 preaction sprinkler system - Total zone coverage.
    - Zone 118 preaction sprinkler system - Partial zone coverage.
    - Zone 119 - No zone coverage.
    - Zone 124 preaction sprinkler system - Partial zone coverage.
    - Zone 183B - No zone coverage.
    - Zone 185 - No zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Laboratory samples in the radio chem lab and sample room.

Clothing

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate the shutdown sound powered phone system control room circuit isolation switch.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a(1).

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a(5).

9A.1.83 FIRE AREA 1-CB-L1-C

A. Location: Control Building, Level 1, Level 2

B. Drawings: AX4DJ8026, AX4DJ8027

C. Description: Includes fire zone 176

Train B electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 1-CB-LA-R.
- North - 3-h-rated barrier separates area from 1-CB-L1-B.
- South - 3-h-rated barrier separates area from 1-CB-L1-D.
- East - 3-h-rated barrier separates area from 1-AB-L2-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-B.

2. Level 2

- North - 3-h-rated barrier separates area from 1-CB-L2-E.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-D.
- West - 3-h-rated barrier separates area from 1-CB-L2-E.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-A.
- Floor - 3-h-rated barrier separates area from 1-CB-L1-B.

E. Area Access

1. Level 1

- West - Class A door from 1-CB-L1-B.

2. Level 2

- West - Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- Train B safe shutdown cables. (Unit 2 separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 176

- Fixed combustible material

  - Cable insulation

- Heat release

-	Fixed combustibles	$\leq$ 262,320,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 520,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 390 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown Train A.

1b. For a fire in this area, shut down Unit 2 using safe shutdown Train A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the Trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

b. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

c. Main steam atmospheric dump valve PV-3020 may open due to a fire in this area.

d. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this area.

e. CVCS train A charging pump miniflow valve HV-8111A may close due to a fire in this fire area.

f. Train A charging path containment isolation valve HV-8105 may close due to a fire in this area.

g. Train B motor driven auxiliary feedwater pump 1-1302-P4-002 may start due to a fire in this fire area.

h. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

i. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

j. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 176

N. Fire Suppression

1. Automatic

- Zone 176 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9A.1.84 FIRE AREA 1-CB-L1-D

A. Location: Control Building, Level 1, Level 2

B. Drawings: AX4DJ8026, AX4DJ8027

C. Description: Includes fire zone 177

Normal electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 1-CB-LA-Q.
- North - 3-h-rated barrier separates area from 1-CB-L1-C.
- South - 3-h-rated barrier separates area from 1-CB-L1-B, elevator No. 2.
- East - 3-h-rated barrier separates area from 1-AB-L2-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-B.

2. Level 2

- North - 3-h-rated barrier separates area from 1-CB-L1-C.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L2-E, elevator No. 2.
- West - 3-h-rated barrier separates area from 1-CB-L2-E.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-A, 1-CB-L4-A.

E. Area Access

1. Level 1

- West - Class A door from 1-CB-L1-B.

2. Level 2

- West - Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Nonsafety-related spurious actuation concerning cables only.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 177

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
   - Heat release
     - Fixed combustibles $\leq$ 322,380,526 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 721,385 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 541 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 177

N. Fire Suppression

1. Automatic

   - Zone 177 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9A.1.85 FIRE AREA 1-CB-L1-E

A. Location: Control Building, Level 1, Level 2

B. Drawings: AX4DJ8026, AX4DJ8027

C. Description: Includes fire zone 108

Normal electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 1-CB-LA-O.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-A.
- East - 3-h-rated barrier separates area from 1-CB-L1-F.
- West - 3-h-rated barrier separates area from 1-CB-LC-A.

2. Level 2

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-B.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L2-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-F.
- West - 3-h-rated barrier separates area from 1-CB-LC-A.

E. Area Access

Level 2

- South - Two class A doors from 1-CB-L2-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Nonsafety-related spurious actuation concerns cables only.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 108

   - Fixed combustible material

     - Cable insulation

   - Heat release

-	Fixed combustibles	168,238,600	Btu
-	Transient combustibles	800,000	Btu

   - Combustible loading 540,059 Btu/ft^2

   - Fire severity (wood equivalent) 405 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train RHR system vent valve HV-10465 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 108

N. Fire Suppression

1. Automatic

- Zone 108 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix B, Section C.5.a(1).

9A.1.86 FIRE AREA 1-CB-L1-F

A. Location: Control Building, Level 1, Level 2

B Drawings AX4DJ8026, AX4DJ8027

C. Description: Includes fire zone 107

Train A Electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 1-CB-LA-P.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-A.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-E.

2. Level 2

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-C.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L2-B, 1-CB-L2-E.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - 3-h-rated barrier separates area from 1-CB-L1-E.

E. Area Access

Level 2

- South - Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- Train A safe shutdown cables. (Unit 2 separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-1805-R3-02P - Alternate FLEX Connection Box 1NB3002P.

K. Combustible Loading

1. Zone No. 107

   - Fixed combustible material

     - Cable insulation

   - Heat release

- Fixed combustibles	117,008,840	Btu
- Transient combustibles	800,000	Btu

   - Combustible loading 456,623 Btu/ft^2

   - Fire severity (wood equivalent) 342 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 107

N. Fire Suppression

1. Automatic

   - Zone 107 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9A.1.87 FIRE AREA 1-CB-L1-G

A. Location: Control Building, Level 1

B. Drawing: AX4DJ8026

C. Description: Includes fire zone 110

Record storage room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LA-N.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L2-E.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-TSC.
- West - 3-h-rated barrier separates area from 1-CB-L1-A, 1-CB-LB-A.

E. Area Access

- South - Class A door from 1-CB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- AHV12162 - Kitchen/toilet exhaust damper.
- AHY12162A - Kitchen/toilet exhaust damper solenoid.
- AHY12162B - Kitchen/toilet exhaust damper solenoid.
- AHY12162C - Kitchen/toilet exhaust damper solenoid.
- AHV12163 - Kitchen/toilet exhaust damper.
- AHY12163A - Kitchen/toilet exhaust damper solenoid.
- AHY12163B - Kitchen/toilet exhaust damper solenoid.

- AHY12163C - Kitchen/toilet exhaust damper solenoid.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- A-1531-B7-008 - CBCR kitchen, toilet, conference room exhaust fan.
- AHV-12799A - Record storage smoke exhaust.
- AHV-12799B - Record storage smoke exhaust.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 110

   - Fixed combustible material
     - Cable insulation
     - Cellulosic materials
     - Plastics
   - Heat release

- Fixed combustibles	$\leq$ 88,800,000	Btu
- Transient combustibles	40,400,00	Btu
• Combustible loading	$\leq$280,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 210	min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B.

---

a. Separation concerns eliminated by the operational considerations of paragraph L.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2. Special operational and design considerations:

   It may not be possible to close either control room kitchen, toilet, and conference room ventilation exhaust damper HV-12162 or HV-12163 due to a fire in this fire area.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 110

- Early warning fire detection is provided in the concealed ceiling spaces with combustible materials.

N. Fire Suppression

1. Automatic

   - Zone 110 Halon suppression system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9A.1.88 FIRE AREA 1-CB-L1-TSC

A. Location: Control Building, Level 1

B. Drawing: AX4DJ8026

C. Description: Includes fire zones 601, 602, 603, 604, 605

Technical support center.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-LA-G, 1-CB-LA-H, 1-CB-LA-I.
- Ceiling - Unrated exterior area boundary.
- North - 2-h-rated barrier separates area from stairwell No.3.
  - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-CB-LA-D.
- West - 3-h-rated barrier separates area from 1-CB-L1-G, 1-CB-L1-B.
- Interior - 1-h-rated barrier separates computer and communications room from corridor.
  - 1-h-rated life safety wall separates electrical equipment room, battery room, men's and women's toilets, and work area from corridor.
  - 1-h-rated life safety wall separates conference room from corridor.
  - 1-h-rated life safety wall separates conference room from mechanical equipment room.
  - 1-h-rated life safety wall separates CRT display room from mechanical equipment room.
  - 1-h-rated life safety wall separates work area from mechanical equipment room.
- Cable trays in concealed ceiling spaces are provided with solid covers and bottoms to limit the combustion rate and intensity of a fire should one occur.

E. Area Access

- West - Certified class A door from 1-CB-L1-B.

- South - Class A doors from 1-AB-L2-A.
- North - Two certified class A doors from outside.
  - Class A door from stairwell.
- Interior - Class C door in life safety wall separates computer room from corridor.
  - Class C door in life safety wall separates communication room from corridor.
  - Class C door in life safety wall separates CRT display room from corridor.
  - Two class C doors in life safety wall separate conference from corridor.
  - Class A door separates mechanical equipment room from corridor.
  - Class C door in life safety wall separates work area from corridor.
  - Class C door in life safety wall separates women's toilet from corridor.
  - Class C door in life safety wall separates men's toilet from corridor.
  - Class C door in life safety wall separates battery room from corridor.
  - Class C door in life safety wall separates electrical equipment room from corridor.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-2301-Q3-F56 - TSC Local suppression indicating panel.
- 1-2304-Q3-007 - Halon control panel.
- 1-2304-R4-006 - Fire protection halon system.
- A-1500-V7-008-TCN - TSC HVAC panel.
- A-1563-A7-001 - TSC air handling unit.
- A-1563-B7-003 - TSC toilet and conference room exhaust fan.
- A-1563-H7-002-000 - TSC OSA electric duct heater.
- A-1563-J7-001 - TSC humidifier
- A-1563-J7-001-MCP - TSC humidifier electric control panel.
- A-1563-N7-001 - TSC filtration unit.
- A-1564-P7-001 - TSC filtration unit.
- A-1805-D3-13T - FLEX Manual Transfer Switch ANBM13T.
- A-1805-R3-13P - Gai-Tronics FLEX Connection Box ANBM13P.
- A-1807-Q3-TS1 - 120-V-ac essential distribution panel.
- A-1807-Q3-TS2 - 120-V-ac essential distribution panel.
- AHV21007A - TSC filter unit outlet.
- AHV21007B - TSC filter unit return.
- AHV21007C - TSC AC unit OSA intake.
- AHV21007D - TSC filter unit OSA intake.
- AHV21007E - TSC ac unit return.
- AHV21013 - TSC filtration unit and charcoal filter.
- AHV21017B - TSC toilet room exhaust fan damper.
- AHV21038A - TSC heater flow control.
- AHV21038B - TSC heater flow control.

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 601

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics

- Heat release

- Fixed combustibles	≤ 245,910,000	Btu
- Transient combustibles	149,850,000	Btu
• Combustible loading	≤ 240,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 180	min

2. Zone No. 602

- Fixed combustible material

  - Charcoal
  - Cellulosic materials
  - Plastics

- Heat release

- Fixed combustibles	54,760,000	Btu
- Transient combustibles	17,800,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

3. Zone No. 603

- Fixed combustible material

  - Cable insulation
  - Plastics

- Heat release

- Fixed combustibles	52,032,780	Btu
- Transient combustibles	49,400,000	Btu
• Combustible loading	452,825	Btu/ft^2

- Fire severity (wood equivalent) 340 min

4. Zone No. 604

- Fixed combustible material

  - Cellulosic materials
  - Plastics

- Heat release

  - Fixed combustibles ≤ 25,106,250 Btu
  - Transient combustibles 9,893,750 Btu

- Combustible loading ≤ 200,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 150 min

5. Zone No. 605

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 59,000,000 Btu
  - Transient combustibles 8,400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3 Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 601
- Zone 602
- Zone 603
- Zone 604
- Zone 605
- Early warning fire detection is provided in the concealed ceiling spaces with combustible materials.

N. Fire Suppression

1. Automatic

    - Zone 602 preaction sprinkler system – Partial zone coverage.
    - Zone 603 - No zone coverage.
    - Zone 605 preaction sprinkler system - Total zone coverage.

2. Manual

    - Zone 601 manual Halon suppression system - Total zone coverage.
    - Zone 604 manual sprinkler system - Total zone coverage.

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate the shutdown sound powered phone system control room circuit isolation switch.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a(1).

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a(5).

9.A.1.89 FIRE AREA 1-CB-L2-A

A. Location: Control Building, Level 2

B. Drawing: AX4DJ8027

C. Description: Includes fire zones 121

Train B Auxiliary relay room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-L1-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-H.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from Unit 1 electrical bridge.
- South - 3-h-rated barrier separates area from 1-CB-L2-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-E.
- West - 3-h-rated barrier separates area from 2-CB-L2-A.

E. Area Access

- South - Two class A doors from 1-CB-L2-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1816-U3-015 - Auxiliary relay panel 1BCPAR7.
- 1-1816-U3-003 - Auxiliary relay panel 1BCPAR3.
- 1-1816-U3-004 - Auxiliary relay panel 1DCPAR4.
- 1-1539-A7-002 - Control building auxiliary relay room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 121

   - Fixed combustible material

     - Cable insulation

   - Heat release

- Fixed combustibles	49,169,800	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	246,157	Btu/ft^2
• Fire severity (wood equivalent)	185	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train B motor-driven auxiliary feedwater pump 1-1302-P4-002 may start due to a fire in this area.

   b. The turbine-driven auxiliary feedwater pump 1-1302-P4-001 may start due to fire damage to HV-5106 or AMSAC autostart circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 121

N. Fire Suppression

1. Automatic

- Zone 121 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9.A.1.90 FIRE AREA 1-CB-L2-B

A. Location: Control Building, Level 2

B. Drawing: AX4DJ8027

C. Description: Includes fire zone 120

Train B cable spreading room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-L1-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-H, 1-CB-L3-M, 1-CB-LC-A.
- North - 3-h-rated barrier separates area from 1-CB-L2-A, 1-CB-L1-E, 1-CB-L1-F, 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-L2-E.
- East - 3-h-rated barrier separates area from 2-CB-L2-E.
- West - 3-h-rated barrier separates area from 2-CB-L2-B.

E. Area Access

- North - Two class A doors from 1-CB-L2-A, 1-CB-L1-E.
- East - Two class A doors from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1601-U3-T04 - Termination cabinet 1BCPT04.
- 1-1601-U3-T10 - Termination cabinet 1BCPT10.
- 1-1601-U3-T20 - Termination cabinet 1BCPT20
- Train B safe shutdown cables.

Unit 2

- Train B safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

- 1-1601-U3-T02 - Termination cabinet 1NCPT02.
- 1-1601-U3-T06 - Termination cabinet 1BCPT06.
- 1-1601-U3-T08 - Termination cabinet 1BCPT08.
- 1-1601-U3-T14 - Termination cabinet 1BCPT14.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1601-U3-T12 - Termination cabinet 1NCPT12.
- 1-1601-U3-T18 - Termination cabinet 1NCPT18.
- 1-1601-U3-T22 - Termination cabinet 1NCPT22.
- 1-1601-U3-T24 - Termination cabinet 1NCPT24.
- 1-1601-U3-T26 - Termination cabinet 1NCPT26.
- 1-1601-U3-T28 - Termination cabinet 1NCPT28.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 120

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
   - Heat release
     - Fixed combustibles ≤ 1,442,400,00 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 400,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 300 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train A.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3a. Spurious actuation considerations (Unit 1):

a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

b. Automatic starting of the train B motor-driven auxiliary feedwater pump 1-1302-P4-002 may occur due to fire damage to steam generator No. 2 and No. 3 level transmitter circuits in this fire area.

c. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

d. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

e. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

f. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area.

g. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

h. Train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

i. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

j. Train B RHR system vent valve, HV-10466, may open due to fire in this fire area.

k. Train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may start due to a fire in this fire area.

l. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to fire damage in HV-5106 or AMSAC autostart circuits in this fire area.

m. Automatic starting of the train A motor-driven auxiliary feedwater pump, 1-1302-P4-003, may occur due to fire damage to steam generator No. 1 and No. 4 level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

   Automatic starting of the train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may occur due to fire damage to steam generator 1 and 4 level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

n. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to steam generator level transmitter circuits or to the feedwater flow transmitters associated with 3 out of 4 steam generator loops in this fire area.

o. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

p. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

q. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

r. Safety injection actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

t. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

u. Containment spray actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

v. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q-SPA, 125-V-dc power feeder circuits in this fire area.

w. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPA, 120-V-ac power feeder circuits in this fire area.

x. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 120-V-ac power feeder circuits in this fire area.

y. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

z. RHR to safety injection pump valve, HV-8804B, may open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 120

N. Fire Suppression

1. Automatic

   - Zone 120 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.1.91 DELETED

9A.1.92 DELETED

9A.1.93 FIRE AREA 1-CB-L2-E

A. Location: Control Building, Level 2

B. Drawing: AX4DJ8027

C. Description: Includes fire zones 122A, 122B, 123, 127, 128, 129, 130, 131, 133A; 133B, 134, 182, 201

Inverter charger and panel, battery, computer and storage rooms, corridors, lobby, vestibules, normal filter unit, instrument calibration laboratory, warehouse storage, lab storage, janitor, men's toilet, women's toilet, office spaces, fire protection valve room, and lube oil analysis room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L1-A, 1-CB-L1-G, 1-CB-L1-C, 2-CB-LA-R.

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-H, 1-CB-L3-A, 1-CB-L3-L, 1-CB-L3-M, 1-CB-LC-A, 1-CB-L3-J, 1-CB-L3-K, 1-AB-LD-B (horizontal sample chase).

  - Unrated exterior area boundary.

- North - 3-h-rated barrier separates area from 1-CB-L1-F, 1-CB-LB-A, 1-CB-L2-B, 2-CB-L2-B, 2-CB-L1-F, 2-CB-LC-B, 2-CB-LB-X.

  - 2-h-rated barrier separates area from stairwell No. 4 and elevator No. 1.

  - Unrated exterior area boundary.

- South - 3-h-rated barrier separates area from 1-AB-LD-B (including horizontal sample chase).

- East - Unrated exterior area boundary.

  - 2-h-rated barrier separates elevator No. 2 and stairwell No. 2.

  - 3-h-rated barrier separates area from 1-CB-L1-C and 1-CB-L1-D.

- West - 3-h-rated barrier separates area from 2-CB-LA-Q, 2-CB-LA-R, 1-AB-LD-B, 1-CB-LB-S, 2-AB-L2-A, 2-AB-LA-D.

  - Unrated exterior area boundary.

- Interior - 3-h-rated barrier separates area from 1-CB-LC-A, 1-CB-L3-M, 1-AB-LD-B (sample chase).

  - 2-h-rated barrier separates area from stairwell.

- 1-h-rated life safety wall separates warehouse storage and fire protection valve room from corridor and lobby.

- 1-h-rated life safety wall separates HVAC room from corridor.

- 1-h-rated life safety wall separates computer area from corridor and HVAC room.

- 1-h-rated life safety wall separates computer area from inverter charger and panel room.

- 1-h-rated life safety wall separates lobby from storage.

- 1-h-rated life safety wall separates HVAC room from lobby.

- 1-h-rated life safety wall separates men's toilet, janitor, HVAC, storage vestibule, and laboratory storage, from corridor.

- 1-h-rated life safety wall separates instrument calibration laboratory from corridor.

- 1-h-rated life safety ceiling on computer area.

- 1-h-rated life safety wall separates fire protection valve room from corridor.

- 1-h-rated life safety wall separates office spaces, storage areas, lube oil analysis room from corridor.

- 1-h-rated life safety ceiling on office spaces and lube oil analysis areas.

• Cable trays in the concealed ceiling spaces are provided with solid covers and bottoms to limit the combustion rate and intensity of a fire should one occur.

E. Area Access

• West - Certified class A door from 2-AB-L2-A, 1-CB-LB-S.

  - Class A door from 2-CB-LA-Q, 2-CB-LA-R, 1-AB-LD-B.

• North - Class A door from 1-CB-L1-F.

  - Two class A doors from 1-CB-L2-B, 2-CB-L2-B.

  - Class B door from stairwell No. 4, 2-CB-LB-X.

• East - Class A door from 1-CB-L1-C, 1-CB-L1-D.

  - Class B door from stairwell No. 2.

- Certified class A door from outside.

- Interior
  - Class A door from 1-CB-LC-A, 1-CB-L3-M.
  - Class B door in life safety wall separates warehouse storage from lobby.
  - Class A door in life safety wall separates HVAC room from fire protection valve room.
  - Certified class B door in life safety wall separates computer area from corridor.
  - Class B door from stairwell.
  - Class B door in life safety wall separates HVAC room from corridor.
  - Class B door in life safety wall separates computer area from inverter charger and panel room.
  - Class B door in life safety wall separates HVAC room from lobby.
  - Class B door in life safety wall separates men's toilet from corridor.
  - Class C door in life safety wall separates fire protection valve room from corridor.
  - Class B door in life safety wall separates vestibule from corridor.
  - Class B door in life safety wall separates janitor room from corridor.
  - Class B door in life safety wall separates HVAC and storage from corridor.
  - Class B door in life safety wall separates instrument calibration laboratory from corridor.
  - Four class B doors in life-safety wall separates office space from corridor.
  - Class B door in life-safety wall separates lube oil analysis room from corridor.
  - Three class B doors in life-safety wall separates storage areas from corridor.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- 1HV12146 - Control room normal supply isolation damper.
- 1HY12146A - Control room supply damper solenoid.
- 1HV12147 - Control room normal supply isolation damper.
- 1HY12147A - Control room supply damper solenoid.
- 1HV12148 - Control room normal return isolation damper.
- 1HY12148A - Control room return damper solenoid.
- 1HV12149 - Control room normal return isolation damper.
- 1HY12149A - Control room return damper solenoid.
- 2HV12146 - Control room normal supply isolation damper.
- 1HY12146B - Control room supply damper solenoid.
- 1HY12146C - Control room supply damper solenoid.
- 2HV12147 - Control room normal supply isolation damper.
- 1HY12147B - Control room supply damper solenoid.
- 1HY12147C - Control room supply damper solenoid.
- 2HV12148 - Control room normal return isolation damper.
- 1HY12148B - Control room return damper solenoid.
- 1HY12148C - Control room return damper solenoid.
- 2HV12149 - Control room normal return isolation damper.
- 1HY12149B - Control room return damper solenoid.
- 1HY12149C - Control room return damper solenoid.

- 1-1605-C5-ASI - Alternate shutdown indicating panel.
- 1-1623-D5-006B - Display processing unit B.
- 2HY12146A - Control room normal supply isolation damper.
- 2HY12146B - Control room normal supply isolation damper.
- 2HY12146C - Control room normal supply isolation damper.
- 2HY12147A - Control room normal supply isolation damper.
- 2HY12147B - Control room normal supply isolation damper.
- 2HY12147C - Control room normal supply isolation damper.
- 2HY12148A - Control room normal return isolation damper.
- 2HY12148B - Control room normal return isolation damper.
- 2HY12148C - Control room normal return isolation damper.
- 2HY12149A - Control room normal return isolation damper.
- 2HY12149B - Control room normal return isolation damper.
- 2HY12149C - Control room normal return isolation damper.
- 21623-D5-004 - Remote processing unit B2.
- 21623-D5-006B - Regulatory Guide 1.97 cabinet/display processing unit B.
- 21605-C5-ASI - Alternate shutdown indication panel.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1623-D5-003 - Remote processing unit B cabinet 1.
- 1-1623-D5-004 - Remote processing unit B cabinet 2.
- 2-1623-D5-003 - Remote processing unit.
- 2-1623-D5-004 - Remote processing unit.
- 2-1623-D5-006B - Display processing unit.

- 2-1605-D5-ASI - Alternate shutdown indicating panel.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1500-V7-003-CBN - Local CB HVAC panel.
- 1-1623-D5-005 - Remote processing unit.
- 2-1500-V7-003-CBN - Local CB HVAC panel.
- 2-1623-D5-005 - Remote processing unit.
- 2-1808-Q3-L27 - 480/277-V-ac lighting panel 2NLP27.
- 2-1808-Q3-L28 - 208V/120-V-ac lighting panel 2NLP28.
- A-1533-A7-001 - CB level 2 service area normal ac unit.
- A-1533-A7-002 - CAS air handling unit.
- A-1533-A7-003 - CB whole body counting room air handling unit.
- A-1535-N7-001 - CB filtration unit.
- A-1535-B7-002 - CB contamination area smoke fan.
- A-1537-B7-002 - Battery room exhaust fan.
- A-1806-S3-CAS - 125-V-dc switchgear ANDC1.
- A-1807-Q3-CA3 - 120-V-ac essential distribution panel.
- A-1807-Q3-CA2 - 120-V-ac essential distribution panel.
- A-1807-Y3-CASI11 - Essential AC inverter ANDCI11.
- A-1807-Y3-CASI12 - Essential AC inverter ANDCI12.
- A-1806-B3-CASB - 125-V-ac battery ANDCASB.
- A-2417-S4-001-E01 - Hot water heater.
- A-2417-S4-001-E03 - Hot water heater.
- AHV12761A - CB level 1 and 2 service area normal AC unit exhaust.

- AHV12761B - CB level 1 and 2 service area normal AC unit recirculation.
- AHV12761C - CB level 1 and 2 service area normal AC unit inlet.
- AHV12769 - CB contamination area smoke exhaust damper.
- AHV12770 - CB contamination area smoke exhaust damper.
- AHV12776A - CB fumehood filter unit damper.
- AHV12776B - CB fumehood filter unit damper.
- AHV12930 - CB level 2 CAS area AC outlet.
- Nonsafety-related cables.
- Laboratory equipment and instrument.

K. Combustibles Loading

1. Zone No. 122A

   - Fixed combustible material

     - Cable insulation
     - Charcoal

   - Heat release

- Fixed combustibles	≤ 275,207,500	Btu
- Transient combustibles	74,712,500	Btu

   - Combustible loading ≤ 240,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 180 min

2. Zone No. 122B

   - Fixed combustible material

     - Cable insulation

   - Heat release

- Fixed combustibles	≤ 171,040,000	Btu
- Transient combustibles	800,000	Btu

   - Combustible loading ≤ 120,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 90 min

3. Zone No. 123

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials

- Heat release

- Fixed combustibles	≤ 306,400,000	Btu
- Transient combustibles	800,000	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

4. Zone No. 127

- Fixed combustible material

  - Plastics

- Heat release

- Fixed combustibles	≤ 40,160,000	Btu
- Transient combustibles	400,000	Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

5. Zone No. 128

- Fixed combustible material

  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 39,200,000	Btu
- Transient combustibles	800,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

6. Zone No. 129

- Fixed combustible material

  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 190,000,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 240,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 180	min

7. Zone No. 130

- Fixed combustible material

  - Oil

- Heat release

- Fixed combustibles	≤ 22,000,000	Btu
- Transient combustibles	400,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

8. Zone No. 131

- Fixed combustible material

  - Cable insulation
  - Rubber goods
  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 107,120,000	Btu
- Transient combustibles	8,400,000	Btu
• Combustible loading	≤ 160,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 120	min

9. Zone No. 133A

- Fixed combustible material

  - Cable insulation
  - Plastics

- Heat release

- Fixed combustibles	≤ 20,423,750	Btu
- Transient combustibles	11,976,250	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

10. Zone No. 133B

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 289,920,000	Btu
- Transient combustibles	1,920,000	Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

11. Zone No. 134

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics

- Heat release

- Fixed combustibles	≤ 60,816,000	Btu
- Transient combustibles	944,000	Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

12. Zone No. 182

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 118,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

13. Zone No. 201

- Fixed combustible material
  - Cellulosic materials
  - Oil/grease
  - Plastics
- Heat release
  - Fixed combustibles ≤ 120,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 240,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 180 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1. For a fire in this fire area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3a. Spurious actuation considerations (Unit 1):

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Deleted.

c. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-O455/PT-0457 circuits in this fire area.

d. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

e. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

f. CVCS volume control tank outlet valve, LV-0112C, may close due to fire in this fire area.

g. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

h. Train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

i. Deleted.

j. Train B RHR system vent valve, HV-10466, may open due to a fire in this fire area.

k. Train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may start due to a fire in this fire area.

l. The turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

m. Automatic starting of the train A motor-driven auxiliary feedwater pump, 1-1302-P4-003, may occur due to fire damage to steam generator 1 and 4 level transmitter circuits in this fire area.

n. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to steam generator level transmitter circuits in this fire area.

o. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

p. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

q. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

r. Safety injection actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

t. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

u. Containment spray actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

v. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

w. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPA, 120-V-ac power feeder circuits in this fire area.

x. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 1-1605-Q5-SPB, 120-V-ac power feeder circuits in this fire area.

y. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

z. RHR to safety injection pump valve, HV-8804B, may open due to a fire in this fire area.

3b. Spurious actuation considerations (Unit 2):

a. Pressurizer PORV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

b. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

c. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

d. CVCS volume control tank outlet valve, LV-0112C, may close due to fire in this fire area.

e. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

f. Train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

g. Train A RHR heat exchanger bypass valve, FV-0618, may open due to a fire in this fire area.

h. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

i. Train B RHR system vent valve, HV-10466, may open due to a fire in this fire area.

j. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

k. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

l. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this fire area.

m. The turbine-driven auxiliary feedwater pump, 2-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

n. Automatic starting of the train A motor-driven auxiliary feedwater pump, 2-1302-P4-003, may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

o. Automatic starting of the train B motor-driven auxiliary feedwater pump, 2-1302-P4-002, may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

p. Automatic starting of the turbine-driven auxiliary feedwater pump, 2-1302-P4-001, may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

q. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

r. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

t. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 2-1605-Q5-SPB, 125-V-dc power feeder circuits in this fire area.

u. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

v. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

w. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 2-1605-Q5-SPA, 120-V-ac power feeder circuits in this fire area.

x. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet, 2-1605-Q5-SPB, 120-V-ac power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 122A
- Zone 122B
- Zone 123
- Zone 127
- Zone 128
- Zone 129
- Zone 130
- Zone 131
- Zone 133A
- Zone 133B
- Zone 134
- Zone 182
- Zone 201
- Early warning fire detection is provided in the concealed ceiling spaces with combustible materials.

N. Fire Suppression

1. Automatic

   - Zone 122A - No zone coverage.
   - Zone 122B - No zone coverage.
   - Zone 123 - No zone coverage.
   - Zone 127 - No zone coverage.

- Zone 128 preaction sprinkler system - Total zone coverage.
- Zone 129 preaction sprinkler system - Partial zone coverage.
- Zone 130 preaction sprinkler system - Total zone coverage.
- Zone 131 - No zone coverage.
- Zone 133B preaction sprinkler system - Partial zone coverage.
- Zone 134 - No zone coverage.
- Zone 182 - No zone coverage.
- Zone 201 preaction sprinkler system - Partial zone coverage.

2. Manual

- Zone 133A manual sprinkler system - Total zone coverage.

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a.(5).

3. Class B door in 3-h-rated fire area boundary:

   See Section 9A.2.48.S.2.

4. Safety-related cable trays without automatic fire suppression:

   Position C.5.e of NRC BTP CMEB 9.5-1 recommends that all safety-related cable trays, even when separated from their redundant division counterparts by a 3-h fire barrier, be protected from the effects of a potential exposure fire by providing automatic water fire suppression systems in the area where such a fire could occur. The BTP also allows reliance on manual fire suppression capability (in lieu of automatic) when all of the four following criteria are met:

   a. Area is accessible for manual firefighting.

   b. The number of equivalent standard 24-in.-wide cable trays (both safety-related and nonsafety-related) in a given area is six or less.

   c. The cables in the trays are not required to achieve and maintain hot shutdown.

   d. Smoke detection is provided in the area of the cable trays (cable tray line-type heat detectors are not considered to be required when smoke detectors are provided).

   Fire zone 182 is a vertical electrical cable chase which is part of this fire area. This cable chase is isolated by 3-h fire barriers from the other vertical cable chases in the area and contains only limited quantities of cable insulation. Access to the room is very good for manual firefighting and smoke detectors are provided in the room. In addition, the combustible loading for the fire zone is just slightly in excess of the 100,000 Btu/ft^2 value, which is considered low, and the physical arrangement of the location would tend to preclude the storage of materials which would represent a significant hazard to the cables in the electrical cable trays. While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in this fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9.A.1.94 FIRE AREA 1-CB-L3-A

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 179

Train B Electrical equipment room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L2-E, 1-CB-L1-C.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-H.
- South - 3-h-rated barrier separates area from 1-CB-L4-A, 1-CB-L3-L.
- East - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-CB-LC-A.

E. Area Access

- North - Class A doors from 1-CB-L3-H
- South - Class A door from 1-CB-L3-L

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TIC13152 - Fan 1-1539-A7-006 interlock.
- 1-1539-A7-006 - Electrical equipment room ESF cooler.
- 1-1805-S3-BBA - Class 1E 480-V MCC 1BBA.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 1-1805-Q3-PB5 - 480-V-ac distribution panel 1NBPB5.
- 1-1808-T3-013 - Lighting distribution transformer 1NBL117X.
- 1-1808-T3-095 - Distribution transformer 1NBPB522X.
- 1-1328-P5-GRC - Gennerex regulator cubicle.
- A-1701-U3-TDC - Telephone/page test and distribution cabinet.
- A-1807-Y3-X6 - Distribution transformer ANBU11X.
- A-1807-Y3-TSCI7 - Telephone/page test essential inverter ANDTI7.
- A-1808-Q3-L84 - 480/277-V-ac lighting panel ANLP84.
- A-1813-Y3-I1 - Fire alarm signaling inverter.
- Nonsafety-related cables.

K. Combustibles Loading

1. Zone No. 179

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	40,779,144	Btu
- Transient combustibles	800,000	Btu

- Combustible loading 494,990 Btu/ft^2

- Fire severity (wood equivalent) 371 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operation and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 179

N. Fire Suppression

1. Automatic

   - Zone 179 - preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breaker in 120-V-ac panel 1BYA1.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9.A.1.95 FIRE AREA 1-CB-L3-B

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 180

Normal electrical shaft

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L1-E.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L3-H.
- East - 3-h-rated barrier separates area from 1-CB-L3-C.
- West - 3-h-rated barrier separates area from 1-CB-LC-A.

E. Area Access

- South - Class A door from 1-CB-L3-H.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 180

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	38,894,440	Btu
- Transient combustibles	800,000	Btu

- Combustible loading 325,364 Btu/ft^2

- Fire severity (wood equivalent) 244 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 180

N. Fire Suppression

1. Automatic

   - Zone 180 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.96 FIRE AREA 1-CB-L3-C

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 178

Train A electrical shaft

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L1-F.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L3-H.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- West - 3-h-rated barrier separates area from 1-CB-L3-B.

E. Area Access

- South - Class A door from 1-CB-L3-H.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components (Units 1 and 2)

- Train A Safe shutdown cables. (Unit 2 separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 178

- Fixed combustible material

  - Cable insulation

- Heat release

-	Fixed combustibles	32,058,630	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading 280,843 Btu/ft^2

- Fire severity (wood equivalent) 211 min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown train B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown trains A or B.

2a. Special operational and design considerations (Unit 1):

None.

2b. Special operational and design considerations (Unit 2):

To preclude smoke infiltration into the control room due to a fire in this fire area, close the normal ventilation system isolation dampers by using both the trains A and B control switches. (The electrical circuits for at least one of the redundant dampers is free of fire damage.)

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 178

N. Fire Suppression

1. Automatic

- Zone 178 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.97 DELETED

9A.1.98 DELETED

9A.1.99 DELETED

9A.1.100 DELETED

9A.1.101 FIRE AREA 1-CB-L3-H

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 135

Normal ac room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L2-A, 1-CB-L2-B, 1-CB-L2-E, 2-CB-L2-A, 2-CB-L2-B.
- Ceiling - Unrated exterior area boundary.
- North - 2-h-rated barrier separates area from elevator No. 1.
  - 3-h-rated barrier separates area from 2-CB-L3-C, 2-CB-L3-B, 1-CB-L3-B, 1-CB-L3-C, 1-CB-LC-A.
  - Unrated barrier separates area from 1-CB-LB-A.
  - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L3-K, 1-CB-L3-J, 1-CB-LC-A, 1-CB-L3-M, 1-CB-L3-A.
- East - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 2-CB-LC-B, 2-CB-LB-X.
  - Unrated exterior area boundary.

E. Area Access

- South - Class A door from 1-CB-L3-J, 1-CB-L3-M, 1-CB-LC-A, 1-CB-L3-A.
  - Two class A doors from 1-CB-L3-K.
- North - Class A doors from 1-CB-L3-B, 1-CB-L3-C, 2-CB-L3-B, 2-CB-L3-C, 1-CB-LB-A.
- West - Class B door from 2-CB-LB-X.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1539-A7-005 - Control building normal AC room ESF cooler.
- 1-1805-S3-ABA - Class 1E 480-V MCC 1ABA.
- 1-1807-Y3-16 - Regulated Transformer 1ABA29RX
- TIC 13150 - Fan 1-1539-A7-005 interlock.
- Train A safe shutdown cables.

<u>Unit 2</u>

- 2-1805-S3-ABA - Class 1E 480-V MCC 2ABA.
- 2-1539-A7-005 - Control building normal AC room ESF cooler.
- TIC 13150 - Fan 2-1539-A7-005 interlock.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1539-A7-005 - CB Normal ac unit.
- 2-1805-S3-ABA - 480-V Mcc 2ABA.
- HV12114 - Main control room air intake isolation.
- HV12115 - Main control room air intake isolation.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- A-1539-A7-003 - CB cable spread room normal ac unit.
- A-1805-S3-B13 - 480-V switchgear ANB13.
- A-1805-S3-B14 - 480-V switchgear ANB14.
- A-1805-S3-B30 - 480-V switchgear ANB30.
- A-1805-S3-NBC - 480-V MCC ANBC.

- A-1805-S3-NBF - 480-V MCC ANBF.
- A-1805-S3-NBM - 480-V MCC ANBM.
- AHV12910A - CB cable spread room smoke exhaust.
- AHV12910B - CB cable spread room smoke exhaust.
- AHV12910C - CB cable spread room recirculation.
- ATV12900A - CB cable spread room smoke exhaust.
- Nonsafety-related cables.

K. Combustibles Loading

1. Zone No. 135

   - Fixed combustible material

     - Cable insulation
     - Rubber goods

   - Heat release

- Fixed combustibles	≤ 454,480,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of safe shutdown capability (Units 1 and 2).

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design consideration:

   None

3. Spurious actuation considerations:

   None

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 135

N. Fire Suppression

1. Automatic

- Zone 135 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and equipment associated with its operation are located in fire zone 135.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V MCC ANBC.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a.(1).

2. Class B door in 3-h-rated fire area boundary:

See Section 9A.2.48.S.2.

3. Separation of fire areas without 3-h fire resistance rating:

   Fire area 1-CB-L3-H (fire zone 135) and fire area 1-CB-LB-A (fire zone 73) are interconnected by a common 32 in. by 48 in. by 4 ft 8 in. HVAC duct to smoke removal fan A-1533-B7-002. The sharing of this interconnecting supply duct between fire areas is acceptable because:

   a. No intervening combustibles exist in the HVAC smoke removal chase and the HVAC supply duct.

   b. Fire areas 1-CB-L3-H and 1-CB-LB-A are provided with fire detection systems.

   c. Fire areas 1-CB-L3-H and 1-CB-LB-A are provided with automatic preaction fire suppression systems.

   d. Should a fire occur in one of the fire areas, the physical arrangement of the air shaft interconnecting with the HVAC duct with a fire damper on the outlet of the HVAC duct makes the contamination of the adjacent area by the passage of smoke and hot gases unlikely.

   e. A fire in either fire area 1-CB-L3-H or 1-CB-LB-A requires the use of the same safe shutdown train B.

9A.1.102 DELETED

9A.1.103 FIRE AREA 1-CB-L3-J

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 126B

Unit 2 train A filter room and chiller room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L2-E, 2-CB-L2-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-H.
- East - 3-h-rated barrier separates area from 1-CB-L3-M.
- South - 3-h-rated barrier separates area from 1-CB-L3-L.
- West - 3-h-rated barrier separates area from 1-CB-L3-K, 1-CB-L3-L.

E. Area Access

- North - Class A door from 1-CB-L3-H.
- South - Class A door from 1-CB-L3-L.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- None.

<u>Unit 2</u>

- 2-1592-T7-001 - Train A ESF chilled water expansion tank.
- 2-1531-N7-001 - Control room cooler unit.
- 2-1592-C7-001 - ESF chiller A.

- 2-1592-P7-001 - Chilled water pump A.
- 2-1531-B7-002 - CBCR ESF chiller room exhaust fan.
- FT1802 - Nuclear service water cooling water to ESF chiller A.
- TE12124 - Control room temperature control.
- TV12124 - Control room cooler valve.
- TY12124A - TV12124 signal converter.
- FT22425 - ESF chilled water flow interlock.
- TDC4170 - ESF chiller A interlock.
- TV11740 - Nuclear service cooling water from ESF chiller A.
- TY11740 - Nuclear service cooling water from ESF chiller A.
- HV12118 - Control room OSA supply damper A.
- HY12118 - Control room OSA supply damper A solenoid.
- TIS12303 - Fan 2-1531-B7-002 interlock.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- 2-1531-U7-001/002-H01 - Electric unit heaters.

K. Combustibles Loading

1. Zone No. 126B

   - Fixed combustible material

     - Cable insulation
     - Charcoal 8,905 lb

   - Heat release

-	Fixed combustibles	≤ 210,477,500	Btu
-	Transient combustibles	129,522,500	Btu

- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

L. Evaluation of safe shutdown capability (Units 1 and 2).

1a. For a fire in this area, shut down Unit 1 using safe shutdown trains A or B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown train B.

2. Special operational and design consideration:

None.

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 126B

N. Fire Suppression

1. Automatic

   - Zone 126B preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

- Unrated exterior fire area boundary:

  See Appendix 9B, section C.5.a.(1).

9A.1.104 FIRE AREA 1-CB-L3-K

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zones 125B, 136

Unit 2 train B filter room, chiller room, and water heater room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-L2-E, 2-CB-LA-Q, 2-CB-LA-R, 2-CB-L2-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-H.
- South - 3-h-rated barrier separates area from 1-CB-L3-L, 1-CB-LB-S, 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-CB-L3-J.
- West - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.

E. Area Access

- South - Class A door from 1-CB-L3-L, 1-AB-LD-B.
  - Certified class A door from 1-CB-LB-S.
- West - Class A door from 1-CB-L4-A.
- North - Two class A doors from 1-CB-L3-H.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- None.

Unit 2

- 2-1805-S3-BBA - Class 1E 480-V MCC 2BBA.
- 2-1531-N7-002 - Control room cooler unit.
- 2-1592-C7-002 - ESF chiller B.
- 2-1592-P7-002 - Chilled water pump B.
- 2-1592-T7-002 - Chilled water expansion tank B.
- 2-1531-B7-004 - CBCR ESF chiller room exhaust fan.
- FT1803 - Nuclear service water cooling water to ESF chiller B.
- TDC4193 - ESF chiller B interlock.
- TV11675 - Nuclear service cooling water from ESF chiller B.
- TY11675 - Nuclear service cooling water from ESF chiller B.
- HV12119 - Control room OSA supply damper B.
- HY12119 - Control room OSA supply damper B solenoid.
- TV12125 - Control room cooler valve.
- TY12125A - TV12125 signal converter.
- TE12125 - Control room temperature control.
- FT22426 - ESF chilled water flow interlock.
- TIS 12300 - Fan 2-1531-B7-004 interlock.
- Train B safe shutdown cables.
- 2-1807-Y3-17 - Regulated transformer 2BBA02RX.

I. Safety-Related Equipment

- AHV-12152 - CBCR minimum outside air inlet.
- AHV-12153 - CBCR minimum outside air inlet.
- 2HV-12114 - Main control room outside air intake isolation.
- 2HV-12115 - Main control room outside air intake isolation.

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- A-2417-S4-001-E01/E02 - Water heaters.
- A-2417-S4-001-M01 - Hot water pump/motor.
- 2-1531-U7-003/004-H01 - Electric unit heaters.
- 2-1807-Q3-VN4 - 120-V-ac distribution panel.
- 2-1807-Y3-RX27 - Regulated transformer 2NBS39RX.

K. Combustibles Loading

1. Zone No. 125B

   - Fixed combustible material
     - Cable insulation
     - Rubber goods
     - Charcoal
   - Heat release

- Fixed combustibles	≤ 255,677,500	Btu
- Transient combustibles	129,522,500	Btu
• Combustible loading	≤ 120,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 90	min

2. Zone No. 136

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 18,200,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability (Units 1 and 2)

1a. For a fire in this area, shut down Unit 1 using safe shutdown trains A or B.

1b. For a fire in this area, shut down Unit 2 using safe shutdown train A.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 125B
- Zone 136

N. Fire Suppression

1. Automatic

- Zone 125B preaction sprinkler system – Partial zone coverage.
- Zone 136- No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a.(5).

9A.1.105 FIRE AREA 1-CB-L3-L

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 137

Lobby and corridor

D. Description of Boundaries

- Floor- 3-h-rated barrier separates area from 1-CB-L2-E, 1-AB-LD-B (sample chase).
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A, 1-CB-LB-S.
- North - 3-h-rated barrier separates area from 1-CB-LB-S, 1-AB-LD-B, 1-CB-L3-K, 1-CB-L3-J, 1-CB-L3-M, 1-CB-LC-A, 1-CB-L3-A.
- South - 3-h-rated barrier separates area from 1-FB-L3-A, 1-FB-L3-B, and 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-CB-L4-A.
  - 2-h-rated barrier separates area from stairwell No. 2 and elevator No. 2.
  - Unrated exterior area boundary.
- West- Unrated exterior area boundary.

E. Area Access

- North - Class A door from 1-CB-L3-K, 1-CB-L3-J, 1-CB-L3-M, 1-CB-LC-A, 1-CB-L3-A.
- West- Class A door from 1-CB-L4-A.
  - Class B door from stairwell No. 2
- South - Class A door from 1-AB-LD-B.
  - Class A door from 1-FB-L3-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-1592-T7-001 - Tank train A ESF chilled water expansion.
- Train B safe shutdown cables
- 1-1807-Y3-17 - Regulated Transformer 1BBA29RX

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 137

   - Fixed combustible material

     - Cable insulation

   - Heat release

- Fixed combustibles	≤ 62,200,000	Btu
- Transient combustibles	800,000	Btu

   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 137

N. Fire Suppression

1. Automatic

   - Zone 137 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.105A FIRE AREA 1-CB-L3-M

A. Location: Control Building, Level 3, 2, 1, A, B

B. Drawings: AX4DJ8022, AX4DJ8023, AX4DJ8028, AX4DJ8027, AX4DJ8026, and AX4DJ8024

C. Description: Includes fire zones 125A, and 57B

Train B filter and chiller rooms

D. Description of Boundaries

1. Level 3

- Floor - 3-h-rated barrier separates area from 1-CB-L2-B, 2-CB-L2-E, 2-CB-L2-B, 1-AB-LD-B (sample chase).
- Ceiling - 3-h-rated barrier separates area from 1-CB-L4-A.
  - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-H.
- South - 3-h-rated barrier separates area from 1-CB-L3-L.
- East - 3-h-rated barrier separates area from 1-CB-LC-A.
- West - 3-h-rated barrier separates area from 1-CB-L3-J.

2. Level 2

- North - 3-h-rated barrier separates area from 1-CB-L2-E.
- East - 3-h-rated barrier separates area from 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-L2-E, 1-AB-LD-B (sample chase).
- West - 3-h-rated barrier separates area from 1-CB-L2-E, 1-AB-LD-B (sample chase).

3. Level 1

- North - 3-h-rated barrier separates area from 1-CB-L1-B.
- East - 3-h-rated barrier separates area from 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-L1-B.

- West - 3-h-rated barrier separates area from 1-CB-L1-B, 1-AB-LD-B (sample chase).

4. Level A

- North - 3-h-rated barrier separates area from 1-CB-LA-U.
- East - 3-h-rated barrier separates area from 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-LA-U.
- West - 3-h-rated barrier separates area from 1-CB-LA-U.

5. Level B

- North - 3-h-rated barrier separates area from 1-CB-LC-B, 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-LC-A.
- South - 3-h-rated barrier separates area from 1-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LC-B.
- Floor - Unrated concrete base mat.
- Ceiling - 3-h-rated barrier separates area from 1-CB-LA-U.

E. Area Access

1. Level 3

- North - Class A door from 1-CB-L3-H.
- South - Class A door from 1-CB-L3-L.

2. Level 2

- North - Class A door from 1-CB-L2-E.

3. Level 1

- South - Class A door from 1-CB-L1-B.

4. Level A

- North - Class A door from 1-CB-LA-U.

5. Level B

- North - Class A door from 1-CB-LC-B.

- South - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- FT1803 - Nuclear service cooling water to ESF chiller "B".
- TDC4193 - ESF chiller "B" interlock.
- TV11675 - Nuclear service cooling water from ESF chiller "B".
- TY11675 - Nuclear service cooling water from ESF chiller "B".
- 1HV12119 - Control room OSA supply damper "B".
- 1HY12119 - Control room OSA supply damper "B" solenoid.
- TV12125 - Control room cooler valve.
- TY12125A - TV12125 signal converter.
- TE12125 - Control room temperature control.
- FT22426 - ESF chilled water flow interlock.
- 1-1531-N7-002 -Control room cooler unit.
- 1-1592-C7-002 -ESF chiller B.
- 1-1592-P7-002 - Chilled water pump B.
- 1-1592-T7-002 - Chilled water expansion tank B.
- 1-1531-B7-004 - CBCR ESF chiller room exhaust fan.
- TIS 12300 - Fan 1-1531-B7-004 interlock.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV12194 - CBCR filter unit charcoal filter deluge.
- 1-1592-T7-004 - Chemical feed pot.
- AHV12798 - CB fumehood unit charcoal filter deluge.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 125A

   - Fixed combustible material

     - Cable insulation
     - Charcoal

   - Heat release

- Fixed combustibles	≤ 255,917,500	Btu
- Transient combustibles	129,522,500	Btu

   - Combustible loading ≤ 160,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 120 min

2. Zone No. 57B

   - Fixed combustible quantities

     - None

   - Heat release

- Fixed combustibles	≤ 27,720,000	Btu
- Transient combustibles	400,000	Btu

   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 125A
- Zone 57B

N. Fire Suppression

1. Automatic

   - Zone 57B - No zone coverage.
   - Zone 125A preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and equipment associated with its operation are located in fire zone 57B.

Q. Drainage

A flooding analysis has determined that drainage from the fire area is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.1.106 FIRE AREA 1-CB-L4-A

A. Location: Control Building, Levels 3, 4

B. Drawings: AX4DJ8028, AX4DJ8029

C. Description: Includes fire zone 170, 181

HVAC Rooms

D. Description of Boundaries

1. Level 3 (Zone 181)

- Floor - 3-h-rated barrier separates area from 1-CB-L1-C, 1-CB-L1-D.
- North - 3-h-rated barrier separates area from 1-CB-L3-A.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from elevator No.2.
- West - 3-h-rated barrier separates area from 1-CB-L3-L.

2. Level 3 (Zone 170)

- Floor - 3-h-rated barrier separates area from 2-CB-LA-Q.
- North - 3-h-rated barrier separates area from 1-CB-L3-K.
- East - 3-h-rated barrier separates area from 1-CB-L3-K.
- South - 3-h-rated barrier separates area from 1-CB-L3-K.
- West - Unrated exterior area boundary.

3. Level 4

- Floor - 3-h-rated barrier separates area from 1-CB-L3-A, 1-CB-L3-H, 1-CB-LC-A, 1-CB-L3-J, 1-CB-LC-B, 1-CB-L3-K, 1-CB-L3-L, 2-CB-L2-D, 1-CB-LB-S, 1-CB-LC-D.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-FB-L3-A, 1-FB-L3-B, 1-AB-LD-B.

  \- Unrated exterior area boundary.

- East - Unrated exterior area boundary.

  - 2-h-rated barrier separates area from lobby, stairwell No. 2 and elevator No. 2.

- West - Unrated exterior area boundary.

  - 3-h-rated barrier separates area from 1-CB-LB-S.

E. Area Access

1. Level 3 (Zone 181)

   - West - Class A door from 1-CB-L3-L.

2. Level 3 (Zone 170)

   - East - Class A door from 1-CB-L3-K.

3. Level 4

   - East - Certified class B door from lobby.

   - North - Class A door from roof area.

   - North - Nonrated door from roof area.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 1-1533-B7-002 - CB lighting switchgear normal AC unit.

- 1-1533-A7-003 - CB level 4 switchgear and battery room.

- 1-1806-B3-CN5 - Battery charger 1ND3ACA.

- 1-1806-B3-CN6 - Battery charger 1ND3ACB.
- 1-1806-B3-CN7 - Battery charger 1ND3BCA.
- 1-1806-B3-CN8 - Battery charger 1ND3BCB.
- 1-1806-S3-DN3 - 125-V-dc switchgear 1ND3A.
- 2-1806-B3-CN5 - Battery charger 2ND3ACA.
- 2-1806-B3-CN6 - Battery charger 2ND3ACB.
- 2-1806-B3-CN7 - Battery charger 2ND3BCA.
- 2-1806-B3-CN8 - Battery charger 2ND3BCB.
- A-1531-A7-001 - CB normal air conditioning unit.
- A-1531-A7-002 - CB normal air conditioning unit.
- A-1531-B7-005 - CBCR normal ac equipment room exhaust fan.
- A-1531-B7-006 - CBCR normal chiller room exhaust fan.
- A-1531-B7-009 - CB return and exhaust fan.
- A-1531-B7-010 - CB return and exhaust fan.
- A-1541-A7-001 - CB normal air conditioning unit.
- A-1541-A7-002 - CB normal air conditioning unit.
- A-1591-C7-001 - Normal chiller unit.
- A-1591-C7-002 - Normal chiller unit.
- A-1591-C7-003 - Normal chiller unit.
- A-1591-T7-002 - Chemical feed pot.
- A-1591-P7-001 - Normal chilled water pump.
- A-1591-P7-002 - Normal chilled water pump.
- A-1591-P7-003 - Normal chilled water pump.
- A-1591-V7-001 - Air separator.
- A-1591-T7-001 - Chiller expansion tank.

- AHV12143 - CBCR ac unit intake.
- AHV12144 - CBCR ac unit intake.
- AHV12150 - CBCR return and exhaust air damper.
- AHV12151 - CBCR return and exhaust air damper.
- AHV12168A - CBCR smoke exhaust operation.
- AHV12168B - CBCR smoke exhaust operation.
- AHV12168D - CBCR smoke exhaust damper.
- ATV12314 - CBCR outside air intake.
- ATV12314B - CBCR outside air damper.
- ATV12316A - CBCR normal chiller room exhaust.
- ATV12316D - CBCR outside air intake.
- Nonsafety-related cables.

K. Combustible loading

1. Zone No. 170

- Fixed combustible material
  - Cable insulation
  - Rubber goods
  - Plastics
- Heat release

- Fixed combustibles	≤ 388,337,500	Btu
- Transient combustibles	46,582,500	Btu

• Combustible loading	40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

2. Zone No. 181

- Fixed combustible material
  - Cable insulation
  - Rubber goods

- Heat release

- Fixed combustibles	$\leq$ 51,607,300	Btu
- Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 403,133 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 302 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 170

- Zone 181

N. Fire Suppression

1. Automatic

   - Zone 170 - No zone coverage.

   - Zone 181 preaction sprinkler system – Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a.(1).

2. Unlabeled door:

   See Appendix 9B, section C.5.a.(5).

3. No fire damper in a rated fire area boundary barrier:

   No fire dampers are installed in two ventilation ducting penetrations in the south control building wall of this fire area near column lines, C13 and C10 (one near each) at el 281 ft. This wall is a 3-h-rated fire area boundary barrier which separates this fire area from the seismic gap between the control building and the fuel handling building. This deviation is acceptable because:

   a. Fire dampers are installed in these ventilation ducting penetrations in the north wall of the fuel handling building which will isolate fire areas 1-FB-L3-A and 1-AB-LD-B (adjoining fire areas) from the seismic gap and from this fire area.

   b. The interconnecting ducting between the fuel handling building fire damper sleeve and the ventilation ducting penetration through the 3-h-rated fire barrier of this area is noncombustible flexible material or sheet metal ducting.

   c. There is no combustible material in the immediate vicinity of the ventilation penetrations within this fire area.

   d. While the seismic gap does contain some combustible material (exposed electrical cable insulation), it is a small quantity (relative), and an exposure fire within this area is not considered credible as the area is not accessible (seismic gap is approximately 5-1/2 in. wide).

e. Safe shutdown capability is not jeopardized as the safety-related cables inside the seismic gap are train B, and fire area 1-CB-L4-A does not contain any safe shutdown equipment or cables.

Modification of the plant to provide rated fire dampers in these ventilation penetrations would not significantly increase the level of protection provided by the existing design.

9A.1.107 FIRE AREA 1-FB-LC-A

A. Location: Fuel Building, Levels B, C, A, and 1

B. Drawings: AX4DJ8031, AX4DJ8032

C. Description: Includes fire zones 15, 132, 29

Pipe penetration rooms

D. Description of Boundaries

1. Level C

   - Floor - Unrated concrete base mat.
   - North - Unrated exterior area boundary.
   - South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LC-C, and 1-AB-LD-A.
   - East - Unrated barrier separates area from containment building 1-CTB.
   - West - 3-h-rated barrier separates area from 1-CB-LC-A.

2. Level B

   - North - 3-h-rated barrier separates area from 1-AB-LD-B.
   - South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LC-C, and 1-AB-LD-A.
   - East - Unrated barrier separates area from containment building 1-CTB.
   - West - 3-h-rated barrier separates area from 1-AB-LD-B.

3. Level A

   - Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
   - North - 3-h-rated barrier separates area from 1-CB-LA-I.
   - South - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-LA-A.
   - East - Unrated barrier separates area from containment building 1-CTB.
   - West - 3-h-rated barrier separates area from 1-AB-LD-B.

- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B, 1-AB-L2-A.

4. Level 1

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 1-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-L2-A.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B (sample chase).

E. Area Access

1. Level B

- West - Class A door from 1-AB-LD-B.
- South - Class A door from 1-AB-LD-B.

2. Level A

- West - Class A door from 1-AB-LD-B.

3. Level 1

- South - Class door from 1-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- PT0934 - Containment pressure transmitter.
- PT0936 - Containment pressure transmitter.
- HV8103C - RCP 3 seal water inlet valve.
- HV8103D - RCP 4 seal water inlet valve.
- HV8809B - Residual heat removal pump to cold legs valve.

- HV10466 - Residual heat removal "B" vent valve.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1513-P5-HMB - Containment hydrogen monitor train B.
- 1-1555-A7-018 - Air handling unit.
- HV-1807 - Containment cooling A7003/A7004 cw valve.
- HV-1809 - Containment cooling A7007/A7008 cw valve.
- HV-1823 - Containment cooling A7003/A7004 valve.
- HV-1831 - Containment cooling A7007/A7008 cw valve.
- HV-2135 - Reactor cavity CCE7002 cw valve.
- HV-2139 - Reactor cavity E7002 cw valve.
- HV-2793A - Hydrogen monitor isolation valve.
- HV-3502 - Reactor cooling system hot leg sample valve.
- HV-3508 - Pressurizer liquid space sample valve.
- HV-3514 - Pressurizer steam space sample valve.
- HV-7136 - Reactor drain tank pump discharge valve.
- HV-7150 - Reactor cooling drain tank vent isolation valve.
- HV-8028 - Pressurizer relief tank primary water isolation valve.
- HV-8033 - Pressurizer relief tank vent isolation valve.
- HV-8212 - Post-accident gas sample return inlet valve.
- HV-8221 - Hydrogen monitor isolation valve.
- HV-8811B - Containment sump isolation.
- HV-9001B - Containment spray pump valve.
- HV-9003B - Containment spray pump P6002 suction valve.
- 1-1213-E6-002 - Spent fuel pit HXB.

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1227-P4-001 - Penetration area sump pump.
- 1-1227-P4-002 - Penetration area sump pump.
- HV-28206 - Fire protection system valve.
- Nonsafety-related cable.

K. Combustible Loading

1. Zone No. 15

   - Fixed combustible material

     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles $\leq$ 457,000,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading $\leq$ 120,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 90 min

2. Zone No. 29

   - Fixed combustible material

     - Rubber goods

   - Heat release

     - Fixed combustibles $\leq$ 3,640,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading 40,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 132

- Fixed combustible material

  - Cable insulation
  - Compressed gas
  - Oil/grease
  - Plastics
  - Cellulosic materials
  - Rubber goods

- Heat release

-	Fixed combustibles	$\leq$ 183,200,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this fire area use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area.

   b. CVCS train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

   c. The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

   d. Train B RHR system vent valve, HV-10466, may open due to a fire in this fire area.

   e. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

   f. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 15
- Zone 29
- Zone 132

N. Fire Suppression

1. Automatic

    - Zone 15 preaction sprinkler system - Partial zone coverage.
    - Zone 29 preaction sprinkler system - Total zone coverage.
    - Zone 132 preaction sprinkler system - Partial zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.A.(1).

9A.1.108 DELETED

9A.1.109 FIRE AREA 1-FB-L3-A

A. Location: Fuel Building, Levels 3

B. Drawing: AX4DJ8032

C. Description: Includes fire zone 167

Post-accident exhaust filter room, train A

D. Description of Boundaries - Level 3

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-L, 1-CB-L4-A.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-FB-L3-B.
- West - 3-h-rated barrier separates area from 1-AB-LD-B.

E. Area Access

- East - Class A door from 1-FB-L3-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

- A-1542-N7-001 train A post-accident exhaust filter unit.
- AHV-12510 - Post-accident filter unit damper.
- AHV-12512 - Post-accident filter unit damper.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- AHV-12486 - Post-accident filter unit damper.
- Nonsafety-related cables.

K. Combustibles Loading

1. Zone No. 167

   - Fixed combustible material
     - Charcoal
   - Heat release

- Fixed combustibles	$\leq$ 35,989,000	Btu
- Transient combustibles	28,211,000	Btu

   - Combustible loading $\leq$ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 167

N. Fire Suppression

1. Automatic

   - Zone 167 preaction sprinkler system - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Post-accident filter unit is designed to retain and collect radioactivity.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a.(1).

9A.1.110 FIRE AREA 1-FB-L3-B

A. Location: Fuel Building, Levels 3

B. Drawing: AX4DJ8032

C. Description: Includes fire zone 168

Post-accident exhaust filter room, train B

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-CB-L3-L, 1-CB-L4-A.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-FB-L3-A.

E. Area Access

- West - Class A door from 1-FB-L3-A.
- North - Class A door from 1-CB-L3-L.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

- A-1542-N7-002 - Train B post-accident exhaust filter unit.
- AHV-12511 - Post-accident filter unit damper.
- AHV-12513 - Post-accident filter unit damper.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- AHV-12487 - Charcoal filter deluge valve.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 168

   - Fixed combustible material
     - Charcoal
   - Heat release
     - Fixed combustibles $\leq$ 35,709,000 Btu
     - Transient combustibles 28,211,000 Btu
   - Combustible loading $\leq$ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown trains A or B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 168

N. Fire Suppression

1. Automatic

   - Zone 168 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Post accident exhaust filter unit is designed to retain and collect radioactivity.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary.

See Appendix 9B, section C.5.A.(1).

9A.1.111 FIRE AREA 1-CTB

A. Location: Containment

B. Drawings: AX4DJ8033, AX4DJ8034, AX4DJ8035, AX4DJ8036

C. Description: Includes fire zone 140A, 140B, 140C, 140E

Containment

D. Description of Boundaries

- The containment wall is an unrated fire area boundary.
- 2-h-rated barrier around the two staircases.

E. Area Access

- Emergency lock at el 187 ft 10-1/2 in. at 120° clockwise.
- Personnel lock at el 220 ft 0 in. at about 210° clockwise.
- Class B doors in entries to staircases.

F. Sealed Penetrations

The containment penetrations (mechanical and electrical) are not rated.

G. Fire Dampers

There are no dampers in the containment wall which is the boundary barrier.

H. Safe Shutdown Components

- Core exit temperature thermocouples TE-10002, 10003, 10006, 10008 thru 10012, 10014, 10016 thru 10019, 10021, 10022, 10024 through 10026, 10028, 10034[i], 10036, 10037, 10040, and 10050.
- 1-1201-B6-001 - Steam generator loop 1.
- 1-1201-B6-002 - Steam generator loop 2.
- 1-1201-B6-003 - Steam generator loop 3.
- 1-1201-B6-004 - Steam generator loop 4.
- 1-1201-V6-001 - Reactor vessel.
- 1-1201-V6-002 - Pressurizer.
- 1-1201-V6-003 - Pressurizer relief tank.

- HV8095A - Reactor head vent valve.
- HV8095B - Reactor head vent valve.
- HV8096A - Reactor head vent valve.
- HV8096B - Reactor head vent valve.
- HV0442A - Reactor head vent valve.
- HV0442B - Reactor head vent valve.
- HV8000A - Pressurizer PORV block valve.
- HV8000B - Pressurizer PORV block valve.
- HV8145 - CVCS auxiliary spray valve.
- HY8145 - Auxiliary spray valve solenoid.
- LT0459 - Pressurizer level transmitter.
- LT0460 - Pressurizer level transmitter.
- PT0403 - Reactor coolant system wide range pressure transmitter.
- PT0405 - Reactor coolant system wide range pressure transmitter.
- PV0455A - Pressurizer PORV.
- PV0456A - Pressurizer PORV.
- RE13135A - Regulatory Guide 1.97 neutron flux chamber.
- TE0413A - Reactor coolant system T-hot wide range loop 1.
- TE0413B - Reactor coolant system T-cold wide range loop 1.
- TE0423B - Reactor coolant system T-cold wide range loop 2.
- TE0433B - Reactor coolant system T-cold wide range loop 3.
- TE0443A - Reactor coolant system T-hot wide range loop 4.
- TE0443B - Reactor coolant system T-cold wide range loop 4.
- PV0455B - Pressurizer spray valve.
- PV0455C - Pressurizer spray valve.

- PT0455 - Pressurizer pressure transmitter.
- PT0456 - Pressurizer pressure transmitter.
- PT0457 - Pressurizer pressure transmitter.
- PT0458 - Pressurizer pressure transmitter.
- PSV8010A - Pressurizer code safety valve.
- RE13135B - Regulatory Guide 1.97 neutron flux chamber.
- PSV8010B - Pressurizer code safety valve.
- PSV8010C - Pressurizer code safety valve.
- PSE10459 - Pressurizer relief tank rupture disk.
- PSE10460 - Pressurizer relief tank rupture disk.
- HV8701A - Residual heat removal pump "A" suction valve.
- HV8701B - Residual heat removal pump "A" suction valve.
- HV8702A - Residual heat removal pump "B" suction valve.
- HV8702B - Residual heat removal pump "B" suction valve.
- HV15216A - S/G 1 blowdown isolation valve.
- HY15216A - S/G 1 blowdown isolation valve solenoid.
- HV15216B - S/G 2 blowdown isolation valve.
- HY15216B - S/G 2 blowdown isolation valve solenoid.
- HV15216C - S/G 3 blowdown isolation valve.
- HY15216C - S/G 3 blowdown isolation valve solenoid.
- HV15216D - S/G 4 blowdown isolation valve.
- HY15216D - S/G 4 blowdown isolation valve solenoid.
- HV15212A - S/G 1 blowdown isolation valve.
- HY15212A - S/G 1 blowdown isolation valve solenoid.
- HV15212B - S/G 2 blowdown isolation valve.

- HY15212B - S/G 2 blowdown isolation valve solenoid.
- HV15212C - S/G 3 blowdown isolation valve.
- HY15212C - S/G 3 blowdown isolation valve solenoid.
- HV15212D - S/G 4 blowdown isolation valve.
- HY15212D - S/G 4 blowdown isolation valve solenoid.
- LT0501 - S/G 1 wide range level transmitter.
- LT0502 - S/G 2 wide range level transmitter.
- LT0503 - S/G 3 wide range level transmitter.
- LT0504 - S/G 4 wide range level transmitter.
- LT0517 - S/G 1 level transmitter.
- LT0518 - S/G 1 level transmitter.
- LT0519 - S/G 1 level transmitter.
- LT0551 - S/G 1 level transmitter.
- LT0527 - S/G 2 level transmitter.
- LT0528 - S/G 2 level transmitter.
- LT0529 - S/G 2 level transmitter.
- LT0552 - S/G 2 level transmitter.
- LT0537 - S/G 3 level transmitter.
- LT0538 - S/G 3 level transmitter.
- LT0539 - S/G 3 level transmitter.
- LT0553 - S/G 3 level transmitter.
- LT0547 - S/G 4 level transmitter.
- LT0548 - S/G 4 level transmitter.
- LT0549 - S/G 4 level transmitter.
- LT0554 - S/G 4 level transmitter.

- LV0460 - Reactor coolant system normal letdown isolation valve.
- LY0460 - Reactor coolant system normal letdown solenoid.
- LV0459 - Reactor coolant system normal letdown isolation valve.
- LY0459 - Reactor coolant system normal letdown solenoid.
- HV1978 - Auxiliary component cooling water supply isolation valve.
- HV1974 - Auxiliary component cooling water return isolation valve.
- HV8146 - Normal charging path valve.
- HV8875A - Safety injection accumulator 1 vent valve.
- HV8875B - Safety injection accumulator 2 vent valve.
- HV8875C - Safety injection accumulator 3 vent valve.
- HV8875D - Safety injection accumulator 4 vent valve.
- HV8875E - Safety injection accumulator 1 vent valve.
- HV8875F - Safety injection accumulator 2 vent valve.
- HV8875G - Safety injection accumulator 3 vent valve.
- HV8875H - Safety injection accumulator 4 vent valve.
- HV0943A - Safety injection accumulator header vent valve.
- HV0943B - Safety injection accumulator header vent valve.
- 1-1208-E6-001 - Regenerative heat exchanger.
- HV0123 - Excess letdown heat exchanger discharge valve.
- HY0123 - Excess letdown heat exchanger discharge valve solenoid.
- HV8153 - Excess letdown isolation valve.
- HY8153 - Excess letdown isolation valve solenoid.
- HV8154 - Excess letdown isolation valve.
- HY8154 - Excess letdown isolation valve solenoid.
- Train A safe shutdown cables.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1204-V6-002 - Accumulator tank.
- 1-1204-V6-003 - Accumulator tank.
- 1-1204-V6-004 - Accumulator tank.
- 1-1204-V6-005 - Accumulator tank.
- 1-1208-E6-002 - Excess letdown HX.
- 1-1501-A7-001 - Containment cooling units.
- 1-1501-A7-002 - Containment cooling units.
- 1-1501-A7-003 - Containment cooling units.
- 1-1501-A7-004 - Containment cooling units.
- 1-1501-A7-005 - Containment cooling units.
- 1-1501-A7-006 - Containment cooling units.
- 1-1501-A7-007 - Containment cooling units.
- 1-1501-A7-008 - Containment cooling units.
- 1-1513-H7-001 - Electric hydrogen recombiner.
- 1-1513-H7-002 - Electric hydrogen recombiner.
- 1-1612-P5-TRB - Thermocouple reference junction B.
- 1-1612-P5-TRA - Thermocouple reference junction A.
- HV-0780 - Reactor cavity and CTMT sump header isolation.
- HV-2041 - Thermal barrier cooling water return.
- HV-2582A - CTB cooling unit A7001 discharge damper.
- HV-2582B - CTB cooling unit A7002 discharge damper.
- HV-2583A - CTB cooling unit A7003 discharge damper.
- HV-2583B - CTB cooling unit A7004 discharge damper.

- HV-2584A - CTB cooling unit A7005 discharge damper.
- HV-2584B - CTB cooling unit A7006 discharge damper.
- HV-2585A - CTB cooling unit A7007 discharge damper.
- HV-2585B - CTB cooling unit A7008 discharge damper.
- HV-2624A - CTB post LOCA purge exhaust isolation.
- HV-2624B - CTB post LOCA purge exhaust isolation.
- HV-2626A - CTB normal purge supply isolation.
- HV-2626B - CTB normal purge supply isolation.
- HV-2628A - CTB normal purge exhaust isolation.
- HV-2628B - CTB normal purge exhaust isolation.
- HV-2792A - Hydrogen monitor isolation.
- HV-2792B - Hydrogen monitor isolation.
- HV-7126 - Reactor coolant drain tank vent isolation.
- HV-7699 - Reactor coolant drain tank pump discharge.
- HV-3500 - Reactor coolant system hot leg sample.
- HV-3501 - Reactor coolant system hot leg sample.
- HV-3507 - Pressurizer liquid space sample.
- HV-3513 - Pressurizer steam space sample.
- HV-3548 - Reactor coolant system hot leg sample.
- HV-8030 - PRT makeup water isolation.
- HV-8032 - Reactor vessel leak isolation.
- HV-8047 - PRT vent isolation.
- HV-8143 - Excess letdown to volume control tank.
- HV-8147 - Charging to reactor coolant system isolation.
- HV-8160 - CVCS letdown isolation.

- HV-8112 - RCP seal water return isolation.
- HV-8141B - RCP2 seal leakoff isolation.
- HV-8141C - RCP3 seal leakoff isolation.
- HV-8141D - RCP4 seal leakoff isolation.
- HV-8149A - Letdown orifice isolation.
- HV-8149B - Letdown orifice isolation.
- HV-8149C - Letdown orifice isolation.
- HV-8211 - Post-accident gas sample return to containment.
- HV-8823 - Safety injection pumps recirc. test isolation.
- HV-8824 - Safety injection system recirc. test isolation.
- HV-8825 - RHRS hot leg injection crossover isolation.
- HV-8808A - Accumulator isolation loop 1.
- HV-8808B - Accumulator isolation loop 2.
- HV-8808C - Accumulator isolation loop 3.
- HV-8808D - Accumulator isolation loop 4.
- HV-8843 - Safety injection system test line bypass.
- HV-8871 - Accumulator holding tank isolation.
- HV-8877A - Accumulator loop 1 test line isolation.
- HV-8877B - Accumulator loop 2 test line isolation.
- HV-8877C - Accumulator loop 3 test line isolation.
- HV-8877D - Accumulator loop 4 test line isolation.
- HV-8878A - Accumulator loop 1 fill line isolation.
- HV-8878B - Accumulator loop 2 fill line isolation.
- HV-8878C - Accumulator loop 3 fill line isolation.
- HV-8878D - Accumulator loop 4 fill line isolation.

- HV-8879A - Accumulator loop 1 injection test line isolation.
- HV-8879B - Accumulator loop 2 injection test line isolation.
- HV-8879C - Accumulator loop 3 injection test line isolation.
- HV-8879D - Accumulator loop 4 injection test line isolation.
- HV-8881 - Safety injection pump accumulator fill isolation.
- HV-8882 - Safety injection test line.
- HV-8889A - Safety injection system recir. test isolation.
- HV-8889B - Safety injection system recir. test isolation.
- HV-8889C - Safety injection system recir. test isolation.
- HV-8889D - Safety injection system recir. test isolation.
- HV-8890A - Safety injection system recir. test isolation.
- HV-8890B - Safety injection system recir. test isolation.
- HV-9380A - Containment atmosphere unit service Air.
- HV-9380B - Containment atmosphere unit service air.
- HV-9553A - S/G 1 blowdown sample isolation.
- HV-9553B - S/G 1 blowdown sample isolation.
- HV-9554A - S/G 2 blowdown sample isolation.
- HV-9554B - S/G 2 blowdown sample isolation.
- HV-9555A - S/G 3 blowdown sample isolation.
- HV-9555B - S/G 3 blowdown sample isolation.
- HV-9556A - S/G 4 blowdown sample isolation.
- HV-9556B - S/G 4 blowdown sample isolation.
- HV-10950 - Accumulator tank 1 local sample isolation.
- HV-10951 - Accumulator tank 2 local sample isolation.
- HV-10952 - Accumulator tank 3 local sample isolation.

- HV-10953 - Accumulator tank 4 local sample isolation.
- HV-12975 - Containment air radiation monitor isolation.
- HV-12978 - Containment air radiation monitor isolation.
- HV-15214 - CVCS letdown isolation.
- HV-19051 - Thermal barrier cooling water RCP1.
- HV-19053 - Thermal barrier cooling water RCP2.
- HV-19055 - Thermal barrier cooling water RCP3.
- HV-19057 - Thermal barrier cooling water RCP4.
- LV-1003 - Reactor coolant drain tank pumps discharge.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1201-T4-002 - RCP L.O drain tank.
- 1-1201-T4-003 - RCP L.O drain tank.
- 1-1201-T4-004 - RCP L.O drain tank.
- 1-1201-T4-005 - RCP L.O drain tank.
- 1-1503-B7-001 - CTB air circulator.
- 1-1503-B7-002 - CTB air circulator.
- 1-1503-B7-003 - CTB air circulator.
- 1-1503-B7-004 - CTB air circulator.
- 1-1503-B7-005 - CTB air circulator.
- 1-1503-B7-006 - CTB air circulator.
- 1-1503-B7-007 - CTB air circulator.
- 1-1503-B7-008 - CTB air circulator.
- 1-1512-B7-001 - CTB reactor support cooling fan.

- 1-1512-B7-002 - CTB reactor support cooling fan.
- 1-1512-B7-003 - CTB reactor support cooling fan.
- 1-1512-B7-004 - CTB reactor support cooling fan.
- 1-1301-P4-010 - Wet layup pumps.
- 1-1301-P4-013 - Wet layup pumps.
- 1-1201-V6-003 - Pressurizer relief tank.
- 1-1901-P6-001 - Reactor coolant drain tank pump.
- 1-1901-P6-002 - Reactor coolant drain tank pump.
- 1-1901-E6-001 - RC drain tank HX.
- 1-1901-T6-001 - RC drain tank.
- 1-1214-P4-013 - Reactor cavity sump pump.
- 1-1214-P4-014 - Reactor cavity sump pump.
- 1-1214-P4-015 - Reactor cavity sump pump.
- 1-1214-P4-016 - Reactor cavity sump pump.
- 1-1214-P4-017 - Reactor cavity sump pump.
- 1-1214-P4-018 - Reactor cavity sump pump.
- 1-1301-P4-011 - Wet layup pump.
- 1-1301-P4-012 - Wet layup pump.
- 1-1504-N7-001 - CTB pre-access filtration unit.
- 1-1504-N7-002 - CTB pre-access filtration unit.
- 1-1515-A7-001 - CTB auxiliary cooling unit.
- 1-1515-A7-002 - CTB auxiliary cooling unit.
- 1-1608-P5-RPA - Rod position indication data cabinet A.
- 1-1608-P5-RPB - Rod position indication data cabinet B.
- 1-2203-P5-RE1 - Fuel transfer system control console.

- HV-7127 - Reactor cooling drain tank outlet.
- HV-7141 - Reactor cooling drain tank to pressure relief tank.
- HV-7143 - Reactor cooling drain tank circulation bypass.
- HV-7144 - Reactor cooling drain tank recirculation.
- HV-8031 - Pressure relief tank outlet.
- HV-12644 - CTB reactor support cooling unit.
- HV-12645 - CTB reactor support cooling unit.
- HV-12646 - CTB reactor support cooling unit.
- HV-12647 - CTB reactor support cooling unit.
- HV-12985 - CTB unit CF deluge.
- HV-12987 - CTB unit N7002 CF deluge.
- LV-0178 - Reactor cooling pump 4 standpipe.
- LV-0179 - Reactor cooling pump 3 standpipe.
- LV-0180 - Reactor cooling pump 2 standpipe.
- LV-0181 - Reactor cooling pump 1 standpipe.
- TV-12654 - CTB pre-access filter unit N7001.
- TV-12655 - CTB pre-access filter unit N7002.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 140A

   - Fixed combustible material

     - Cable insulation
     - Charcoal
     - Cellulosic materials
     - Plastics

   - Heat release

- Fixed combustibles 645,150,000 Btu
- Transient combustibles 152,450,000 Btu

- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

2. Zone No. 140B

- Fixed combustible material
  - Cable insulation
  - Charcoal
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release
  - Fixed combustibles $\leq$ 645,150,000 Btu
  - Transient combustibles 152,450,000 Btu

- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

3. Zone No. 140C

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Plastics

- Heat release
  - Fixed combustibles $\leq$ 446,880,000 Btu
  - Transient combustibles 36,720,000 Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 90 min

4. Zone No. 140E

- Fixed combustible material
  - Cable insulation

- Heat release

-	Fixed combustibles	$\leq$ 11,040,000	Btu
-	Transient combustibles	800,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown trains A or B depending on the location of the fire. In general, the west and north portions of the containment annulus area outside the secondary shield wall (fire zone 140B) and the north steam generator/reactor coolant pump area inside the secondary shield contain safe shutdown train B equipment and cables. Similarly, the east and south portions of the containment annulus area outside the secondary shield wall (fire zone 140A), and the south steam generator/reactor coolant pump area inside the secondary shield wall contain safe shutdown train A equipment and cables.

2. Special operational and design considerations.

   a. Separation of safe shutdown trains (equipment and cables) inside containment is as presented in table 9A.1.111-1.

   b. A radiant energy shield is provided for PT-0403 and LT-0459 to preclude simultaneous fire damage to these devices and instrumentation cables of their redundant counterparts.

   c. The following raceways are shielded to protect essential safe shutdown cables from a fire in this fire area:

1AE51ARX321	1BE51BKXJ01
1AE51ARX323	1BE51BKXJ02
1ARJB0056	1BRJB0050
1A51AKXJ95	1BE512RX065
1BE513KXJ01	1BE513RX059
1ARJB0051	

3. Spurious actuation considerations:

   a. Deleted.

   b. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   d. Pressurizer PORV PV-0455A and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

e. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to a fire in this fire area.

f. Pressurizer spray valve, PV-0455B, may open due to a fire in this fire area.

g. Pressurizer spray valve, PV-0455C, may open due to a fire in this fire area.

h. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

i. Automatic starting of the train A motor-driven auxiliary feedwater pump, 1-1302-P4-003, may occur due to fire damage to steam generator 1 and 4 level transmitter circuits in this fire area.

j. Automatic starting of the train B motor-driven auxiliary feedwater pump, 1-1302-P4-002, may occur due to file damage to steam generator 2 and 3 level transmitter circuits in this fire area.

k. Automatic starting of the turbine-driven auxiliary feedwater pump, 1-1302-P4-001, may occur due to fire damage to steam generator level transmitter circuits in this fire area.

l. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

m. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

n. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

o. Excess letdown valves HV-8153, HV-8154, and HV-0123 may all open due to a fire in this fire area.

M. Fire Detection

- Line-type heat detectors are installed in zone 140A and zone 140B.
- Infrared flame detectors are installed in zone 140C.

N. Fire Suppression

1. Automatic

   - Zone 140A - No zone coverage.
   - Zone 140B - No zone coverage.

- Zone 140C - No zone coverage.

- Zone 140E - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

   Primary coolant system, charcoal filter media.

P. Ventilation

   The normally off containment purge system can be manually turned on; its full flowrate to the outside is 15,000 ft^3/min. It is usually turned on prior to entry into containment.

Q. Drainage

   The containment is equipped with a sump. Flooding of the containment by the fire protection system is not a problem since all available firewater volumes would result in a level less than post-LOCA flood levels.

R. Emergency Lighting

   8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

   1. Unrated containment building fire area boundary:

      The personnel lock and the mechanical and electrical penetrations in the containment building fire area boundary were not specifically fire tested and therefore are not rated in hours of resistance to fire. The VEGP personnel lock and the mechanical and electrical penetrations are typical of nuclear power plant installations. They are of special construction, designed to maintain the integrity of the containment system boundary during various postulated accident situations. The containment building area boundary wall is of heavy concrete construction, which, along with its penetration design, represents a significant barrier to fire propagation.

   2. Separation by distance without full area suppression:

      See Appendix 9B, section C.5.e.

TABLE 9A.1.111-1 (SHEET 1 OF 2)

SEPARATION OF SAFE SHUTDOWN TRAIN INSIDE CONTAINMENT

Component[(a)(b)] Description	Device Tag Number Train A	Train B	Minimum Horizontal Separation Distance	Comments
RCS hot leg/core exit temperature	TE-0413A TE-0443A	(c) (c)	40 ft	
RCS cold leg temperature	--- ---	TE-0423B TE-0433B	NA	(d)
Pressurizer level	LT-0459	LT-0460	65 ft	(e)
RCS pressure (wide range)	PT-0405	PT-0403	24 ft	(e)
Neutron flux	RE-13135A	RE-13135B	88 ft	
Steam generator level (wide range)	LT-0501 LT-0504	LT-0502 LT-0503	32 ft	
CVCS normal charging path	HV-8146	---	NA	(f)
CVCS letdown isolation	LV-0459	LV-0460	NA	(g)
Steam generator blowdown isolation	--- --- --- ---	HV-15216A HV-15216B HV-15216C HV-15216D	NA	(h)
Safety injection accumulator vent valves	HV-8875A HV-8875B HV-8875C HV-8875D HV-0943A	HV-8875E HV-8875F HV-8875G HV-8875H HV-0943B	NA	(h)
RHR suction from the RCS	HV-8701A HV-8701B	HV-8702A HV-8702B	60 ft	

TABLE 9A.1.111-1 (SHEET 2 OF 2)

Notes:

a. Only components having circuits inside containment and which must remain operational to achieve safe (cold) shutdown in the event of a containment fire are listed. Spurious actuation concerns (such as the pressurizer PORVs) are not alleviated by separation. Using protected instrumentation, the plant operators have sufficient information to evaluate the effect on safe shutdown capability resulting from the spurious actuations as well as other fire-induced failures. Plant procedures will define the operator responses to mitigate an undesired occurrence.

b. Safe shutdown can be achieved using only two steam generators. Because of their association with the motor-driven auxiliary feedwater pumps, steam generators 1 and 4 (RCS loops 1 and 4) are considered train A and steam generators 2 and 3 (RCS loops 2 and 3) are considered train B. Safe shutdown devices associated with these steam generators and RCS loops have equivalent train associations.

c. Core exit thermocouples TE-10002, 10003, 10006, 10008 through 10012, 10014, 10016 through 10019, 10021, 10022, 10024 through 10026, 10028, 10034[i], 10036, 10037, 10040, and 10050.

d. All RCS cold leg temperature instrumentation is associated with separation train B. Indirect indication of RCS cold leg temperature for loops 1 and 4 (see note b) is available to the plant operators via steamline (steam generator) pressure indication. These steam line pressure transmitters are located outside the containment building.

e. Three-h-rated raceway fire proofing and radiant energy shield provided to obtain the horizontal separation distance.

f. Redundant means to accomplish the function is not dependent on a device or electrical cables located inside containment.

g. For a fire in the vicinity of valves LV-0460 and LV-459 (inside the secondary shield wall), letdown isolation can be achieved by closure of HV-8149A, HV-8149B, and HV-8149C (outside the secondary shield wall). All valves fail closed upon loss of air or electrical power which is the desired safe shutdown position.

h. Due to the proximity of the safety injection accumulator tank vent valves, it may not be possible to depressurize all accumulators following a fire inside the containment building. However, undesired accumulator injection into the RCS can also be precluded by closing the accumulator injection valve which is capable of being closed from the control room or by local manual operator actions. The combustible loadings in the vicinity of a safety injection accumulator tank are low, and it is not expected that a single fire could cause damage to the cables at the redundant vent valves and the tank injection valves and also cause mechanical damage so as to preclude local manual operation of the injection valve.

i. The input signal from this thermocouple has been disconnected from the PSMS cabinet to prevent it from being used in the subcooling calculation.

9A.1.112 DELETED

9A.1.113 FIRE AREA 1-EB-B

A. Location: Equipment Building East Side el 200 ft 0 in., Level 1

B. Drawing: AX4DJ8035

C. Description: Includes fire zone 141B

Filter and exhaust unit area, valve room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-CB-LA-B and 1-CB-LA-C.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-AFB-C.
- West - Unrated barrier separates area from containment building 1-CTB.
  - 3-h-rated barrier separates area from 1-CB-LA-D.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- East - Class B door from outside.

F. Sealed Penetration

Seals meet or exceed fire barrier rating.

G. Fire Dampers

None.

H. Safe Shutdown Components

Train B safe shutdown cables.

I. Safety-Related Equipment

- HV-2627A & B - CTB normal purge supply isolation damper.

J. Nonsafety-Related Equipment

- 1-1505-A7-001 - Containment building normal purge supply unit.
- 1-1505-B7-001 - Preaccess purge fan.
- 1-1505-B7-002 - Minipurge fan.
- 1-1526-B7-001 - Equipment building vent system fan.
- 1-1526-U7-001 - Equipment building unit heaters.
- 1-1526-U7-002 - Equipment building unit heaters.
- 1-1526-U7-003 - Equipment building unit heaters.
- 1-HV-2593 - CTB normal purge supply unit damper.
- 1-TV-12432A - Equipment building OSA intake damper.
- 1-TV-12432B - Equipment building OSA intake damper.
- 1-TV-12432C - Equipment building OSA intake damper.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 141B

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	≤ 100,960,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.

3. Spurious actuation concerns:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 141B

N. Fire Suppression

1. Automatic

   - Zone 141B - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Material

None under normal conditions.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unrated containment building fire area boundary:

   See section 9A.1.111.S.1.

9A.1.114 FIRE AREA 1-DB-L1-A

A. Location: Diesel Generator Building, Levels 1 and 2

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 161

Train A diesel generator, intake filter, fan room, air plenum room, exhaust silencer room, duct penetration room

D. Description of Boundaries

1. Level 1

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-CB-LB-A.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-DB-L1-C.
- West - 3-h-rated barrier separates area from 1-DB-L1-B, 1-DB-L1-D.

2. Level 2

- Floor - Unrated barrier separates area from 1-DB-L1-C.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-DB-L1-B.
  - 2-h-rated barrier separates area from stairwell.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level 1

- North - Unlabeled door from 1-CB-LB-A.

- North - Class A door from outside.
- South - Class A door from 1-DB-L1-C.
- South - Class A door from outside.

2. Level 2

- North - Class B door from stairwell.

F. Sealed Penetration

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TV12086 - Diesel generator building outside air damper.
- TY12086 - Diesel generator building outside air damper solenoid.
- TV12094A - Diesel generator building outside air damper.
- TY12094C - Diesel generator building outside air damper solenoid.
- TY12094D - Diesel generator building outside air damper solenoid.
- TV12094B - Diesel generator building outside air damper.
- TY12094E - Diesel generator building outside air damper solenoid.
- TY12094F - Diesel generator building outside air damper solenoid.
- TV12096 - Diesel generator building outside air damper.
- TY12096 - Diesel generator building outside air damper solenoid.
- TV12097 - Diesel generator building outside air damper.
- TV12100A - Diesel generator building outside air damper.
- TY12100C - Diesel generator building outside air damper solenoid.
- TV12100 - Diesel generator building outside air damper.
- TY12100B - Diesel generator building outside air damper solenoid.

- TISH12051 - Diesel generator building temperature interlock.
- TISH12100 - Diesel generator ventilation temperature interlock.
- HV12050 - Diesel generator building fan damper.
- HV12051 - Diesel generator building fan damper.
- FE12087- Diesel generator building ventilation flow interlock.
- FS12087- Diesel generator building ventilation flow interlock.
- 1-1566-B7-001 - Diesel generator building fan.
- 1-1566-B7-003 - Diesel generator building fan.
- 1-2403-G4-001 - Diesel generator package.
- 1-2403-G4-001-V01 - Diesel generator air start receiver.
- 1-2403-G4-001-V02 - Diesel generator air start receiver.
- 1-2403-P5-DG1 - Diesel generator panel DG1A.
- 1-2403-P5-DG2 - Diesel generator panel DG1A.
- 1-1805-S3-ABF - Class 1E 480-V MCC 1ABF.
- TV-12086A - Diesel generator building outside air damper.
- TV-12094C - Diesel generator building outside air damper.
- TV-12094D - Diesel generator building outside air damper.
- TV-12096A - Diesel generator building outside air damper.
- TV-12097A - Diesel generator building outside air damper.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-2403-64-001-F02 - Diesel generator exhaust silencers.
- HV-12052 - DGB fan damper.
- Train A safety-related cables.
- 1-1808-T3-114 - LTG isolation XFMR 1ABF13RX

J. Nonsafety-Related Equipment

- 1-1566-B7-005 - DGB non-ESF exhaust fan.
- 1-1566-U7-005 - DGB unit heater.
- 1-1566-U7-007 - DGB unit heater.
- 1-1566-U7-009 - DGB unit heater.
- 1-1566-U7-011 - DGB unit heater.
- 1-1566-U7-013 - DGB unit heater.
- 1-1566-U7-015 - DGB unit heater.
- 1-1566-U7-017 - DGB unit heater.
- 1-1566-U7-019 - DGB unit heater.
- 1-1566-U7-001 - DGB unit heater.
- 1-1566-U7-003 - DGB unit heater.
- 1-1215-P4-019 - DGB oily waste sump pump.
- 1-1805-S3-NBG - 480-V MCC.
- 1-2403-G4-001-C02 - DG air start compr. air cooler.
- 1-2403-G4-001-E02 - DG air start compr. after cooler.
- 1-2403-G4-001-K01 - DG air start air dryer.
- 1-2403-G4-001-K02 - DG air start air dryer.
- 1-2403-S3-001 - DG 480-V MCC.
- 1-2403-T3-NGA - Neutral grounding cabinet.
- HV-28181 - Fire protection system manual actuation valve.
- PV-9080 - DG1A start air compr. to after cooler valve.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 161

- Fixed combustible material

  - Cable insulation
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	$\leq$ 261,469,000	Btu
- Transient combustibles	106,331,000	Btu

• Combustible loading	$\leq$ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 161

N. Fire Suppression

1. Automatic

   - Zone 161 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide for operation of the diesel generator at the control panels.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unlabeled doors:

   The unlabeled door at the north boundary (door number 12107L1101) between this area and 1CB-LB-A level 1 is fabricated of the same material of construction as that of a 3-h labeled door.

   See Appendix 9B, section C.5.a(5).

3. Unrated hatch:

   See section 9A.1.116.S.

9A.1.115 FIRE AREA 1-DB-L1-B

A. Location: Diesel Generator Building, Levels 1 and 2

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 162

Train B diesel generator, intake filter, fan room, air plenum room, exhaust silencer room, duct penetration room

D. Description of Boundaries

1. Level 1

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-CB-LB-D.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-DB-L1-A, 1-DB-L1-D.
- West - Unrated exterior area boundary.

2. Level 2

- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-DB-L1-A.
- West - Unrated exterior area boundary.
  - 2-h-rated barrier separates area from stairwell.
- Ceiling - Unrated exterior area boundary.
- Floor - 3-h-rated barrier separates area from 1-DB-L1-C.

E. Area Access

1. Level 1

- North - Unlabeled door from 1-CB-LB-D.
  - Certified class A door from outside.

- South - Class A door from 1-DB-L1-D.
  - Certified class A door from outside.

2. Level 2

   - North - Class B door from stairwell.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV12053 - Diesel generator building fan damper.
- HV12054 - Diesel generator building fan damper.
- TV12085 - Diesel generator building outside air damper.
- TV12095A - Diesel generator building outside air damper.
- TY12095C - Diesel generator building outside air damper solenoid.
- TY12095D - Diesel generator building outside air damper solenoid.
- TV12095B - Diesel generator building outside air damper.
- TY12095E - Diesel generator building outside air damper solenoid.
- TY12095F - Diesel generator building fan damper solenoid.
- TV12098 - Diesel generator building outside air damper.
- TY12098 - Diesel generator building outside air damper solenoid.
- TV12099 - Diesel generator building outside air damper.
- TY12099 - Diesel generator building outside air damper solenoid.
- TV12101A - Diesel generator building outside air damper.
- TY12101C - Diesel generator building outside air damper solenoid.
- TV12101 - Diesel generator building outside air damper.

- TY12101B - Diesel generator building outside air damper solenoid.
- TISH12054 - Diesel generator building temperature interlock.
- TISH12101 - Diesel generator ventilation temperature interlock.
- 1-1566-B7-002 - Diesel generator building fan.
- 1-1566-B7-004 - Diesel generator building fan.
- 1-2403-G4-002 - Diesel generator package.
- 1-2403-G4-002-V01 - Diesel generator air start receiver.
- FE12088 - Diesel generator building ventilation flow interlock.
- FS12088 - Diesel generator building ventilation flow interlock.
- 1-2403-G4-002-V02 - Diesel generator air start receiver.
- 1-2403-P5-DG3 - Diesel generator panel DG1B.
- 1-2403-P5-DG4 - Diesel generator panel DG1B.
- 1-1805-S3-BBF - Class 1E 480-V MCC 1BBF.
- TV-12085A - Diesel generator building outside air damper.
- TV-12095C - Diesel generator building outside air damper.
- TV-12095D - Diesel generator building outside air damper.
- TV-12098A - Diesel generator building outside air damper.
- TV-12099A - Diesel generator building outside air damper.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-2403-G4-002-F01 - Diesel generator intake air filter.
- 1-2403-G4-002-F02 - Diesel generator exhaust silencers.
- HV-12055 - Diesel generator building fan damper.
- 1-2403-G4-001-F01 - Diesel generator intake air filter.
- Train B safety-related cables.

- 1-1808-T3-115 - Lighting isolation transformer 1BBF13RX

J. Nonsafety-Related Equipment

- 1-1215-P4-017 - Diesel generator building oily waste sump pump.
- 1-1566-B7-006 - Diesel generator building non-ESF exhaust fan.
- 1-1566-U7-002 - Diesel generator building unit heater.
- 1-1566-U7-004 - Diesel generator building unit heater.
- 1-1566-U7-006 - Diesel generator building unit heater.
- 1-1566-U7-008 - Diesel generator building unit heater.
- 1-1566-U7-010 - Diesel generator building unit heater.
- 1-1566-U7-012 - Diesel generator building unit heater.
- 1-1566-U7-014 - Diesel generator building unit heater.
- 1-1566-U7-016 - Diesel generator building unit heater.
- 1-1566-U7-018 - Diesel generator building unit heater.
- 1-1566-U7-020 - Diesel generator building unit heater.
- 1-1805-S3-NBQ- 480-V MCC.
- 1-2403-G4-002-C02 - Diesel generator air start compressor air cooler.
- 1-2403-G4-002-K01 - Diesel generator air start air dryer.
- 1-2403-G4-002-K02 - Diesel generator air start air dryer.
- 1-2403-G4-002-E02 - Diesel generator air start compressor aftercooler.
- 1-2403-S3-002 - Diesel generator 480-V MCC.
- 1-1566-B7-007 - Diesel generator building fuel oil day tank room exhaust fan.
- HV-28182 - Fire protection system manual actuation valve.
- PV-9081 - DG1B start air compressor to aftercooler valve.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 162

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Plastics

- Heat release

- Fixed combustibles	≤ 629,269,000	Btu
- Transient combustibles	106,331,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 162

N. Fire Suppression

1. Automatic

   - Zone 162 preaction sprinkler system – Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide for operation of the diesel generator at the control panels.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unlabeled doors:

   The unlabeled door at the north boundary (door number 12107L1104) between this area and 1CB-LB-D level 1 is fabricated of the same material of construction as that of a 3-h labeled door.

   See Appendix 9B, section C.5.a(5).

3. Unrated penetration seal configuration in north wall separating this area from 1-CB-LB-D.

   This configuration involves the Calvert bus duct, several cable trays, conduits, and pipe passing through the diesel generator building wall, the control building wall, and the seismic gap between the two buildings. The Calvert bus duct cannot be rigidly held in place as is done with normal foam penetration seals, and a seismic gap seal cannot be installed with the existing field configuration.

   With these special restrictions, an alternative method was developed and evaluated that involves installing a three-hour-rated penetration seal in the north side of the control building tunnel south wall and a 1-in. noncombustible damming board in the south side of the diesel generator building north wall and then filling the entire space in between (approximately 5.5 ft) with loose penetration seal damming material. A 1-in. gap, filled with damming material,

is left between the Calvert bus duct and the damming board in the diesel generator building wall only to allow for the required seismic movement of the Calvert bus duct. This deviation is justified because of the total lack of combustible material in the seismic gap and because the void between the control building penetration seal and the diesel generator building damming board (including the seismic gap) is stuffed with a significant amount of noncombustible damming material, thereby creating an effective barrier to the passage of smoke and hot gases through the seismic gap or through the 1-in. gap around the Calvert bus duct.

9A.1.116 FIRE AREA 1-DB-L1-C

A. Location: Diesel Generator Building, Level 1

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 163

Train A fuel oil day tank room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- Ceiling - 3-h-rated barrier separates area from 1-DB-L1-A.
- North - 3-h-rated barrier separates area from 1-DB-L1-A.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-DB-L1-A.

E. Area Access

- North - Class A door from 1-DB-L1-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-2403-T4-003 - Diesel fuel oil day tank.
- LSH 9020 - Diesel fuel oil storage tank pump interlock.
- LSL 9020 - Diesel fuel oil storage tank pump interlock.
- LSLL 9020 - Diesel fuel oil storage tank pump interlock.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 163

   - Fixed combustible material

     - Oil/grease

   - Heat release

- Fixed combustibles	189,200,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	1,727,273	Btu/ft^2
• Fire severity (wood equivalent)	1,295	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 163

N. Fire Suppression

1. Automatic

   - Zone 163 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unrated hatch:

   A hatch cover is located in the ceiling of the train A fuel oil day tank room separating the tank room from the rest of the train A diesel generator building (fire area 1-DB-L1-A). The hatch opening is 3 ft x 7 ft and is used to facilitate access to various manual valve operators. The opening is closed by an access hatch that is fabricated of the same material and methods of construction as that of a 3-h-labeled fire door.

   An "A" label is maintained on the hatch to ensure surveillance per 3-h rating criteria.

   The fire area boundary containing the unrated hatch cover does not separate redundant safe shutdown components.

9A.1.117 FIRE AREA 1-DB-L1-D

A. Location: Diesel Generator Building, Level 1

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 164

Train B fuel oil day tank room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- Ceiling - 3-h-rated barrier separates area from 1-DB-L1-B.
- North - 3-h-rated barrier separates area from 1-DB-L1-B.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-DB-L1-A.
- West - 3-h-rated barrier separates area from 1-DB-L1-B.

E. Area Access

- North - Class A door from 1-DB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-2403-T4-004 - Diesel fuel oil storage tank.
- LSH 9021 - Diesel fuel oil storage tank pump interlock.
- LSL 9021 - Diesel fuel oil storage tank pump interlock.
- LSLL 9021 - Diesel fuel oil storage tank pump interlock.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 1-1566-B7-008 - DGB fuel oil tank room exhaust fan.
- Nonsafety-related cables.
- No major equipment.

K. Combustible Loading

1. Zone No. 164

   - Fixed combustible material
     - Oil/grease
   - Heat release

- Fixed combustibles	189,200,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	1,727,273	Btu/ft^2
• Fire severity (wood equivalent)	1,295	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 164

N. Fire Suppression

1. Automatic

   - Zone 164 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

2. Unrated hatch:

A hatch cover is located in the ceiling of the train B fuel oil day tank room separating the tank room from the rest of the train B diesel generator building (fire area 1-DB-L1-B). The hatch opening is 3 ft x 7 ft and is used to facilitate access to various manual valve operators. The opening is closed by an access hatch that is fabricated of the same material and methods of construction as a 3-h-labeled fire door.

The fire area boundary containing the unrated hatch cover does not separate redundant safe shutdown components.

9A.1.118 FIRE AREA 1-DPB-A

A. Location: Diesel Pumphouse, train A; el 211 ft - 6 in.

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 165

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-DPB-B.
- West - Unrated exterior area boundary.

E. Are Access

- South - Class A door from 1-DPB-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-2403-P4-001 - Diesel fuel oil storage tank pump.
- 1-2403-P4-002 - Diesel fuel oil storage tank pump.
- 1-2403-T4-001 - Diesel fuel oil storage tank.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 165

- Fixed combustible material
  - Oil/grease
- Heat release

- Fixed combustibles	1,210,640,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	15,077,460	Btu/ft^2
• Fire severity (wood equivalent)	11,308	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 165

N. Fire Suppression

1. Automatic

   - Zone 165 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

None.

Q. Drainage

A flooding analysis has determined that drainage from the fire area is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9A.1.119 FIRE AREA 1-DPB-B

A. Location: Diesel Pumphouse, train B; el 211 ft - 6 in. and 222 ft - 0 in.

B. Drawing: AX4DJ8037

C. Description: Includes fire zone 166

Train B diesel pumproom, valve room

D. Description of Boundaries

1. el 211 ft - 6 in.

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- West - Unrated below grade exterior area boundary.
- South - Unrated below grade exterior area boundary.
- North - 3-h-rated barrier separates area from 1-DPB-A.
- East - Unrated below grade exterior area boundary.

2. el 222 ft - 6 in.

- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

E. Area Access

1. el 211 ft - 6 in.

- West - Class A door from 1-DPB-A.

2. el 222 ft - 0 in.

- North - Certified Class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 1-2403-T4-002 - Diesel fuel oil storage tank
- 1-2403-P4-003 - Diesel fuel oil storage tank pump
- 1-2403-P4-004 - Diesel fuel oil storage tank pump
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 166

- Fixed combustible material
  - Oil/grease
- Heat release

-	Fixed combustibles	1,210,640,000	Btu
-	Transient combustibles	800,000	Btu

• Combustible loading	9,041,972	Btu/ft^2
• Fire severity (wood equivalent)	6,781	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 166

N. Fire Suppression

1. Automatic

   - Zone 166 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

None.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1)

2. Unlabeled door:

   See Appendix 9B, section C.5.a(5).

9.A.1.120 DELETED

9.A.1.121 FIRE AREA 1-AFB-A

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8038

C. Description: Includes fire zone 155

Auxiliary feedwater pump room, train B

D. Description of Boundaries

- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-AFB-B.
- South - 3-h-rated barrier separates area from 1-AFB-C.
- East - Unrated exterior area boundary.
- Floor - Unrated concrete base mat.

E. Area Access

- North - Certified Class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV5118 - Auxiliary feedwater pump B suction valve.
- FV5154 - Auxiliary feedwater pump B miniflow valve.
- FT5154 - Auxiliary feedwater pump B valve.
- HV12005 - Auxiliary feedwater pump room "B" fan damper.
- TIS12005 - Auxiliary feedwater pump room B fan interlock.
- 1-1302-P4-002 - Auxiliary feedwater pump B.
- 1-1593-B7-002 - Auxiliary feedwater pump room B fan.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- 1-1302-P5-FWB - Vibration amplifier housing.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 155

   - Fixed combustible material

     None.

   - Heat release

- Fixed combustibles	≤ 18,880,000	Btu
- Transient combustibles	400,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 155

N. Fire Suppression

1. Automatic

- Zone 155 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.6.a(1)

9.A.1.122 FIRE AREA 1-AFB-B

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8038

C. Description: Includes fire zone 156

Auxiliary feedwater pump room, Train A

D. Description of Boundaries

- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-AFB-C.
- East - 3-h-rated barrier separates area from 1-AFB-A.
- Floor - Unrated concrete base mat.

E. Area Access

- North - Certified Class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV5119 - Auxiliary feedwater pump A suction valve.
- FV5155 - Auxiliary feedwater pump A mini flow valve.
- FT5155 - Auxiliary feedwater pump A valve.
- HV12006 - Auxiliary feedwater pump room A fan damper.
- TIS12006 - Auxiliary feedwater pump room A fan interlock.
- 1-1302-P4-003 - Auxiliary feedwater pump A.
- 1-1593-B7-001 - Auxiliary feedwater pump room A fan.

- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1302-P5-FWC - Vibration amplifier housing.
- Train A safety-related cables.

J. Nonsafety-Related Equipment.

- 1-1593-U7-001 - Unit heater.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 156

   - Fixed combustible material

     None.

   - Heat release

- Fixed combustibles	≤ 18,880,000	Btu
- Transient combustibles	400,000	Btu

   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 156

N. Fire Suppression

1. Automatic

- Zone 156 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9.A.1.123 FIRE AREA 1-AFB-C

A. Location: Auxiliary Feedwater Pumphouse and Tunnels 1T6A and 1T6B

B. Drawing: AX4DJ8038

C. Description: Includes fire zones 157A, 193, 194

Auxiliary feedwater pump room, train C

D. Description of Boundaries

1. Pump House

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 1-AFB-A and 1-AFB-B.
- West - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 1-AFB-F.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AFB-D.
  - Unrated exterior area boundary.

2. Tunnel 1T6A

- Floor - Unrated concrete base mat.
- East - Unrated below-grade exterior area boundary.
- South - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-AB-LA-D.
- Ceiling - Unrated exterior area boundary.

3. Tunnel 1T6B

- Floor - Unrated concrete base mat.
  - 3-h-rated barrier separates area from 1-CB-LA-A.
- North - Unrated exterior area boundary.

- - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 1-EB-B.
- West - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- East - Class A door from 1-AFB-D.
- South - Certified class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV5106 - Steam to auxiliary feedwater pump turbine.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 1-1302-P5-FWA - Vibration amplifier housing.
- 1-1302-P4-001 - Aux FW pump turbine driver.
- 1-1302-P5-AFT - Aux FW TD control panel.
- 1-1302-P5-AFP - Aux FW TD panel.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 1-1593-U7-003 - Unit heater.
- 1-1593-U7-004 - Unit heater.
- 1-1593-U7-005 - Unit heater.

- 1-1593-U7-006 - Unit heater.
- 1-1215-P4-021 - Aux FW sump pump
- 1-1215-P4-020 - Aux FW sump pump.
- 1-1593-B7-003 - Aux FW pump house exhaust fan.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 157A

- Fixed combustible material
  - Oil/grease
- Heat release

- Fixed combustibles	≤ 53,780,000	Btu
- Transient combustibles	1,460,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

2. Zone No. 193

- Fixed combustible material

  None.
- Heat release

- Fixed combustibles	≤ 10,840,000	Btu
- Transient combustibles	400,000	Btu
• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

3. Zone No. 194

- Fixed combustible material

  None.
- Heat release

- Fixed combustibles $\leq$ 62,600,000 Btu
- Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   The turbine-driven auxiliary feedwater pump 1-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 157A

N. Fire Suppression

1. Automatic

   - Zone 157A preaction sprinkler system – Partial zone coverage.

   - Zone 193 - No zone coverage.

   - Zone 194 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide for operation of the turbine-driven auxiliary feedwater system including the ability to trip valve PV-15129.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1)

2. Embedded conduit:

   Conduits 1BE33ARL008, 1BE33ARS009, and 1BE33ARQ080 are embedded in the floor of fire zone 193 of this fire area. These conduits contain circuits which could change the results of the safe shutdown analysis, as presented in paragraph L, if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth equivalent to a 3-h fire barrier, only 3.5 in. of concrete cover over these conduits can be verified.

   Modification of the facility to relocate the circuits in these embedded conduits, or to otherwise provide additional protection, is not warranted because the minimum concrete cover over the conduits (equivalent to 80 min per figure 7-8E of the NFPA Fire Protection Handbook, 16th Edition) provides at least a 100-percent margin of safety above the calculated combustible loading fire severity for the location.

9A.1.124 FIRE AREA 1-AFB-D

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8038

C. Description: Includes fire zone 157B

Condensate storage tank room

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior barrier separates area from condensate storage tanks 1 and 2.
- West - 3-h-rated barrier separates area from 1-AFB-C.

E. Area Access

- West - Class A door from 1-AFB-C.
  - Certified class A door from outside.

F. Sealed Penetrations

There are no sealed penetrations in this area.

G. Fire Dampers

There are no fire dampers in this area.

H. Safe Shutdown Components

- LT5101 - CST 1 level transmitter.
- LT5104 - CST 2 level transmitter.
- LT5111 - CST 1 level transmitter.
- LT5116 - CST 2 level transmitter.
- LI5100 - CST 1 local level indicator.

- LI5115 - CST 2 local level indicator.
- 1-1302-V4-001 - Condensate storage tank 1.
- 1-1302-V4-002 - Condensate storage tank 2.
- Train A safe shutdown cables.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV5087 - Condensate storage tank number 1 outlet.
- HV5088 - Condensate storage tank number 2 outlet.

J. Nonsafety-Related Equipment

- 1-1302-D4-001-P04 - Degasifier vacuum pump.
- 1-1302-D4-001-E01 - Vacuum degasifier.
- 1-1302-D4-001-P05 - Degasifier vacuum pump.
- 1-1302-D4-001-P01 - Degasifier feed pump.
- 1-1302-D4-001-P03 - Degasifier transfer pump.
- 1-1302-D4-001-P02 - Degasifier feed transfer pump.
- 1-1302-P5-CDP - Condensate storage degasifier control panel.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 157B

- Fixed combustible material

  None.

- Heat release

- Fixed combustibles	≤ 27,200,000	Btu
- Transient combustibles	400,000	Btu

• Combustible loading	≤ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 30	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area use safe shutdown train A or B.

2. Special operational and design considerations:

   Local level indicators, LI-5100 and LI-5115, are available should fire damage to the condensate storage tank level transmitters and/or their associated electrical cables result in loss of level indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 157B

N. Fire Suppression

1. Automatic

   - Zone 157B - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

None.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to read local condensate storage tank level indicators LI-5100 and LI-5115.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Separation by distance without full area suppression:

   Fire area 1-AFB-D contains both the train A and B level transmitters for both condensate storage tanks 1-1302-V4-001 (LT-5101 and LT-5111) and 1-1302-V4-002 (LT-5104 and LT-5116) and their associated electrical cables. While approximately 16 horizontal ft of separation exist between the redundant level transmitters for each tank, the circuits for the transmitters have less separation (cable cross in one case). This fire area is not provided with an automatic fire suppression system, but the fire detection system will alert the plant operators should a fire occur. The combustible loadings in this area are very small lending to easy extinguishment of a fire using manual firefighting equipment. The local level indicators (LI-5100 and LI-5115) are located at the rear of the area where a fire, if one should occur, would not result in damage to the local indicator and both sets of level transmitter and the electrical cables. Should a fire occur in this area no other safe shutdown equipment or electrical cables are jeopardized. Providing a full area automatic fire suppression system or installation of a fire barrier to achieve greater separation would not significantly improve the existing capability to achieve safe shutdown.

9A.1.124A DELETED

9A.1.124B DELETED

9A.1.125 FIRE AREA 1-NSP-LA-A

A. Location: Nuclear Service Cooling Water (NSCW) Pumphouse train A

B. Drawing: AX4DJ8039 and AX4DJ8040

C. Description: Includes fire zones 145, 160A

Train A NSCW pumphouse, cooling tower, tunnels 1T2A, 1T3A, and 1T5A

D. Description of Boundaries

1. Cooling tower and pump house

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

2. Tunnels 1T2A, 1T5A, and 1T3A

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-DB-L1-A.
- East - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-AB-LD-G.

E. Area Access

- North - Certified class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

None.

H. Safe Shutdown Components

- HV1668A - "A" nuclear service cooling water tower valve.
- HV1668B - "A" nuclear service cooling water tower bypass valve.
- TE1668 - "A" nuclear service cooling water tower bypass interlock.
- HV11600 - Nuclear service cooling water pump 001 valve.
- HV11605 - Nuclear service cooling water pump 005 valve.
- HV11606 - Nuclear service cooling water pump 003 valve.
- TE11641 - Nuclear service cooling water pump 001 fan F01 interlock.
- TE11642 - Nuclear service cooling water pump 001 fan F02 interlock.
- TE11643 - Nuclear service cooling water pump 001 fan F03 interlock.
- TE11644 - Nuclear service cooling water pump 001 fan F04 interlock.
- 1-1202-P4-001 - Nuclear service cooling water pump 001.
- 1-1202-P4-003 - Nuclear service cooling water pump 003.
- 1-1202-P4-005 - Nuclear service cooling water pump 005.
- 1-1202-W4-001 - Nuclear service cooling water cooling tower.
- 1-1202-W4-001-F01 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-001-F02 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-001-F03 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-001-F04 - Nuclear service cooling water cooling tower fan.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- CV9446 - NSCW tower blowdown valve.
- 1-1202-P4-007 - Train B nuclear service cooling water transfer pump.

- Train A safety-related cables.

J. Nonsafety Related Equipment

- 1-1817-U3-010 - Heat tracing panel.
- Nonsafety-related cables.

K. Combustible Loadings

1. Zone No. 145

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 330,400,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 240,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 180	min

2. Zone No. 160A

- Fixed combustible material
  - Cable insulation
  - Oil/grease
- Heat release

- Fixed combustibles	≤ 168,800,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 145
- Zone 160A

N. Fire Suppression

1. Automatic

   - Zone 145 preaction sprinkler system – Partial zone coverage.
   - Zone 160A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

None.

Q. Drainage

A flooding analysis has determined that drainage from this area is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9A.1.126 FIRE AREA 1-NSP-LA-B

A. Location: NSCW Pumphouse, train B

B. Drawing: AX4DJ8039 and AX4DJ8040

C. Description: Includes fire zones 146, 160B, 188

Train B NSCW: pumphouse, cooling tower, refueling water storage tank, reactor makeup water storage tank, tunnels 1T2B, 1T5B

D. Description of Boundaries

1. Cooling tower and pumphouse

- Floor - Unrated concrete base mat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

2. Tunnels 1T2B, 1T5B, refueling water storage tank, reactor makeup storage tank

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 1-AB-LA-B.
- East - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- North - Certified class A door from outside.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

None.

H. Safe Shutdown Components

- HV11607 - Nuclear service cooling water pump 002 valve.
- HV11612 - Nuclear service cooling water pump 006 valve.
- HV11613 - Nuclear service cooling water pump 004 valve.
- TE11646 - Nuclear service cooling water tower 002 fan F01 interlock.
- TE11647 - Nuclear service cooling water tower 002 fan F02 interlock.
- TE11648 - Nuclear service cooling water tower 002 fan F03 interlock.
- TE11649 - Nuclear service cooling water tower 002 fan F04 interlock.
- TE1669 - "B" nuclear service cooling water tower bypass interlock.
- HV1669A - "B" nuclear service cooling water tower valve.
- HV1669B - "B" nuclear service cooling water tower bypass valve.
- 1-1202-P4-002 - Nuclear service cooling water pump 002.
- 1-1202-P4-004 - Nuclear service cooling water pump 004.
- 1-1202-P4-006 - Nuclear service cooling water pump 006.
- 1-1204-T4-001 - Refueling water storage tank.
- 1-1202-W4-002 - Nuclear service cooling water cooling tower.
- 1-1202-W4-002-F01 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-002-F02 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-002-F03 - Nuclear service cooling water cooling tower fan.
- 1-1202-W4-002-F04 - Nuclear service cooling water cooling tower fan.
- LT0990 - RWST level.
- LT0991 - RWST level.
- LI0990C - RWST local level indication.
- Train A safe shutdown cables
- Train B safe shutdown cables

I. Safety-Related Equipment

- 1-1202-P4-008 - Train A nuclear service cooling water transfer pump.
- 1-1228-T4-001 - Reactor makeup water storage tank.
- Train B safety-related cables.
- CV9447 - NSCW tower blowdown valve.
- HV10957 - RWST sludge mixing isolation valve.
- HV10958 - RWST sludge mixing isolation valve.

J. Nonsafety-Related Equipment

- 1-1817-U3-006 - Heat tracing panel.
- 1-1817-U3-005A - Heat trace cabinet (normal) reactor makeup.
- 1-1817-T3-005A - Transformer - heat trace reactor makeup water.
- 1-1817-U3-005B - Heat trace cabinet (standby) reactor makeup.
- HV7733B - Reactor makeup storage tank.
- HV7751 - Vacuum degasifier.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 146

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	$\leq$ 409,600,000	Btu
- Transient combustibles	800,000	Btu

• Combustible loading	$\leq$ 240,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 180	min

2. Zone No. 188

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 72,600,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 160B

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat release

  - Fixed combustibles $\leq$ 168,800,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Local level indicator, LI-0990C, is available should fire damage to the refueling water storage tank level transmitter cables in fire zone 146 result in loss of level indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 146
- Zone 160B
- Zone 188

N. Fire Suppression

1. Automatic

   - Zone 146 - Partial zone coverage.
   - Zone 160B - No zone coverage.
   - Zone 188 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

None.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixtures(s) provide the capability to read the local refueling water storage tank level indicator LI-0990C.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Separation by distance without full area suppression:

   Fire area 1-NSP-LA-B contains both the train A and B level transmitters for the refueling water storage tank (LT-0990 and LI-0991) and their associated electrical cables. While approximately 25 horizontal ft of separation exists

between the redundant level transmitters and their associated electrical cables in fire zone 188 (RWST tank room), the cables for the transmitters have less separation (approximately 12 horizontal ft) in the fire zone 146 (NSCW pipe and electrical tunnels). This fire area is provided with an automatic fire suppression system but only in the NSCW electrical tunnel (part of fire zone 146). The combustible loading in fire zone 188 is very small and the NSCW piping tunnel (other part of fire zone 146) is devoid of combustible material. The local level indicator (LI-0990C) is located at one side of fire zone 146 where, if a fire were to occur, it would not jeopardize the redundant remote level indication cables and the local reading device. Providing a full area automatic fire suppression system or installation of a fire barrier to achieve greater separation would not significantly improve the existing capability to achieve safe shutdown.

9A.1.126A FIRE AREA 1-NSP-LA-C

A. Location: NSCW and Electric Steam Boiler Building Tunnel

B. Drawing: AX4DJ8040

C. Description: Includes Fire Zone 146A

Tunnels ESBT and 1T3B.

D. Description Boundaries

- Floor - Unrated concrete basemat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-DB-L1-B.
- South - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 1-AB-LA-B.

E. Area Access

None.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

None.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 146A

- Fixed combustible material

  None.

- Heat release

-	Fixed combustibles	$\leq$ 20,600,000	Btu
-	Transient combustibles	400,000	Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

- Zone 146A

  None.

N. Fire Suppression

- Zone 146A - No zone coverage.

O. Radioactive Material

None.

P. Ventilation

There are no combustibles in this area, consequently, smoke removal need not be considered.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Because this area is not accessible, no ingress/egress lighting is required.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9A.1.127 (DELETED)

9A.1.128 (DELETED)

9A.1.129 FIRE AREA 1-RTB-L1-A

A. Location: Radwaste Transfer Building, Levels 1, 2 Alternate Radwaste Building, Level 1

B. Drawings: AX4DJ8004, AX4DJ8005, and AX4DJ8006

C. Description: Includes fire zones 300B, 303, 304, 330

Valve gallery, equipment room, control room, dressout area

D. Description of Boundaries

1. Level 1

- Floor - Unrated concrete basemat.
- North - Credit for 3-h-rated barrier taken from south wall of Auxiliary Building (1-AB-LD-B, 1-AB-LA-B, 1-AB-L1-G, and 1-AB-L2-A)
- West - 2-h-rated barrier separates area from stairwell No. A.
  - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.

2. Elevation 237 ft - 0 in.

- North - Credit for 3-h-rated barrier taken from south wall of Auxiliary Building (1-AB-LD-B, 1-AB-LA-B, and 1-AB-L1-G).
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - 2-h-rated barrier separates area from stairwell No. A.
  - Unrated exterior area boundary.

3. Level 2

- Ceiling - Unrated exterior area boundary.
- North - Credit for 3-h-rated barrier taken from the south wall of Auxiliary Building (1-AB-L2-A and 1-AB-LA-B).
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.

- West - 2-h-rated barrier separates from stairwell No. A.
  - Unrated exterior area boundary.

E. Area Access

1. Level 1

   - North - Class A door from 1-AB-L1-G.
   - West - Class A door from stairwell No. A.
     - Unrated door from outside.
     - Unrated rollup door from outside.
   - East - Unrated doors from outside.

2. Elevation 237 ft - 0 in.

   - East - Unrated door from stairwell No. C.

3. Level 2

   - West - Class A door from stairwell No. A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Fire dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related equipment

- Radwaste process equipment.

K. Combustible Loading

1. Zone No. 300B

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles $\leq$ 8,720,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 303

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 39,840,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 304

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles $\leq$ 18,320,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

4. Zone No. 330

- Fixed combustible material

  - Cellulosic materials

  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 128,750,000 Btu
  - Transient combustibles 20,850,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 300B

- Zone 303

- Zone 304

- Zone 330

N. Fire Suppression

1. Automatic

   - Zone 300B - No zone coverage.

   - Zone 303 - No zone coverage.

- Zone 304 - No zone coverage.
- Zone 330 - Wet pipe sprinkler system - partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

- Radioactive liquids.
- Radioactive drywaste.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

Because there are no safe shutdown and/or safety-related components in this area, no special consideration has been given to flooding.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See appendix 9B, section C.5.a(1).

9A.1.130 FIRE AREA 1-RPF-L1-A

A. Location: Radwaste Processing Facility

B. Drawing: AX4DJ8050

C. Description: Includes fire zone 350

Radwaste Processing

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

E. Area Access

- North - Unrated rollup door from outside.
- North - Unrated hollow metal door from outside.
- South - Unrated hollow metal door from outside.
- East - Unrated hollow metal door from outside.

F. Sealed Penetrations

N/A

G. Fire Dampers

None

H. Safe Shutdown Components

None

I. Safety-Related Equipment

None

J. Nonsafety-Related Equipment

- A-1590-U7-001 - Radwaste processing facility space

heater.

•	A-1590-U7-002	-	Radwaste processing facility space heater.
•	A-1590-U7-003	-	Radwaste processing facility space heater.
•	A-1590-U7-004	-	Radwaste processing facility space heater.
•	ARE-16971	-	Radwaste processing facility area radiation monitor.
•	ARE-16972	-	Radwaste processing facility area radiation monitor.
•	ARE-16973	-	Radwaste processing facility area radiation monitor.
•	ARE-16980	-	Radwaste processing facility vent radiation monitor.
•	A-1590-A7-003	-	Control room auxiliary heating unit.
•	A-1590-A7-003-M01	-	Auxiliary heating unit fan motor.
•	A-1590-E7-000	-	Control room condensing unit.
•	A-1590-N7-001-000	-	HEPA filtration unit.
•	A-1590-N7-001-M01	-	HEPA filtration unit motor.
•	A-1590-A7-001	-	Electrical room air makeup unit.
•	A-1590-A7-002	-	Mechanical room air makeup unit.

K. Combustible Loading

Zone No. 350

- Fixed combustible material
  - Cable Insulation
  - Cellulose
  - Plastics
  - Rubber Goods
  - Oil/grease
- Heat Release

- Fixed combustibles	$\leq$ 26,625,000	Btu
- Transient combustibles	800,000	Btu
• Combustible loading	$\leq$ 40,000	Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 30	min

L. Evaluation of Safe Shutdown Capability

1. N/A.
2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within zone 350.

N. Fire Suppression

1. Automatic

   - Zone 350 - No zone coverage.

2. Manual

   Hose station (with portable extinguisher) is conveniently located to this area.

O. Radioactive Materials

Low level radioactive material.

P. Ventilation

The HVAC system and exhaust system for the potentially contaminated processing room and storage room are designed to provide control of airborne contamination. The HVAC unit for the potentially contaminated processing room returns air from the room and passes the air through HEPA filters and out the vent stack.

Q. Drainage

The grade elevation is above that required for natural flood protection. Curbs and ramps are provided, in radioactive areas, to contain inadvertent radwaste spills.

R. Emergency Lighting

90-minute battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   The building is outside of the protected area and does not communicate with any other fire area.

2. Unlabeled doors:

   The building is outside of the protected area and does not communicate with any other fire area.

9A. 1.131 DELETED.

9A.1.132 FIRE AREA 1-OSB

A. Location: Outage Storage Building

B. Drawing: AX4DJ8051

C. Description: Includes fire zone 702

Plant Outage Material Storage

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- South - Unrated door from outside.
  - Unrated rollup door from outside.
- West - Unrated door from outside.
  - Unrated rollup door from outside.

F. Sealed Penetrations

N/A

G. Fire Dampers

None

H. Safe Shutdown Components

None

I. Safety-Related Equipment

None

J. Nonsafety-Related Equipment

Outage support equipment and construction material.

K. Combustible Loading

Zone No. 702

- Fixed combustible material

  - Lube Oil
  - Cable
  - Class A
  - Plastics
  - Rubber
  - Hydraulic fluid

- Heat Release

- Fixed combustibles	208,736,000	Btu
- Transient combustibles	36, 538,900	Btu

• Combustible loading	≤ 80,000	Btu/ft^2
• Fire severity (wood equivalent)	≤ 60	min

L. Evaluation of Safe Shutdown Capability

1. N/A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within zone 702.

N. Fire Suppression

1. Automatic

   None.

2. Manual

   Portable extinguishers are conveniently located close to each access door. The closest fire hydrant is located about 200 ft from the building. Additionally, support from the local fire brigade is available, when required.

O. Radioactive Materials

Low-level radioactive material stored in sealed, steel, unrated B-25 and Sealand containers, and in other suitable coverings.

P. Ventilation

None.

Q. Drainage

The grade elevation is above that required for natural flood protection.

R. Emergency Lighting

90-minute battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   The building is outside of the protected area and does not communicate with any other fire areas.

2. Unlabeled doors:

   The building is outside of the protected area and does not communicate with any other fire areas.

K. Combustible Loading

1. Zone No. 300B

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles $\leq$ 8,720,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 303

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 39,840,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 304

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles $\leq$ 18,320,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

4. Zone No. 330

- Fixed combustible material

  - Cellulosic materials

  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 128,750,000 Btu
  - Transient combustibles 20,850,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 300B
- Zone 303
- Zone 304
- Zone 330

N. Fire Suppression

1. Automatic

   - Zone 300B - No zone coverage.

   - Zone 303 - No zone coverage.

- Zone 304 - No zone coverage.
- Zone 330 - Wet pipe sprinkler system - partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

- Radioactive liquids.
- Radioactive drywaste.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

Because there are no safe shutdown and/or safety-related components in this area, no special consideration has been given to flooding.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See appendix 9B, section C.5.a(1).

9.A.1.130 FIRE AREA 1-RPF-L1-A

A. Location: Radwaste Processing Facility

B. Drawing: AX4DJ8050

C. Description: Includes fire zone 350

Radwaste Processing

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

E. Area Access

- North - Unrated rollup door from outside.
- North - Unrated hollow metal door from outside.
- South - Unrated hollow metal door from outside.
- East - Unrated hollow metal door from outside.

F. Sealed Penetrations

N/A

G. Fire Dampers

None

H. Safe Shutdown Components

None

I. Safety-Related Equipment

None

J. Nonsafety-Related Equipment

- A-1590-U7-001 - Radwaste processing facility space

heater.

- A-1590-U7-002 - Radwaste processing facility space heater.
- A-1590-U7-003 - Radwaste processing facility space heater.
- A-1590-U7-004 - Radwaste processing facility space heater.
- ARE-16971 - Radwaste processing facility area radiation monitor.
- ARE-16972 - Radwaste processing facility area radiation monitor.
- ARE-16973 - Radwaste processing facility area radiation monitor.
- ARE-16980 - Radwaste processing facility vent radiation monitor.
- A-1590-A7-003 - Control room auxiliary heating unit.
- A-1590-A7-003-M01 - Auxiliary heating unit fan motor.
- A-1590-E7-000 - Control room condensing unit.
- A-1590-N7-001-000 - HEPA filtration unit.
- A-1590-N7-001-M01 - HEPA filtration unit motor.
- A-1590-A7-001 - Electrical room air makeup unit.
- A-1590-A7-002 - Mechanical room air makeup unit.

K. Combustible Loading

Zone No. 350

- Fixed combustible material
  - Cable Insulation
  - Cellulose
  - Plastics
  - Rubber Goods
  - Oil/grease
- Heat Release
  - Fixed combustibles ≤ 26,625,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. N/A.
2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within zone 350.

N. Fire Suppression

1. Automatic

   - Zone 350 - No zone coverage.

2. Manual

   Hose station (with portable extinguisher) is conveniently located to this area.

O. Radioactive Materials

Low level radioactive material.

P. Ventilation

The HVAC system and exhaust system for the potentially contaminated processing room and storage room are designed to provide control of airborne contamination. The HVAC unit for the potentially contaminated processing room returns air from the room and passes the air through HEPA filters and out the vent stack.

Q. Drainage

The grade elevation is above that required for natural flood protection. Curbs and ramps are provided, in radioactive areas, to contain inadvertent radwaste spills.

R. Emergency Lighting

90-minute battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   The building is outside of the protected area and does not communicate with any other fire area.

2. Unlabeled doors:

   The building is outside of the protected area and does not communicate with any other fire area.

9A. 1.131 DELETED.

9A.1.132 FIRE AREA 1-OSB

A. Location: Outage Storage Building

B. Drawing: AX4DJ8051

C. Description: Includes fire zone 702

Plant Outage Material Storage

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- South - Unrated door from outside.
  - Unrated rollup door from outside.
- West - Unrated door from outside.
  - Unrated rollup door from outside.

F. Sealed Penetrations

N/A

G. Fire Dampers

None

H. Safe Shutdown Components

None

I. Safety-Related Equipment

None

J. Nonsafety-Related Equipment

Outage support equipment and construction material.

K. Combustible Loading

Zone No. 702

- Fixed combustible material
  - Lube Oil
  - Cable
  - Class A
  - Plastics
  - Rubber
  - Hydraulic fluid

- Heat Release
  - Fixed combustibles 208,736,000 Btu
  - Transient combustibles 36, 538,900 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. N/A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within zone 702.

N. Fire Suppression

1. Automatic

   None.

2. Manual

   Portable extinguishers are conveniently located close to each access door. The closest fire hydrant is located about 200 ft from the building. Additionally, support from the local fire brigade is available, when required.

O. Radioactive Materials

Low-level radioactive material stored in sealed, steel, unrated B-25 and Sealand containers, and in other suitable coverings.

P. Ventilation

None.

Q. Drainage

The grade elevation is above that required for natural flood protection.

R. Emergency Lighting

90-minute battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   The building is outside of the protected area and does not communicate with any other fire areas.

2. Unlabeled doors:

   The building is outside of the protected area and does not communicate with any other fire areas.

9A.2.1 FIRE AREA 2-AB-LD-A

A. Location: Auxiliary Building Central Area, Levels D, C, B, A, 1, 2

Auxiliary Building Wing Area, Levels D, C, A

B. Drawings: AX4DJ8007, AX4DJ8008, AX4DJ8010, AX4DJ8011, AX4DJ8012, AX4DJ8015, AX4DJ8016, AX4DJ8017, and AX4DJ8019

C. Description: Includes fire zones 9, 11B

Train B pipe chase, train B RHR pump room, nontrain pipe chase, train B electrical chase, HVAC chase.

D. Description of Boundaries

1. Level D - Central

- Floor - Unrated concrete base mat.
- North - 3-h-rated barrier separates area from 2-AB-LD-D.
- West - 3-h-rated barrier separates area from 2-AB-LD-I, 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-F.
  - 2-h-rated barrier separates area from stairwell No. 2.
- East - 3-h-rated barrier separates area from 2-AB-LD-C, 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LC-A.

2. Level D - Wing (el 135 ft - 2 in.)

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LD-J.
- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LC-D.

3. Level C - Central

- North - 3-h-rated barrier separates area from 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LD-I.
- South - 3-h-rated barrier separates area from 2-AB-LD-F.
  - 2-h-rated barrier separates area from stairwell No. 2.
- East - 3-h-rated barrier separates area from 2-AB-LC-C, 2-AB-LC-A, 2-AB-LD-B.
- Floor - 3-h-rated barrier separates area from 2-AB-LD-D.

4. Level C - Wing (el 158 ft - 0 in.)

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LC-D, 2-AB-LC-E.
- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G
- West - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LC-D, 2-AB-LC-E.
- East - 3-h-rated barrier separates area from 2-AB-LD-G
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LB-A.

5. Level B - Central

- North - 3-h-rated barrier separates area from 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LD-I, 2-AB-LB-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-F.
  - 2-h-rated barrier separates area from stairwell No. 2.
- East - 3-h-rated barrier separates area from 2-AB-LC-A, 2-AB-LD-B, 2-AB-LC-C.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-A.

6. Level A - Central

- North - 3-h-rated barrier separates area from 2-AB-LA-A, 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-I, 2-AB-LA-B, 2-AB-LB-B, 2-AB-LA-C.
- South - 3-h-rated barrier separates area from 2-AB-LD-F.
  - 2-h-rated barrier separates area from stairwell No. 2.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L1-C, 2-AB-LD-B, 2-AB-L1-B.

7. Level A - Wing (el 211 ft - 5 in.)

- North - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LA-D, 2-AB-LA-E.
- West - 3-h-rated barrier separates area from 2-AB-LA-D.
- South - 3-h-rated barrier separates area from 2-AB-LA-D, 2-AB-LA-E, 2-AB-LB-B, 2-AB-LD-I, 2-AB-LA-C.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-E, 2-AB-LD-G.
- Floor - 3-h-rated barrier separates area from 2-AB-LA-D, 2-AB-LD-I, 2-AB-LA-E, 2-AB-LA-C.

8. Level 1 – Central (Electrical chase)

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-L1-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-L1-B.

9. Level 1 – Central (HVAC chase)

- North - 3-h-rated barrier separates area from 2-AB-L1-C.
- West - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LD-I.

- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-L1-C.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-C, 2-AB-L2-A.

10. Level 2 – Central

- North - 3-h-rated barrier separates area from 2-AB-L2-C.
- South - 3-h-rated barrier separates area from 2-AB-L1-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-L1-B.
- Ceiling - Unrated exterior fire area boundary.

E. Area Access

1. Level D

- East - Unrated watertight door from 2-AB-LD-B.
- East - Class A door [(a)] from 2-AB-LD-B.

2. Level C

- East - Class A door [(a)] from 2-AB-LD-B.

3. Level B

- East - Class A door [(a)] from 2-AB-LD-B.

4. Level A

- East - Class A door [(a)] from 2-AB-LD-B.
  - Class A door from 2-AB-LD-B (elevation 211 ft-5 in.)

5. Level 1

- East - Class A door from 2-AB-L1-B.

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a. Indicated fire door is normally open, but is released when smoke is detected.

6. Level 2

   - East - Class A door from 2-AB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8716B - Residual heat removal discharge header cross connection valve.
- HV8812B - RWST to RHR pump B valve.
- TE12212 - Fan 2-1555-A7-008 interlock.
- 2-1205-P6-002 - Residual heat removal pump B.
- Train A safe shutdown cables (Spurious actuation concerns and separation concerns eliminated by the design and operational considerations of paragraph L.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. <u>Zone No. 9</u>

   - Fixed combustible material

     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Oil/grease
     - Rubber goods

   - Heat release

- Fixed combustibles ≤ 9,200,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 11B

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles 614,395,875 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 259,030 Btu/ft^2

- Fire severity (wood equivalent) 194 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Fire damage to cables for both boric acid transfer pump discharge valves may require use of the refueling water storage tank and RCS letdown to achieve RCS boration.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve LV-0112B may close due to a fire in this fire area.

   b. Train A residual heat removal (RHR) system vent HV-10465 may open due to a fire in this fire area.

   c. The train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   d. CVCS train A charging pump miniflow valve HV-8111A may close due to a fire in this fire area.

   e. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this fire area.

f. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

g. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

h. Deleted.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 9
- Zone 11B

N. Fire Suppression

1. Automatic

   - Zone 9 preaction sprinkler system - total zone coverage.
   - Zone 11B preaction sprinkler system - partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

Watertight door D18 separates fire zone 9 in fire area 2-AB-LD-A from fire zone 13 in fire zone area 2-AB-LD-B. Fire zone 9 is the train B RHR pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 13 is the level D central part of the auxiliary building which includes corridors and various tank and equipment rooms.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-A and 2-AB-LD-B is acceptable because (also see Appendix 9B, Section C.5.a.(5)):

a. Within fire area 2-AB-LD-B (fire zone 13) approximately 14 horizontal ft of separation distance with no intervening combustibles exists between watertight door D18 and the closest safe shutdown component (including electrical cables). This separation path is a heavy concrete construction labyrinth which provides access to fire area 2-AB-LD-A.

b. Fire zones 9 and 13 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 9 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

d. Fire zone 13 is provided with an independent automatic fire suppression system for the Train A related cable trays in the corridor adjacent to the labyrinth. This system also provides coverage of the labyrinth entrance and exterior walls.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unlabeled oversize fire dampers:

See Appendix 9B, Section C.5.a.(4).

3. Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

4. No fire damper in a rated fire area boundary:

No fire dampers are installed in the two ventilation duct penetrations in the north auxiliary building wall of this fire area between column lines A4 and A6 at el 215

ft (approximately). This wall is a 3-h-rated fire area boundary barrier which separates this fire area from the seismic gap between the auxiliary building and the fuel handling building. This deviation is acceptable because:

a. Fire dampers are installed in these ventilation ducting penetrations in the south wall of the fuel handling building which will isolate fire area 2-FB-LC-A (adjoining fire area) from the seismic gap and from this fire area.

b. The interconnecting ducting between the fuel handling building fire damper sleeve and the ventilation ducting penetration through the 3-h-rated fire barrier of this area is noncombustible flexible material or sheet metal ducting.

c. There is no combustible material in the immediate vicinity of the ventilation penetrations within this fire area.

d. While the seismic gap does contain some combustible material (exposed electrical cable insulation) it is a small quantity (relative), and an exposure fire within this area is not considered credible as the area is not accessible (seismic gap is approximately 5 1/2 in. wide).

e. Safe shutdown capability is not jeopardized. Only train B safety-related cables exist inside the seismic gap, and train B safe shutdown cables and equipment exist in fire area 2-AB-LD-A.

Modifications of the plant to provide rated fire dampers in these ventilation penetrations would not significantly increase the level of protection provided by the existing design.

9A.2.2 FIRE AREA 2-AB-LD-B

A. Location: Auxiliary Building - Central Area Levels D, C, B, A, 1; Fuel Handling Building, Control Building

B. Drawings: AX4DJ8007, AX4DJ8009, AX4DJ8010, AX4DJ8014, AX4DJ8012, AX4DJ8015, AX4DJ8017, AX4DJ8032, AX4DJ8027

C. Description: Includes fire zones 13, 24, 25, 38, 40, 41, 46, 192

1. Level D - Auxiliary Building

   Floor drain tank room, filter area, sump and sump pump area, waste hold-up tank room, valve gallery, boron recycle hold-up tank room, waste evaporator feed pump room, waste monitor tank pump rooms, and horizontal and vertical utility chases.

2. Level C - Auxiliary Building

   Recycle and waste evaporator rooms, valve galleries, boron recycle hold up tank room, SGB spent resin storage tank and pump rooms, waste monitor tank rooms, nontrain vertical electric chase, and horizontal and vertical utility chases.

3. Level B - Auxiliary Building

   Decay tank rooms, valve galleries, filter chambers, waste gas compressor rooms, catalytic recombiner rooms, nontrain vertical electric chase, and horizontal and vertical utility chases.

4. Level A - Auxiliary Building

   Volume control tank room, demineralizer rooms, spent fuel pit heat exchanger rooms, switchgear room, valve galleries, nontrain vertical electric chase, and horizontal and vertical utility chases.

5. Level 1 - Auxiliary Building

   Corridors, nontrain vertical electric chase, sample chase (including horizontal section), switchgear control panel room.

6. Level 2 - Fuel Handling Building

   Sample chase (at el 240 ft - 0 in. and el 249 ft - 0 in.).

D. Description of Boundaries

1. Level D - Auxiliary Building

   - Floor - Unrated concrete base mat.

     - 3-h-rated barrier separates area from 2-AB-LD-C, 1-AB-LD-B (el 135 ft - 2 in. utility chase in both cases).

- North - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-D, 2-AB-LD-A, 2-AB-LD-G, 2-AB-LD-E, 2-AB-LD-C, 2-AB-LD-F.

  - 2-h-rated barrier separates area from stairwell No. 2.
- South - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-B (including el 135 ft - 2 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-C, 2-AB-LD-E, 2-AB-LC-B, 2-AB-LD-F.

2. Level C - Auxiliary Building

- North - Unrated below-grade exterior area boundary.

  - 3-h-rated barrier separates area from 2-AB-LC-B, 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LC-A, 2-AB-LC-C, 2-AB-LD-F, 2-AB-LD-G.

  - 2-h-rated barrier separates area from stairwell No. 2
- South - Unrated below-grade exterior area boundary.

  - 3-h-rated barrier separates area from 1-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B (including el 161 ft - 1 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B (el 161 ft - 1 in. utility chase).
- Floor - 3-h-rated barrier separates area from 2-AB-LD-C, 2-AB-LD-E, 1-AB-LD-B (including el 161 ft - 1 in. utility chase).

3. Level B - Auxiliary Building

- North - 3-h-rated barrier separates area from 1-AB-LD-B, 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LC-C, 2-AB-LC-A, 2-AB-LD-A, 2-AB-LD-F, 2-AB-LB-A.

- 2-h-rated barrier separates area from stairwell No. 2.

- South - 3-h-rated barrier separates area from 1-AB-LD-B.
  - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-B (including el 186 ft - 8 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 1-AB-LD-B (including el 186 ft - 8 in. utility chase).
- Floor - 3-h-rated barrier separates area from 2-AB-LC-B, 1-AB-LD-B (including el 186 ft - 8 in. utility chase).
- Interior - 3-h-rated barrier separates area from 2-AB-LC-B.

4. Level A - Auxiliary Building

- North - 3-h-rated barrier separates area from 1-AB-LD-B, 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LA-A, 2-AB-LD-A, 2-AB-LD-F, 2-AB-LA-B.
  - 2-h-rated barrier separates area from stairwell No. 2.
- South - 3-h-rated barrier separates area from 1-AB-LD-B.
  - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-B (including el 211 ft - 5 in. utility chase).
- Ceiling - 3-h-rated barrier separates area from 1-AB-L1-H, 1-AB-LD-B (including el 211 ft - 5 in. utility chase).
- Floor - 3-h-rated barrier separates area from 2-AB-LC-C, 2-AB-LC-A, 2-AB-LC-B, 1-AB-LD-B (including el 211 ft - 5 in. utility chase).
- Interior - 3-h-rated barrier separates area from 2-AB-LC-B.

5. Level 1 - Auxiliary Building

- North - 3-h-rated barrier separates area from 2-AB-L2-A, 1-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-A (HVAC and electrical chases), 2-AB-L1-C, 2-AB-L1-B, 2-AB-LD-G, 2-AB-LA-B, 2-AB-LD-F.

- 2-h-rated barrier separates area from stairwell No. 2.

- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-L1-H, 1-AB-LD-B, 2-AB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L1-B, 2-AB-L2-C, 2-AB-L2-A.
- Floor - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LC-B.

6. Level 2 - Fuel Handling Building (Sample Chase)

- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- South - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.
- Floor - 3-h-rated barrier separates area from 2-AB-L2-A, 2-FB-LC-A.

7. Level 2 Control Building (Sample Chase)

- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- South - Rated exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling (Unit 2) - 3-h-rated barrier separates area from 1-CB-L3-L.
- Floor - 3-h-rated barrier separates area from 2-AB-L2-A, 2-CB-L2-B.

E. Area Access

1. Level D - Auxiliary Building

- West - Unrated watertight doors from 2-AB-LD-D, 2-AB-LD-A.
  - Class A door from 2-AB-LD-A.[a]

- Class A doors from 2-AB-LD-C, 2-AB-LD-E.
- Certified class A door from 2-AB-LD-G.
- Certified class B door from stairwell No. 2.

- East - Two certified class A doors from 2-AB-LD-B.
  - Class A door from 1-AB-LD-B (el 135 ft 2 in.)
- Ceiling - Concrete plugs provides access to level D of the pipe chase from level C of the auxiliary building. Access to other levels of the pipe chase is provided by ladders within the chase and by concrete plugs in the floor of level A. Since the amount of combustibles in the pipe chase is insufficient to support a fire (pipes and inorganic insulating materials), access to the chase for firefighting is not required.

2. Level C - Auxiliary Building

- North - Certified class A door from 2-AB-LC-B.
- West - Class A doors from 2-AB-LD-A[a], 2-AB-LC-A, 2-AB-LC-C.
  - Certified class A door from 2-AB-LD-G.
  - Class B door from stairwell No. 2.
- East - Two certified class A doors from 1-AB-LD-B.
  - Class A door from 1-AB-LD-B (el 161 ft 1 in.)

3. Level B - Auxiliary Building

- North - Class A door from 2-FB-LC-A.
- West - Class A doors from 2-AB-LD-A[a], 2-AB-LB-A.
  - Class B door from stairwell No. 2.
- East - Two class A doors from 1-AB-LD-B.
- Interior - Class A door from 2-AB-LC-B.
  - Class A door from 1-AB-LD-B.

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a. Indicated fire door is normally open, but is released when smoke is detected.

4. Level A - Auxiliary Building

- West - Class A doors from 2-AB-LD-A[a], 2-AB-LA-B.
  - Class A door from 2-AB-LD-A (el 211 ft-5 in.)
  - Class B door from stairwell No. 2.
- East - Three class A doors from 1-AB-LD-B.
  - Class A door from 1-AB-LD-B (el 211 ft 5 in.)
- Floor - See the description of the utility chase access for the ceiling of elevation D.
- Interior - Class A door from 2-AB-LC-B.

5. Level 1 - Auxiliary Building

- North - Class A door from 2-AB-L2-A.
- West - Class A doors from 2-AB-L1-C, 2-AB-LD-G, 2-AB-L1-B.
  - Unrated watertight door from 2-AB-LA-B.
  - Two class B doors from stairwell No. 2.
- South - Exterior door.
- East - Two class A doors from 1-AB-LD-B, 1-AB-L1-H.
  - Class A door from 2-AB-LC-B.

6. Level 2 - Control Building

- East - Class A door from 1-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

a. Indicated fire door is normally open, but is released when smoke is detected.

H. Safe Shutdown Components

- HY0607 - HV0607 I/P converter.

- HY0606 - HV0606 I/P converter.
- FIS0610 - Residual heat removal A miniflow interlock.
- FY0618 - FV0618 I/P converter.
- FY0619 - FV0619 I/P converter.
- FT0618 - Residual heat removal A flow.
- FT0619 - Residual heat removal B flow.
- FIS0611 - Residual heat removal B miniflow interlock.
- LV0112B - VCT isolation valve.
- LV0112C - VCT isolation valve.
- HV8104 - BAST to charging pump A valve.
- TSH12206 - Fan 2-1555-A7-007 interlock.
- TSH12212 - Fan 2-1555-A7-008 interlock.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the design and operational considerations of paragraph L.)

I. Safety-Related Equipment

- 2-1213-E6-001 - Train A spent fuel pit heat exchanger.
- 2-1213-P6-002 - Train A spent fuel pit pump.
- Boron recycle holdup tank.
- Waste gas compressors.
- Waste gas decay tanks.
- 2-1208-T6-001 - Volume control tank.
- 2-1555-A7-017 - Spent fuel pit heat exchanger and pump room cooler.
- PV0115 - Volume control tank to waste gas valve.
- HV7805 - Gas decay tank header bypass valve.

- FV0110A - Boric acid injection to blender valve.
- FV0111A - Makeup water to boric acid blender valve.
- LV0112A - Letdown to volume control tank.
- HV-12596 - Boron recycle holdup Tk 2 HVAC supply.
- HV-12597 - Boron recycle holdup Tk 2 HVAC supply.
- FV-0110B - Boric acid injection to charge pump.
- FV-0111B - Boric acid blender discharge.
- HV-8115 - Letdown divert to thermal regeneration.
- TV-0129 - Letdown to demineralizer or VCT.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- CVCS chillers.
- Chemical drain tank and pump.
- Spent fuel pit skimmer pump.
- Clean and radioactive sumps and pumps.
- Resin charging tank.
- Waste monitor tank and pumps.
- Spent resin sluice pump and storage tank.
- CVCS chiller surge tank.
- Waste evaporator pumps.
- Floor drain tank and pump.
- CVCS chiller pumps.
- Recycle evaporator feed pumps.
- Fuel pool area recirculation fan.
- Radioactive and nonradioactive filters.

- Refueling water purification pump.
- Waste evaporator package. (abandoned)
- Absorption tower. (abandoned)
- Crud tank pumps.
- Chemical mixing tank.
- Waste evaporator condensate tank and pump.
- SGB spent resin storage tank and sluice pump.
- Liquid nitrogen receiving tank.
- Boron meter tank.
- Waste evaporator feed pump.
- Catalytic hydrogen recombiners.
- Waste gas decay tank drain pump.
- Gas traps.
- Demineralizers.
- Waste holdup tank.
- Steam generator blowdown to condenser valves.
- Crud tank pump inlet valves.
- Crud tank pump outlet valves.
- Crud tank pump recirculation valve.
- Waste process control panels.
- Heat tracing cabinets.
- Light panels.
- Lighting distribution transformer.
- Fire protection isolation headers.
- Nonsafety-related cables.

- 2-1805-S3-NBK - 480-V MCC 2NBK.
- 2-1805-S3-NBH - 480-V MCC 2NBH.
- 2-1805-S3-NBJ - 480-V MCC 2NBJ.
- 2-1805-S3-B27 - 480-V MCC switchgear 2NB27.
- 2-1804-S3-A05 - 4160-V MCC switchgear 2NA05.
- 2-1807-Y3-RX19 - Regulated transformer 2NJB15RX.
- 2-1807-Y3-RX20 - Regulated transformer 2NBK30RX.

K. Combustibles Loading

1. Zone No. 13

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 283,400,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 24

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 689,200,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 25

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 206,985,630 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 2,968,366 Btu/ft^2

- Fire severity (wood equivalent) ≤ 2226 min

4. Zone No. 38

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 726,000,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

5. Zone No. 40

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 352,400,000 Btu

- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

6. Zone No. 41

- Fixed combustible material
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 11,600,000 Btu
  - Transient combustibles 0 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

7. Zone No. 46

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 382,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

8. Zone No. 192

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
- Heat release

- Fixed combustibles ≤ 334,280,000 Btu
- Transient combustibles 0 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1a. For a fire in this area, use safe shutdown train B with the operational considerations of paragraph L2.

2. Special operational and design considerations:

a. Remote starting of the train B RHR pump room cooler, 2-1555-A7-008, from the remote shutdown panel may be required due to a fire in this fire area.

b. Fire damage to both boric acid transfer pump discharge valves or their associated cables may require use of the refueling water storage tank and RCS letdown to achieve RCS boration.

c. Fire damage to the train B RHR miniflow valve interlock switch FIS-0611 or its circuits may require verification of the position of FV-0611 during RHR system operation.

3. Spurious actuation considerations:

a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

b. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this area.

c. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

d. Train B RHR heat exchanger outlet valve, HV-0607, may close due to a fire in this fire area.

e. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

f. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

g. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

h. Train B RHR heat exchanger bypass valve, FV-0619, may open due to a fire in this fire area.

i. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 13
- Zone 24
- Zone 25
- Zone 38
- Zone 40
- Zone 46

N. Fire Suppression

1. Automatic

   - Zone 13 preaction sprinkler system - partial zone coverage.
   - Zone 24 - no zone coverage.
   - Zone 25 preaction sprinkler system - total zone coverage.
   - Zone 38 preaction sprinkler system - partial zone coverage.
   - Zone 41 - no zone coverage.
   - Zone 46 preaction sprinkler system - partial zone coverage.
   - Zone 192 - no zone coverage.

2. Manual

   Zone 40 manual sprinkler system - partial zone coverage.

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids and solids in process equipment and piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation (except for rooms C38, A91, C36, C27, D112, and D124). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

   a. See Section 9A.2.1.S.1.

   b. See Section 9A.2.1.4.S.1.

   c. See Section 9A.2.19.S.4.

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a.(5).

3. Unlabeled oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

4. Unrated containment building fire area boundary:

   See Section 9A.2.76.S.1.

5. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

6. Separation by distance without full area suppression:

   Deleted.

7. No fire damper in a rated fire area boundary:

   No fire dampers are installed in the two ventilation duct penetrations in the north auxiliary building wall of this fire area between column lines A8 and A9 at el 213

ft (approximately) inside room A19. This wall is a 3-h-rated fire area boundary barrier which separates this fire area from the seismic gap between the auxiliary building and the fuel handling building. This deviation is acceptable because:

a. Fire dampers are installed in these ventilation ducting penetrations in the south wall of the fuel handling building which will isolate fire area 1-AB-LD-B (adjoining fire area) from the seismic gap and from this fire area.

b. The interconnecting ducting between the fuel handling building fire damper sleeve and the ventilation ducting penetration through the 3-h-rated fire barrier of this area is noncombustible flexible material or sheet metal ducting.

c. There is no combustible material in the immediate vicinity of the ventilation penetrations within this fire area.

d. While the seismic gap does contain some combustible material (exposed electrical cable insulation), it is a small quantity (relative), and an exposure fire within this area is not considered credible as the area is not accessible (seismic gap is approximately 5-1/2 in. wide.)

e. Safe shutdown capability is not jeopardized. Only train B safety-related cables exist inside the seismic gap, and no safe shutdown equipment or cables exist in Room A91.

f. Room A91 is separated from the rest of fire area 2-AB-LD-B by walls of heavy concrete construction and a watertight door (provided for flooding concerns).

g. Automatic suppression systems provide protection for the train A safe shutdown cable trays along the west wall outside of room A91 and for the nonsafe-shutdown cable tray(s) inside room A91 where they penetrate the west wall.

h. Fire detectors are provided for room A91.

Modification of the plant to provide rated fire dampers in these ventilation penetrations would not significantly increase the level of protection provided by the existing design.

8. Safety-related cable trays without automatic fire suppression protection:

Safety-related cable trays in fire zones 13 and 38 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at these locations satisfies the accessibility and the fire detection criteria of BTP CMEB 9.5-1 Position C.5.e and the locations have combustible loadings of less than 100,000 Btu/ft2, which is considered low by the NFPA Fire Protection Handbook (page 5-92 in the 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water

suppression protection for these locations would not significantly increase the existing level of protection.

9. Embedded conduit:

   Conduit 2DE441RX001 is embedded in a wall of fire zone 40 of this fire area. This conduit contains a cable which could change the results of the safe shutdown analysis as presented in Paragraph L if it were to be damaged by a fire in this fire area. While it is anticipated that this conduit is embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 4-in. of concrete coverage over the conduit can be verified to exist.

   Modification of the facility to relocate the cable in this embedded conduit or to otherwise provide additional protection is not warranted because the minimum concrete coverage over the conduit (equivalent to approximately 100 minutes of protection per figure 5-8F of the NFPA Fire Protection Handbook - Fifteenth Edition) provides a margin of safety of at least 100-percent above the calculated combustible loading for the location.

9A.2.3 FIRE AREA 2-AB-LD-C

A. Location: Auxiliary building, central area level D (el 128 ft - 1 in.)

B. Drawing: AX4DJ8007

C. Description: Includes fire zone 190

Train B RHR pump room ESF cooler room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-AB-LD-B
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B.

E. Area Access

- North - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1555-A7-008 - Residual heat removal pump B room cooler.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 190

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 3,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 190

N. Fire Suppression

1. Automatic
   - Zone 190 - No zone coverage.
2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe egress/ingress of personnel.

S. Deviations and Justifications

None.

9A.2.4 FIRE AREA 2-AB-LD-D

A. Location: Auxiliary Building, Central Area, Level D

B. Drawing: AX4DJ8007

C. Description: Includes fire zones 8, 10

Train A RHR pump room and train A pipe chase

D. Description of Boundaries

- Floor - Unrated concrete base mat.
- North - Unrated below-grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-I.
- South - 3-h-rated barrier separates area from 2-AB-LD-A.
- East - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-E.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LC-C, 2-AB-LD-A.

E. Area Access

East - Unrated watertight door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8716A - Residual heat removal discharge header cross connection valve.
- HV8812A - RWST to RHR pump A valve.
- TE12206 - Fan 2-1555-A7-007 interlock.
- 2-1205-P6-001 - Residual heat removal pump A.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone 8

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 34,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 10

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Oil/grease
  - Plastics
  - Rubber goods
- Heat release
  - Fixed combustibles ≤ 39,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

a. CVCS charging pump common mini-flow valve, HV-8110, may close due to a fire in this fire area.

b. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

c. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 8
- Zone 10

N. Fire Suppression

1. Automatic

- Zone 8 preaction sprinkler system - Total zone coverage.
- Zone 10 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and pipes.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight doors:

Watertight door D20 separates fire zone 10 in fire area 2-AB-LD-D from fire zone 13 in fire area 2-AB-LD-B. Fire zone 10 is the train A RHR pump room and is provided with a watertight door for flooding protection of safety related equipment. Fire zone 13 is the level D central part of the auxiliary building which includes corridors and various tank and equipment rooms. Fire zone 13 does not contain train B safe shutdown components (including electrical cables) of concern.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-D and 2-AB-LD-B is acceptable because (also see Appendix 9B, Section C.5.a.(5)):

a. The capability to achieve safe shutdown using train B is not jeopardized for a fire in either location.

b. Fire zones 10 and 13 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 10 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

d. Fire zone 13 is provided with an independent automatic fire suppression system for the Train A cable trays in the access corridor to zone 10, including coverage in the immediate vicinity of the watertight door.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by existing design.

9A.2.5 FIRE AREA 2-AB-LD-E

A. Location: Auxiliary Building, Central Area, Level D (el 128 ft - 1 in.)

B. Drawing: AX4DJ8007

C. Description: Includes fire zone 189

Train A RHR pump room ESF cooler room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-D.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B.

E. Area Access

- South - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1555-A7-007 - Residual heat removal pump A room cooler.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment

K. Combustibles Loading

Zone No. 189

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles ≤ 3,200,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed with the following zone:

- Zone 189

N. Fire Suppression

1. Automatic

   - Zone 189 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category I dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.6 FIRE AREA 2-AB-LD-F

A. Location: Auxiliary Building Central Area, Levels D, C, B, A, 1, 2

B. Drawings: AX4DJ8008, AX4DJ8010, AX4DJ8012, AX4DJ8015, AX4DJ8017, AX4DJ8019

C. Description: Includes fire zones 184

HVAC shaft

D. Description of Boundaries

1. Level D (el 135 ft - 2 in.)
   - Floor - 3-h-rated barrier separates area from 2-AB-LD-B.
   - North - 3-h-rated barrier separates area from 2-AB-LD-A.
   - West - 3-h-rated barrier separates area from 2-AB-LD-G.
   - South - 3-h-rated barrier separates area from 2-AB-LD-B.
   - East - 2-h-rated barrier separates area from stairwell No. 2.
2. Level C
   - North - 3-h-rated barrier separates area from 2-AB-LD-A.
   - West - 3-h-rated barrier separates area from 2-AB-LD-G.
   - South - 3-h-rated barrier separates area from 2-AB-LD-B.
   - East - 2-h-rated barrier separates area from stairwell No. 2.
3. Level B
   - North - 3-h-rated barrier separates area from 2-AB-LD-A.
   - West - 3-h-rated barrier separates area from 2-AB-LB-A.
   - South - 3-h-rated barrier separates area from 2-AB-LD-B.
   - East - 2-h-rated barrier separates area from stairwell No. 2.
4. Level A
   - North - 3-h-rated barrier separates area from 2-AB-LD-A.
   - West - 3-h-rated barrier separates area from 2-AB-LA-B.

- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 2-h-rated barrier separates area from stairwell No. 2.

5. Level 1

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LA-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 2-h-rated barrier separates area from stairwell No. 2.

6. Level 2

- North - 3-h-rated barrier separates area from 2-AB-L1-B.
- West - 3-h-rated barrier separates area from 2-AB-LA-B.
- South - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 2-h-rated barrier separates area from stairwell No. 2.
- Ceiling - Unrated exterior area boundary.

E. Area Access

The HVAC shaft contains no combustibles and is not an operating area; consequently, no access is required.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

None.

J. Nonsafety-Related Equipment

None.

K. Combustible Loading

Zone No. 184

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles ≤ 1,120,000 Btu
  - Transient combustibles 0 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations.

   None.

3. Spurious actuation considerations.

   None.

M. Fire Detection

Zone 184 - None

N. Fire Suppression

1. Automatic

   - Zone 184 - No zone coverage.

2. Manual

   Because the area is not accessible and is devoid of combustible material, fire suppression is not required.

O. Radioactive Materials

None.

P. Ventilation

There are no combustibles in this area, consequently smoke removal need not be considered.

Q. Drainage

None.

R. Emergency Lighting

Because this area is not accessible, no ingress/egress lighting is required.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.7 FIRE AREA 2-AB-LD-G

A. Location: Auxiliary Building, Wing Area, Levels D, C, B, A, 1, 2

B. Drawings: AX4DJ8008, AX4DJ8011, AX4DJ8013, AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 3, 5, 14A, 14B, 14C, 14D, 21, 22, 26A, 30, 32, 36, 48, 49, 54

1. Level D

   Train B Containment spray pump room and boric acid transfer pump room, boric acid storage tank room, sumps, component cooling water drain tank room, waste monitor tank room, waste monitor tank pump room.

2. Level C

   Train A pipe penetration room, pull-out area, SGB heat exchanger room, motor control center room, boric acid batching tank room, vestibule, CVCS normal charging pump room.

3. Level B

   SGB heat exchanger room, train A auxiliary component cooling water pump room, train A safety injection pump room.

4. Level A

   Train A CCW pumps room.

5. Level 1

   Train A ACCW heat exchanger room, moderating heat exchanger room.

6. Level 2

   Train A CCW heat exchanger room.

D. Description of Boundaries

1. Level D

   - Floor - Unrated concrete base mat.
   - North - 3-h-rated barrier separates area from 2-AB-LD-I.
   - West - Unrated below-grade exterior area boundary.

     - 2-h-rated barrier separates area from stairwell No. 4 and elevator No. 2.

- South - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 2-AB-LD-A,2-AB-LD-B, 2-AB-LD-F.
- Interior - 3-h-rated barriers separate area from 2-AB-LD-J.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LC-D, 2-AB-LC-E.
  - 3-h-rated barrier separates fire zone 3 from fire zone 14C.

2. Level C

- Floor - 3-h-rated barrier separates area from 2-AB-LD-H, 2-AB-LD-I.
- North - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-LD-I.
- West - Unrated below-grade exterior area boundary.
  - 2-h-rated barriers separate area from elevator No. 2.
- South - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area 2-AB-LD-B, 2-AB-LD-F, 2-AB-LD-A, 2-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LD-A, 2-AB-LB-A.
- Interior - 3-h-rated barriers separate area from 2-AB-LC-D, 2-AB-LC-E.
  - 3-h-rated barrier separates zone 14D from zone 14C.
  - 3-h-rated barrier separates zone 14C from zone 3.

3. Level B

- Floor - 3-h-rated barrier separates area from 2-AB-LC-D, 2-AB-LC-E.
- North - 3-h-rated barrier separates area from 2-AB-LB-A, 2-AB-LB-B.
- West - Unrated below-grade exterior area boundary.

- 2-h-rated barriers separate area from stairwell No. 4 and elevator No. 2.

- South - Unrated below-grade exterior area boundary.

  - 3-h-rated barrier separates area from 2-AB-LB-A.

- East - 3-h-rated barrier separates area from 2-AB-LB-A, 2-AB-LB-B.

- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-D, 2-AB-LA-E, 2-AB-LA-B (with unrated equipment hatch).

4. Level A

- Floor - 3-h-rated barrier separates area from 2-AB-LB-A.

- North - 3-h-rated barrier separates area from 2-AB-LA-E, 2-AB-LA-C.

- West - Unrated below-grade exterior area boundary.

  - 3-h-rated barrier separates area from 2-NSP-LA-A, 2-DB-L1-B.

- South - 3-h-rated barrier separates area from 2-AB-LA-B, 2-NSP-LA-B.

  - 2-h-rated barrier separates area from stairwell No. 4.

- East - 3-h-rated barrier separates area from 2-AB-LA-B.

5. Level 1

- Floor - 3-h-rated barrier separates area from 2-AB-LA-C, 2-AB-LD-I, 2-AB-LA-B.

- North - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-LA-E, 2-AB-LD-I.

- West - Unrated exterior area boundary.

- South - 3-h-rated barrier separates area from 2-AB-LA-B, 2-AB-LD-I.

  - 2-h-rated barrier separates area from stairwell No. 4.

- East - 3-h-rated barrier separates area from 2-AB-L1-B, 2-AB-LD-A (HVAC and electrical chase), 2-AB-LD-B, 2-AB-L1-C, 2-AB-LD-I.

- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-E.

6. Level 2

- North - 3-h-rated barrier separates area from 2-AB-L2-E, 2-AB-LA-E.

- West - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LA-B.
  - 2-h-rated barrier separates area from stairwell No. 4.
- East - 3-h-rated barrier separates area from 2-AB-L1-B, 2-AB-LD-A, 2-AB-L2-C.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level D

- North - Class A door from 2-AB-LD-I.
  - Unrated watertight door from 2-AB-LD-I.
- East - Certified class A door from 2-AB-LD-B.
- Interior - Two class B doors from stairwell No. 4.
  - Unrated watertight door from 2-AB-LD-J.

2. Level C

- West - Two class B doors from stairwell No. 4.
- East - Class A door from 2-AB-LD-I.
  - Certified class A door from 2-AB-LD-B.
- Interior - Class A door from 2-AB-LC-D, 2-AB-LC-E.
  - Class A door separates zone 14D from zone 14C.

3. Level B

- North - Certified class A door from 2-AB-LB-B.
- West - Two class B doors from stairwell No. 4.
- East - Three class A doors from 1-AB-LB-A, 2-AB-LB-B.
- Ceiling - Unrated equipment hatch from 2-AB-LA-B.

4. Level A

- South - Class B door from stairwell No. 4.

- East - Class A door from 2-AB-LA-B.
- North - Unrated watertight door from 2-AB-LA-E.

5. Level 1

- South - Class B door from stairwell No. 4.
- East - Class A door from 2-AB-LD-B, 2-AB-L1-C, 2-AB-LD-I.

6. Level 2

- North - Class A door from 2-AB-L2-E.
- South - Class B door from stairwell No. 4.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- LV0112D - RWST to charging pump valve.
- LV0112E - RWST to charging pump valve.
- LT0102 - BAST level.
- LT0104 - BAST level.
- PT0408 - Residual heat removal valve pressure interlock.
- PT0438 - Residual heat removal valve pressure interlock.
- PT0544 - S/G 4 pressure.
- PT0545 - S/G 4 pressure.
- PT0546 - S/G 4 pressure.
- FT0121 - Charging line flow.
- FV0121 - Centrifugal charging pump flow control valve.
- FY0121A - FV0121 I/P converter.

- PT3030 - Atmospheric dump valve pressure transmitter.
- LSLL1852 - Component cooling water pump 001 interlock
- LSLL1854 - Component cooling water pump 003 interlock.
- LSLL1856 - Component cooling water pump 005 interlock.
- PT1956 - Auxiliary component cooling water pump interlock.

- TISH12202 - Fan 2-1555-A7-003 interlock.
- TSH12209 - Fan 2-1555-A7-013 interlock.
- TISH12208 - Fan 2-1555-A7-011 interlock.
- 2-1203-E4-001 - Component cooling water heat exchanger A.
- 2-1203-P4-001 - Component cooling water pump 001.
- 2-1203-P4-003 - Component cooling water pump 003.
- 2-1203-P4-005 - Component cooling water pump 005.
- 2-1203-T4-001 - Component cooling water surge tank.
- 2-1208-P6-007 - Boric acid transfer pump.
- 2-1208-T4-003 - Boric acid storage tank.
- 2-1217-P4-001 - Auxiliary component cooling water pump.
- 2-1555-A7-011 - Component cooling water pump A room cooler.
- 2-1805-S3-ABD - Class 1E 480-V MCC 2ABD.
- 2-1217-E4-001 - Auxiliary component cooling water heat exchanger.
- HY0190B - HVO190B I/power converter.
- HY0190A - HVO190A I/power converter.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

I. Safety-Related Equipment

- 2-1206-P6-002 - Train B containment spray pump.
- 2-1555-A7-010 - Train B containment spray pump ESF room cooler.
- 2-1208-P4-001 - CVCS normal charging pump.
- 2-1205-V4-001 - Train A RHR encapsulation vessel.
- 2-1206-V4-002 - Train A containment spray encapsulation vessel.
- 2-1204-P6-003 - Train A safety injection pump.
- 2-1555-A7-015 - SI pump room cooler.
- 2-1208-E6-006 - Letdown chiller heat exchanger.
- 2-1208-E6-005 - Moderating heat exchanger.
- HV9017B - Containment spray pump P6002 to RWST inlet.
- HV8109 - Normal charging pump minimum flow isolation.
- HV9002A - Containment spray pump suction.
- HV9003A - Containment spray pump suction.
- HV8811A - Containment sump isolation.
- HV8986B - Containment sump isolation to post accident sampling system.
- HV8923A - Train A safety injection pump suction.
- HV8924 - Charging pump header to/from SI pump A.
- HV8814 - Train A safety injection miniflow isolation.
- HV8807A - Safety injection pump suction header.
- HV7022 - Moderating heat exchanger outlet.
- HV7002A - Letdown chiller heat exchanger isolation.

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a. Spurious actuation concerns and separation concerns eliminated by the design and operational considerations of paragraph L.

- HV7041 - Letdown chiller heat exchanger bypass.
- LV1848 - Component cooling water surge tank makeup.
- LV1850 - Component cooling water surge tank makeup.
- HV8821A - Safety injection pump to RCS cold leg isolation.
- HV7054 - Boron thermal regenerative system valve.
- HV7040 - Letdown chiller heat exchanger return.
- HV7002B - Letdown chiller heat exchanger isolation.
- HV0182 - Charging header.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1215-T4-001 - CCW drain tank (not required for CCW operation).
- 2-1215-P4-001 - CCW drain tank pump (not required for CCW operation).
- 2-1407-E6001-E6008 - SGB heat exchangers.
- Sumps and sump pumps.
- 2-1817-U3-001A - Heat tracing panel.
- 2-1817-U3-003A - Heat tracing panel.
- 2-1805-S3-B21 - 480-V switchgear 2NB21.
- 2-1407-P5-SBP - SGB process panel.
- 2-1407-P4-004 - SG drain pump.
- 2-1407-P5-SG1 - SGB instrument rack.
- 2-1217-T4-002 - Chemical addition feeder tank.
- 2-1407-E6-009 - SG blowdown trim heat exchanger.
- A-1901-T4-012 - Waste monitor tank.
- A-1901-T4-013 - Waste monitor tank.

- A-1901-P4-011 - Waste monitor tank pump.
- A-1901-P4-012 - Waste monitor tank pump.
- PV1151 - SG blowdown heat exchanger outlet header.
- FV1150 - SG blowdown heat exchanger outlet header.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 3

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 194,000,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 5

- Fixed combustible material

  - Cable insulation
  - Plastics
  - Rubber goods
  - Oil/grease

- Heat release

- Fixed combustibles	≤ 11,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 14A

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	≤123,600,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

4. Zone No. 14B

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤130,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

5. Zone No. 14C

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 52,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

6. Zone No. 14D

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 27,000,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

7. Zone No. 21

- Fixed combustible material

  - Cable insulation
  - Plastics
  - Rubber goods
  - Oil/grease
  - Cellulosic materials

- Heat release

- Fixed combustibles	≤ 19,460,000 Btu
- Transient combustibles	4,940,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

8. Zone No. 22

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	≤ 114,400,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 240,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 180 min

9. Zone No. 26A

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 126,400,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

10. Zone No. 30

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

- Fixed combustibles	≤ 17,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

11. Zone No. 32

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Oil/grease
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 23,940,000 Btu
- Transient combustibles	860,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

12. Zone No. 36

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

  - Fixed combustibles $\leq$ 247,000,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 90 min

13. Zone No. 48

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

  - Fixed combustibles $\leq$ 87,400,000 Btu
  -Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 90 min

14. Zone No. 49

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat Release

  - Fixed combustibles $\leq$ 92,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

15. Zone No. 54

- Fixed combustible material

  - Cable insulation
  - Rubber goods

- Heat Release

  - Fixed combustibles $\leq$ 92,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area:

   a. Use safe shutdown train A if the fire is in fire zone 14C.

   b. Use safe shutdown train B if the fire is not in fire zone 14C.

2. Special operational and design considerations:

   Fire damage to cables for both boric acid transfer pumps and BAST level transmitters may require use of the refueling water storage tank and RCS letdown to achieve RCS boration if the fire is not in fire zone 14C.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3000 may open due to a fire in this area (fire not in fire zone 14C).

   b. Main steam atmospheric dump valve PV-3030 may open due to a fire in this area (fire not in fire zone 14C).

   c. CVCS volume control tank outlet valve LV-0112B may close due to a fire in this fire area (fire not in fire zone 14C).

   d. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this fire area (fire in fire zone 14C).

   e. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area (fire not in fire zone 14C).

   f. CVCS train A charging pump miniflow valve HV-8111A may close due to a fire in this fire area (fire in fire zone 14C).

g. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area (fire not in fire zone 14C).

h. Safety injection actuation may occur due to a fire damage to steam line pressure circuits in this fire area (fire not in fire zone 14C).

i. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area (fire not in fire zone 14C).

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 3
- Zone 5
- Zone 14D
- Zone 14A
- Zone 14B
- Zone 14C
- Zone 21
- Zone 22
- Zone 26A
- Zone 30
- Zone 32
- Zone 36
- Zone 48
- Zone 49
- Zone 54

N. Fire Suppression

1. Automatic

- Zone 3 preaction sprinkler system - Partial zone coverage.
- Zone 5 preaction sprinkler system - Total zone coverage.

- Zone 14D preaction sprinkler system - Total zone coverage.
- Zone 14A - No zone coverage.
- Zone 14B - No zone coverage.
- Zone 14C preaction sprinkler system - Total zone coverage.
- Zone 21 preaction sprinkler system – Partial zone coverage.
- Zone 22 - No zone coverage.
- Zone 26A preaction sprinkler system – Partial zone coverage.
- Zone 30 preaction sprinkler system – Total zone coverage.
- Zone 32 preaction sprinkler system – Partial zone coverage.
- Zone 36 preaction sprinkler system – Total zone coverage.
- Zone 48 preaction sprinkler system – Partial zone coverage.
- Zone 49 preaction sprinkler system – Partial zone coverage.
- Zone 54 preaction sprinkler system – Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for a post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in process equipment and piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except room B125). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h rated battery fixture(s) provide the capability to operate breakers in 480-V MCC 2ABD.

S. Deviations and Justifications

1. Unrated watertight doors:

   a. See section 9A.2.9.S.1

   b. See section 9A.2.10.S.

   c. Watertight door A11 separates fire zone 36 in fire area 2-AB-LD-G from fire zone 39A in fire area 2-AB-LA-E. Fire zone 36 is the train A component cooling water pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 39A is the level A vestibule for access to chase UC-A12 and restraint room A107. Fire zone 39A does not contain train B safe shutdown components, including electrical cables.

      The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-G and 2-AB-LA-E is acceptable because (also see Appendix 9B, section C.5.a.(5)):

      1) The capability to achieve safe shutdown using train B is not jeopardized for a fire in either location.

      2) The combustible loading in zones 36 and 39A is negligible in the area of the door.

      3) Fire zones 36 and 39A are both provided with fire detection systems which would provide early warning of a fire at either location.

      4) Fire zone 36 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

      Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated hatch:

   See section 9A.2.19.S.2.

3. Separation by distance without full area suppression:

Fire zone 14C contains train B safe shutdown cables for the train B safe shutdown centrifugal charging pump and associated valves. Fire zones 14D and 22 contain the cables for the redundant train A counterparts. Fire zone 14C is bounded by 3-h rated barriers (walls, floors, and ceilings) except for the wall adjoining fire zone 14A. Room C15 of fire zone 14A does not contain safe shutdown equipment or cables. While fire area 2-AB-LD-G is not provided with a full area automatic suppression system, fire zone 14C, which contains the train B safe shutdown cables, is provided with a fire detection and automatic preaction suppression system. Upgrading the wall between fire zones 14A and 14C to a 3-h-rated barrier or providing a full area automatic suppression system would not significantly increase the existing level of protection provided.

4. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a.(1).

5. Unlabeled door:

   See Appendix 9B, section C.5.a.(5).

6. Safety-related cable trays without automatic fire suppression:

   Three cable trays pass thru a very small valve gallery room in fire zone 48 of this fire area. In all other parts of this fire zone, safety-related cable trays are protected by automatic water fire suppression systems. While access into the valve gallery room with a charged fire hose may be difficult, the cable tray lengths and quantities of cable insulation is very small. In addition, the valve gallery room is essentially devoid of other combustible material; the combustible loading for the entire zone is less than 100,000 Btu/ft^2, and the room is provided with smoke detectors. By the nature of the difficulty in entering the location, the addition of permanent or transient combustibles is very unlikely. While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in this area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

   Safety-related cable trays in fire zone 22 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.8 FIRE AREA 2-AB-LD-H

A. Location: Auxiliary Building, Wing Area, Level D

B. Drawing: AX4DJ8008

C. Description: Includes fire zone 2

Train A switchgear room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary
- West - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-I.
- East - 3-h-rated barrier separates area from 2-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G.

E. Area Access

- South - Class A door from 2-AB-LD-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- TISH12200 - Fan 2-1555-A7-001 interlock.
- 2-1805-S3-B15 - Class 1E 480-V switchgear 2AB15.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment

K. Combustible Loading

1. Zone No. 2

- Fixed combustible material

  - Cable insulation

- Heat Release

  - Fixed combustibles $\leq$ 47,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 2

N. Fire Suppression

1. Automatic

- Zone 2 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials.

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 2AB15.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 2 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.9 FIRE AREA 2-AB-LD-I

A. Location: Auxiliary Building Wing Area, Levels D, C, B, A, 1, 2

B. Drawings: AX4DJ8008, AX4DJ8011, AX4DJ8013, AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 1, 4, 23

Train A piping room, Train A containment spray pump room, spray additive tank room, Train A electrical chase.

D. Description of Boundaries

1. Level D

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 2-AB-LD-H.
- West - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LD-D.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G.

2. Level C

- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LD-A.

3. Level B

- North - 3-h-rated barrier separates area from 2-AB-LB-B.
- West - 3-h-rated barrier separates area from 2-AB-LB-B.
- South - 3-h-rated barrier separates area from 2-AB-LB-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-A.

4. Level A

- North - 3-h-rated barrier separates area from 2-AB-LA-C.
- West - 3-h-rated barrier separates area from 2-AB-LA-C.
- South - 3-h-rated barrier separates area from 2-AB-LA-C.
- East - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LA-A.

5. Level 1

- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LD-A (HVAC chase).

6. Level 2

- North - 3-h-rated barrier separates area from 2-AB-L2-E.
- West - 3-h-rated barrier separates area from 2-AB-L2-E.
- South - 3-h-rated barrier separates area from 2-AB-L2-E.
- East - 3-h-rated barrier separates area from 2-AB-L2-A, 1-AB-L2-C.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level D

- North - Class A door from 2-AB-LD-H
- South - Unrated watertight door from 2-AB-LD-G.
  - Class A door from 2-AB-LD-G.

2. Level C

- South - Class A door from 2-AB-LD-G.

3. Level B

- South - Class A door from 2-AB-LB-B.

4. Level A

   - South - Class A door from 2-AB-LA-C.

5. Level 1

   - North - Class A door from 2-AB-LD-G.

6. Level 2

   - North - Class A door from 2-AB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1555-A7-001 - Train A MCC room cooler.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1206-P6-001 - Train A containment spray pump.
- 2-1206-T6-001 - Spray additive tank. (Abandoned in place.)
- 2-1555-A7-009 - Train A containment spray pump ESF room cooler.
- HV8994A - Spray addition tank outlet. (Abandoned in place.)
- HV8994B - Spray addition tank outlet. (Abandoned in place.)
- HV9017A - Train A containment spray pump to RWST.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 1

   - Fixed combustible material

- Cable insulation
- Cellulosic materials
- Plastics
- Rubber goods

- Heat release

- Fixed combustibles	≤ 198,400,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 4

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Oil/grease
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 15,400,000 Btu
-Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 23

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	238,179,450 Btu
- Transient combustibles	800,000 Btu

- Combustible loading 1,648,134 Btu/ft^2

- Fire severity (wood equivalent 1236 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational considerations:

   None

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   c. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

   d. CVCS volume control tank outlet valve LV-0112B may close due to fire in this fire area.

   e. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 1
- Zone 4
- Zone 23

N. Fire Suppression

1. Automatic

   - Zone 1 Preaction sprinkler system - Total zone coverage.
   - Zone 4 Preaction sprinkler system - Total zone coverage.
   - Zone 23 Preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except for zone 23). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated watertight door:

   Watertight door D03 separates fire zone 4 in fire area 2-AB-LD-I from fire zone 3 in fire area 2-AB-LD-G. Fire zone 4 is the Train A containment spray pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 3 is in the level D wing area of the auxiliary building which includes the Train B containment spray pump room, the Train B boric acid transfer pump room, and various tank rooms.

   The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-I and 2-AB-LD-G is acceptable because (also see Appendix 9B, section C.5.a.(5)):

   a. Within fire area 2-AB-LD-I, approximately 32 horizontal ft of separation distance exists between watertight door D03 and any significant safe shutdown components (including electrical cables). An alternate means of RCS boration is available (RWST and RCS letdown), therefore protection of the boric acid transfer pumps is not a significant concern when defining the separation distance.

   b. Fire zones 3 and 4 are both provided with fire detection systems which would provide early warning of a fire at either location.

   c. Fire zone 4 is provided with an independent automatic fire suppression system with total zone coverage, including coverage in the immediate vicinity of the watertight door.

   d. Fire zone 3 is provided with an independent automatic fire suppression system for the Train B related cable trays, including coverage in the immediate vicinity of the watertight door.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

9A.2.10 FIRE AREA 2-AB-LD-J

A. Location: Auxiliary Building, Wing Area, Level D

B. Drawing: AX4DJ8008

C. Description: Includes fire zone 6

Train A boric acid transfer pump room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LD-G.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-A.

E. Area Access

- East - Unrated watertight door from 2-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1208-P6-006 - Boric acid transfer pump.
- PI-10115 - Boric acid transfer pump A suction pressure.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 6

- Fixed combustible material

  None.

- Heat release

- Fixed combustibles	≤ 2,000,000 Btu
- Transient combustibles	400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 6

N. Fire Suppression

1. Automatic

   - Zone 6 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to read the local boric acid storage tank pressure indicator PI-10115.

S. Deviations and Justifications

Unrated watertight door:

Watertight door D09 separates fire area 2-AB-LD-J (fire zone 6) from fire zone 3 in fire area 2-AB-LD-G. Fire area 2-AB-LD-J is the Train A boric acid transfer pump room and is provided with a watertight door for flooding protection of safety-related equipment. Fire zone 3 is the level D wing area of the auxiliary building which includes the Train B boric acid transfer pump room, the Train B containment spray pump room and various tank rooms.

The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-J and 2-AB-LD-G is acceptable because (also see Appendix 9B, Section C.5.a.(5)).

a. Within fire zone 3, approximately 35 horizontal ft of separation distance exists between watertight door D09 and any significant safe shutdown components (including electrical cables). An alternate means of RCS boration is available (RWST and RCS letdown); therefore, protection of the boric acid transfer pumps is not a significant concern.

b. Fire zones 3 and 6 are both provided with fire detection systems which would provide early warning of a fire at either location.

c. Fire zone 3 is provided with an independent automatic fire suppression system for the Train B related cable trays and Train B containment spray pump room.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

9A.2.11 FIRE AREA 2-AB-LC-A

A. Location: Auxiliary Building, Central Area, Levels C, el 153 ft - 2 in., B

B. Drawings: AX4DJ8010, AX4DJ8012

C. Description: Includes fire zone 16

Train B RHR heat exchanger room

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-AB-LC-C.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

2. Level C (el 153 ft - 2 in.)

- North - 3-h-rated barrier separates area from 2-AB-LC-C.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

3. Level B

- North - 3-h-rated barrier separates area from 2-AB-LC-C.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B.

E. Area Access

Level C (el 153 ft - 2 in.)

- East - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- HV0607 - Residual heat removal B heat exchanger outlet valve.
- FV0611 - Residual heat removal B miniflow valve.
- FV0619 - Residual heat removal B heat exchanger bypass valve.
- HV8804B - Residual heat removal Train B to SIS valve.
- 2-1205-E6-002 - Residual heat removal heat exchanger B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 16

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 9,000,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

The early warning fire detectors are installed within the following zone:

- Zone 16

N. Fire Suppression

1. Automatic

   - Zone 16 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.2.12 FIRE AREA 2-AB-LC-B

A. Location: Auxiliary Building, Central Area, Levels C, B, A, 1, 2

B. Drawings: AX4DJ8009, AX4DJ8010, AX4DJ8014, AX4DJ8012, AX4DJ8015, AX4DJ8017, AX4DJ8019

C. Description: Includes fire zone 17

Train A electrical chase

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 2-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LC-A.
  - Unrated below grade exterior area boundary (below el 160 ft - 0 in.)
- West - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B.

2. Level B

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

3. Level A

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

4. Level 1

- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.

5. Level 2

- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-L2-C.
- South - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 2-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level C

- South - Certified Class A door from 2-AB-LD-B.
- North - Certified Class A door from 2-CB-LC-A[a] (el 160 ft - 0 in.)

2. Level B

- South - Class A door from 2-AB-LD-B.

3. Level A

- South - Class A door from 2-AB-LD-B.

4. Level 1

- South - Class A door from 2-AB-LD-B.

5. Level 2

- East - Class A door from 2-AB-L2-A.

---

a. Indicated fire door is normally open, but is released when smoke is detected.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown cables.

J. Nonsafety-Related Equipment

Nonsafety-related cables.

- 480-V FLEX power receptacle 2NB3009R.
- 480-V FLEX junction box 2NBJB0009.
  - Phase A Transformer - 2NB3009XA.
  - Phase B Transformer - 2NB3009XB.
  - Phase C Transformer - 2NB3009XC.

K. Combustible Loading

1. Zone No. 17

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	221,245,090 Btu
- Transient combustibles	800,000 Btu

- Combustible loading 462,594 Btu/ft^2

- Fire severity (wood equivalent) 347 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations.

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

   c. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   d. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   e. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 17

N. Fire Suppression

1. Automatic

   - Zone 17 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1)

9A.2.13 FIRE AREA 2-AB-LC-C

A. Location: Auxiliary Building, Central Area, Levels C, (el 153 ft - 2 in.)

B. Drawings: AX4DJ8010, AX4DJ8012

C. Description: Includes fire zone 18

Train A RHR heat exchanger room

D. Description of Boundaries

1. Level C

- Floor - 3-h-rated barrier separates area from 2-AB-LD-D.
- North - Unrated below grade exterior area boundary.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LC-A.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

2. Level C (el 153 ft - 2 in.)

- North - 3-h-rated barrier separates area from 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LC-A.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

3. Level B

- North - 3-h-rated barrier separates area from fuel building 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-A.
- South - 3-h-rated barrier separates area from 2-AB-LC-A.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B.

E. Area Access

Level C (el 153 ft - 2 in.)

- East - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0606 - Residual heat removal A heat exchanger outlet valve.
- FV0610 - Residual heat removal A miniflow valve.
- FV0618 - Residual heat removal A heat exchanger bypass valve.
- HV8804A - Residual heat removal Train A to CVCS valve.
- 2-1205-E6-001 - Residual heat removal heat exchanger A.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the design considerations of paragraph L.)

I. Safety-Related Equipment

No major equipment other than safe shutdown components.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 18

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 9,800,000 Btu
- Transient combustibles	400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   Pull box 2DE443KXJ02 is covered with a 3-h-rated fire barrier to protect the train B safe shutdown cables for LT-0104.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within Zone 18.

N. Fire Suppression

1. Automatic

   - Zone 18 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Embedded conduit:

Conduit 2DE443RX001 is embedded in the wall of fire zone 18 of this fire area. This conduit contains a cable which could change the results of the safe shutdown analysis as presented in paragraph L if it were to be damaged by a fire in this fire area. While it is anticipated that this conduit is embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 4 in. of concrete coverage over the conduit can be verified to exist.

Modification of the facility to relocate the cable in this embedded conduit or to otherwise provide additional protection is not warranted because the minimum concrete coverage over the conduit (equivalent to approximately 100 minutes of protection per figure 5-8F of the NFPA Fire Protection Handbook - Fifteenth Edition) provides a margin of safety of at least 100 percent above the calculated combustible loading for the location.

9A.2.14 FIRE AREA 2-AB-LC-D

A. Location: Auxiliary Building, Wing Area, Level C

B. Drawing: AX4DJ8011

C. Description: Includes fire zone 20

Train A CVCS charging pump room, valve gallery

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LD-J.
- North - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LC-E.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
  - 2-h-rated barrier separates area from stairwell No. 4.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LB-A, 2-AB-LD-G, 2-AB-LD-A.

E. Area Access

- East - Class A door from 2-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV8111A - Train A miniflow valve.
- HV8471A - Charging pump A suction valve.
- HV8485A - Centrifugal charging pump A discharge valve.
- HV8508A - Train A miniflow valve.
- HV8509B - Train A miniflow valve.

- TE12209 - Fan 2-1555-A7-013 interlock.
- 2-1208-P6-002 - Charging pump A.
- 2-1555-A7-013 - Charging pump A room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns only.)

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 20

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Oil/grease
  - Rubber goods

- Heat release

- Fixed combustibles	≤ 16,420,000 Btu
- Transient combustibles	7,980,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   CVCS volume control tank outlet valve LV-0112B may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 20

N. Fire Suppression

1. Automatic

    - Zone 20 preaction sprinkler system - Total zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate HV-8111A.

S. Deviations and Justifications

None.

9A.2.15 FIRE AREA 2-AB-LC-E

A. Location: Auxiliary Building, Wing Area, Level C

B. Drawing: AX4DJ8011

C. Description: Includes fire zone 19

Train B CVCS charging pump room, valve gallery

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G.
- North - 3-h-rated barrier separates area from 2-AB-LC-D.
- East - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
  - 2-h-rated barrier separates area from stairwell No. 4.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LB-A, 2-AB-LD-G, 2-AB-LD-A.

E. Area Access

- East - Class A door from 2-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0190B - Train B boration path valve.
- HV8111B - Train B miniflow valve.
- HV8438 - Charging pump to normal charging pump valve.
- HV8471B - Charging pump B suction valve.
- HV8485B - Train B boration path valve.

- HV8508B - Train B miniflow valve.
- HV8509A - Train B miniflow valve.
- TISH12215 - Fan 2-1555-A7-014 interlock.
- 2-1208-P6-003 - Charging pump B.
- 2-1555-A7-014 - Charging pump B room cooler.
- Train A safe shutdown cables. (Spurious actuation concerns only.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 19

- Fixed combustible material

  - Cable insulation
  - Oil/grease
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 16,420,000 Btu
  - Transient combustibles 7,980,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   a. Deleted.

   b. CVCS train A charging pump miniflow valve HV-8111A may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 19

N. Fire Suppression

1. Automatic

   - Zone 19 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in equipment and lines.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.2.16 FIRE AREA 2-AB-LB-A

A. Location: Auxiliary Building, Wing Area, Level B

B. Drawing: AX4DJ8013

C. Description: Includes fire zones 31, 33, 34, 35

Train B MCC room, Train B SI pump room, ACCW pump room, seal water heat exchanger room, reactor makeup water pump room, valve galleries, piping enclosure room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LC-E, 2-AB-LC-D, 2-AB-LD-G, 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-AB-LB-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- South - Unrated below grade exterior area boundary.
- East - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-F, 2-AB-LD-A.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LB-B, 2-AB-LA-B.

E. Area Access

- North - Class A door from 2-AB-LB-B.
- West - Three Class A doors from 2-AB-LD-G.
- East - Class A door from 2-AB-LD-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT1957 - Auxiliary component cooling water pump interlock.
- HV8110 - Seal water heat exchanger valve.

- TISH12203 - Fan 2-1555-A7-004 interlock.
- 2-1217-P4-002 - Spare (train B) auxiliary component cooling water pump.
- 2-1555-A7-004 - Train B MCC room cooler.
- 2-1805-S3-BBD - Class 1E 480-V MCC 2BBD.
- Train A safe shutdown cables. (Spurious actuation concerns only.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1208-E6-004 - Seal water heat exchanger.
- 2-1204-P6-004 - Train B safety injection pump.
- 2-1555-A7-016 - Train B SI pump ESF room cooler.
- HV8806 - Train B safety injection pump suction isolation.
- HV8923B - Train B safety injection pump inlet.
- HV8821B - Train B safety injection pump to RCS cold leg isolation.
- HV8920 - Train B safety injection pump miniflow.
- HV8807B - Train B safety injection pump suction header.
- HV8813 - Train B safety injection pump miniflow isolation.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1228-P4-001 - Reactor makeup pump.
- 2-1228-P4-002 - Reactor makeup pump.
- 2-1311-P5-SGC - SGB local conductivity panel.
- HV7760B - Reactor makeup water gravity flow bypass.
- HV7760A - Reactor makeup water gravity flow bypass.
- 2-1311-G5-009 - SGB sample bath
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 31

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Oil/grease
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 11,540,000 Btu
- Transient combustibles	860,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 33

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

- Fixed combustibles	≤ 19,000,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 34

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 119,200,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

4. Zone No. 35

- Fixed combustible material

  - Cable insulation

- Heat Release

  - Fixed combustibles ≤ 38,400,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. CVCS Train A charging pump miniflow valve, HV-8111A, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 31
- Zone 33
- Zone 34
- Zone 35

N. Fire Suppression

1. Automatic

- Zone 31 - preaction sprinkler system – Partial zone coverage.
- Zone 33 - preaction sprinkler system – Total zone coverage.
- Zone 34 - preaction sprinkler system – Partial zone coverage.
- Zone 35 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate HV-8110 and breakers in 480-V MCC 2BBD.

S. Deviations and Justifications

Safety-related cable trays in fire zone 35 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BPT guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.17 FIRE AREA 2-AB-LB-B

A. Location: Auxiliary Building, Wing Area, Levels B, A

B. Drawings: AX4DJ8013 and AX4DJ8016

C. Description: Includes fire zones 26B, 39B, 171

Pipe penetration room, boron injection pump room, boron injection tank room, pipe chase room, sample cooler room

D. Description of Boundaries

1. Level B

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G.
- North - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LB-A.
- East - 3-h-rated wall separates area from 2-AB-LD-A, 2-AB-LD-I.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-D, 2-AB-LA-C, 2-AB-LA-E, 2-AB-LD-I.

2. Level B (el 180 ft - 6 in.)

- Floor - 3-h-rated barrier separates area from 2-AB-LB-A, 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LB-A.
- South - 3-h-rated barrier separates area from 2-AB-LB-A.
- East - 3-h-rated barrier separates area from 2-AB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-E, 2-AB-LD-G.
- Cable trays in concealed utility chase UC-B12 are provided with solid bottoms and covers to limit the combustion rate and intensity of a fire should one occur.

3. Level A (fire zones 26B, 39B)

- North - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A
- West - 3-h-rated barrier separates area from 2-AB-LA-E.
- South - 3-h-rated barrier separates area from 2-AB-LA-C, 2-AB-LA-E, 2-AB-LD-A.
- East - 3-h-rated barrier separates area from 2-AB-LA-A, 2-AB-LD-A.

4. Level A (fire zone 171)

- North - 3-h-rated barrier separates area from 2-AB-LA-E, 2-AB-LD-A (el 211 ft - 5 in.).
- West - 3-h-rated barrier separates area from 2-AB-LA-E.
- South - 3-h-rated barrier separates area from 2-AB-LA-E.
- East - 3-h-rated barrier separates area from 2-AB-LA-C.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LA-E.

E. Area Access

1. Level B

- North - Certified Class A door from 2-AB-L2-A.
- South - Three Class A doors from 2-AB-LD-G.
  - Certified Class A door from 2-AB-LD-G.
  - Class A door from 2-AB-LB-A.
- East - Class A door from 2-AB-LD-I.

2. Level A (fire zones 26B, 39B)

- South - Class A door from 2-AB-LA-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT0935 - Containment pressure.
- PT0937 - Containment pressure.
- HV8801A - SIS boration valve.
- HV8801B - SIS boration valve.
- HV10465 - Residual heat removal A vent valve.
- 2-1555-A7-003 - Train A MCC room cooler.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

- 2-1513-P5-HMA - Containment hydrogen monitor.
- HV-1806 - NSCW containment isolation valve.
- HV-1808 - NSCW containment isolation valve.
- HV-1822 - NSCW containment isolation valve.
- HV-1830 - NSCW containment isolation valve.
- HV-2134 - NSCW containment isolation valve.
- 2-1204-V6-001 - Boron injection tank (abandoned).
- HV-2138 - NSCW containment isolation valve.
- HV-5278 - Steam generator 1 wet layup containment isolation.
- HV-5279 - Steam generator 2 wet layup containment isolation.
- HV-5280 - Steam generator 3 wet layup containment isolation.
- HV-5281 - Steam generator 4 wet layup containment isolation.
- HV-7603A - Steam generator 1 blowdown containment isolation.
- HV-7603B - Steam generator 2 blowdown containment isolation.

- HV-7603C - Steam generator 3 blowdown containment isolation.
- HV-7603D - Steam generator 4 blowdown containment isolation.
- HV-8840 - RHR hot leg injection crossover isolation.
- HV-9001A - Containment spray pump to spray header.
- HV-9378 - Instrument air containment isolation.
- HV-9385 - Service air containment isolation.
- 2-1407-P5-SGS - SGB isolation rack.
- HV-9451 - Steam generator 1 blowdown sample isolation.
- HV-9452 - Steam generator 2 blowdown sample isolation.
- HV-9453 - Steam generator 3 blowdown sample isolation.
- HV-9454 - Steam generator 4 blowdown sample isolation.
- HV-12976 - Containment radiation monitor isolation.
- HV-12977 - Containment radiation monitor isolation.
- HV-27901 - Fire protection header containment isolation.
- HV-2791B - Hydrogen monitor isolation.
- HV-2793B - Hydrogen monitor isolation.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1203-P5-NCA - Nuclear service cooling water containment cooler rack.
- 2-1817-U3-007B - Containment hydrogen monitor heat tracing panel (standby).
- 2-1817-T7-007B - Containment hydrogen monitor heat tracing transformer (standby).
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 26B

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods
  - Compressed gas

- Heat Release

- Fixed combustibles	≤ 126,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 39B

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 4,400,000 Btu
- Transient combustibles	400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

3. Zone No. 171

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 61,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   Due to fire damage to boron injection tank outlet valves, HV-8801A and HV-8801B, and their associated cables, it may be necessary to add makeup to the reactor coolant system using the Train B charging pump through the Train A safe shutdown charging path (HV-0190A and HV-8116) in this fire area. Train A associated valves HV-8485A, HV-0190A, HV-8116, and HV-8146 are free of fire damage in this fire area.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. Train A RHR system vent valve, HV-10465, may open due to a fire in this fire area.

   c. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 26B
- Zone 39B
- Zone 171

N. Fire Suppression

1. Automatic

   - Zone 26B preaction sprinkler system – Partial zone coverage.
   - Zone 39B - No zone coverage.
   - Zone 171 preaction sprinkler system – Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in process piping and equipment.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundaries:

   See section 9A.2.76.S.1.

2. Unlabeled door:

   See Appendix 9B, section C.5.a.(5).

3. Safety-related cable trays without automatic fire suppression:

   Fire zone 171 of this fire area contains a piping utility chase which is not readily accessible for maintenance or inspection activities. Some safety-related cable trays pass through this utility chase and are not protected within the chase by either a fire detection or fire suppression system. These cable trays are provided with solid covers and bottoms to limit the combustion rate and intensity of a fire, if one were to occur within the trays.

   Except for the cable insulation, this piping utility chase is devoid of combustible material, and by the nature of the difficulty in entering the location, the addition of permanent or transient combustibles is very unlikely. Therefore, an exposure fire is not a significant concern. In addition, these cable trays do not carry cables required to achieve and maintain a hot shutdown plant condition. Providing automatic water fire suppression and fire detection for this location would not significantly increase the existing level of protection.

4. Blind Flange Penetration Seals

   Penetrations 2-08-037-B, 2-08-038-B, 2-08-039-B, 2-08-040-B, and 2-08-041-B

all have a blind flanged penetration seal. These penetrations are constructed of noncombustible material and are similar to existing piping runs embedded in/routed through fire-rated barriers. These flanged embedded pipe sleeves are an integral part of the fire barrier in that they are designed to prevent the propagation of fire, smoke, and hot gases from one side of the fire barrier to the other. It is unlikely that the initiation of a fire in one of the penetration rooms will propagate smoke and hot gas through a 6-in. or 8-in. penetration sleeve provided with blind flanges or elevate the temperature on the cold side to the point where ignition can take place in a room with very low combustible loading. The defense in depth at the site, including the fire brigade team rapid response to any fire, and the fire detection and suppression systems does not make this a credible fire scenario.

9A.2.18 FIRE AREA 2-AB-LA-A

A. Location: Auxiliary Building, Central Area, Level A

B. Drawing: AX4DJ8015

C. Description: Includes fire zone 11A

Train A electrical chase

D. Description of boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-FB-LC-A.
- West - 3-h-rated barrier separates area from 2-AB-LA-C, 2-AB-LD-I, 2-AB-LB-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-A.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-A.

E. Area Access

- North - Class A door from 2-FB-LC-A.
- West - Class A door from 2-AB-LA-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 11A

- Fixed combustible material

  - Cable insulation

- Heat Release

- Fixed combustibles	52,347,120 Btu
- Transient combustibles	800,000 Btu

- Combustible loading 253,082 Btu/ft^2

- Fire severity (wood equivalent) 190 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   b. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 11A

N. Fire Suppression

1. Automatic

   - Zone 11A preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.19 FIRE AREA 2-AB-LA-B

A. Location: Auxiliary Building, Wing Area, Levels A, 1, 2

B. Drawings: AX4DJ8016, AX4DJ8018 and AX4DJ8020

C. Description: Includes fire zones 37, 52, 55

1. Level A

   Train B CCW pump room

2. Level 1

   Train B ACCW heat exchanger room.

3. Level 2

   Train B CCW heat exchanger room.

D. Description of Boundaries

1. Level A

   - Floor - 3-h-rated barrier with unrated equipment hatch cover separates area from 2-AB-LD-G.

     - 3-h-rated barrier separates area from 2-AB-LB-A.

   - North - 3-h-rated barrier separates area from 2-AB-LA-C, 2-AB-LD-G.

     - 2-h-rated barrier separates area from stairwell No. 4.

   - West - Unrated below grade exterior area boundary.

     - 3-h-rated barrier separates area from 2-DB-LI-B.

   - South - Unrated below grade exterior area boundary.

     - 2-h-rated barrier separates area from elevator No. 2.

     - 3-h-rated barrier separates area from 2-NSP-LA-B.

   - East - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-F, 2-AB-LD-A.

2. Level 1

   - North - 3-h-rated barrier separates area from 2-AB-LD-G.

- 2-h-rated barrier separates area from stairwell No. 4.

- West - Unrated exterior area boundary.
- South - 2-h-rated barrier separates area from elevator No. 2.
  - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-F.

3. Level 2

- North - 3-h-rated barrier separates area from 2-AB-LD-G.
  - 2-h-rated barrier separates area from stairwell No. 4.
- West - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
  - 2-h-rated barrier separates area from elevator No. 2.
- East - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-LD-F, 2-AB-L1-B.
- Ceiling - Unrated exterior area boundary.
  - 2-h-rated barrier separates area from elevator machine room.

E. Area Access

1. Level A

- North - Class B door from stairwell No. 4.
  - Class A door from 2-AB-LA-C.
  - Class A door from 2-AB-LD-G.
- East - Class A door from 2-AB-LD-B.

2. Level 1

- North - Class B door from stairwell No. 4.
- East - Watertight door from 2-AB-LD-B.

3. Level 2

- North - Class B door from stairwell No. 4.
- East - Class A door from 2-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- LSLL1853 - Component cooling water pump 002 interlock.
- LSLL1855 - Component cooling water pump 004 interlock.
- LSLL1857 - Component cooling water pump 006 interlock.
- LSLL1956 - Auxiliary component cooling water pump interlock.
- LSLL1957 - Auxiliary component cooling water pump interlock.
- TISH12214 - Fan 2-1555-A7-012 interlock.
- 2-1203-E4-002 - Component cooling water heat exchanger B.
- 2-1203-P4-002 - Component cooling water pump 002.
- 2-1203-P4-004 - Component cooling water pump 004.
- 2-1217-E4-002 - ACCW heat exchanger.
- 2-1217-T4-001 - Auxiliary component cooling water surge tank.
- 2-1203-P4-006 - Component cooling water pump 006.
- 2-1203-T4-002 - Component cooling water surge tank.
- 2-1555-A7-012 - Component cooling water pump B room cooler.
- Train A safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- LV1954 - ACCW surge tank makeup.

- LV1955 - ACCW surge tank makeup.
- LV1849 - CCW surge tank makeup.
- LV1851 - CCW surge tank makeup.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV27930 - Auxiliary building fire protection header isolation.
- 2-1203-T4-004 - Train B chemical addition feeder tank.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 37

   - Fixed combustible material

     - Cable insulation
     - Oil/grease

   - Heat Release

     - Fixed combustibles ≤ 220,800,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 80,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 52

   - Fixed combustible material

     - Cable insulation

   - Heat Release

     - Fixed combustibles ≤ 212,000,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 55

- Fixed combustible material

  - Cable insulation

- Heat Release

  - Fixed combustibles ≤ 105,600,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Local level indicator, LI-0990C, is available should fire damage to the redundant refueling water storage tank level indication cables result in loss of indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   The train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 37

- Zone 52

- Zone 55

N. Fire Suppression

1. Automatic

- Zone 37 preaction sprinkler system - Total zone coverage.

- Zone 52 preaction sprinkler system – Partial zone coverage.

- Zone 55 preaction sprinkler system – Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unlabeled doors:

See Appendix 9B Section C.5.a.(5).

2. Unrated hatch:

This hatch cover is located at level A of the auxiliary building wing area and separates the Train B component cooling water pump room (fire zone 37) from the level B (fire zone 26A) corridor area just west of the auxiliary cooling water and safety injection pump rooms. The level B corridor contains Train A safe shutdown raceway.

The hatch opening is used to facilitate equipment maintenance by allowing transporting of large components to and from the plant shop areas. Permanent closure of the opening cannot be tolerated from a maintenance standpoint and replacement or modification of the opening so as to obtain a rated closure is not warranted based on the low level of combustibles and the distance separating redundant safe shutdown trains.

The hatch opening is 7 ft x 12 ft and while the 1/4-in. thick A36 steel checkered plate hatch cover is not rated or designed as a fire barrier, it does represent a physical barrier and an impediment to fire propagation from one level of the

auxiliary building to the other. The rest of the floor area separating the Train B equipment area at level A from level B is rated as a 3-h fire barrier.

Train A safe shutdown components (includes electrical raceway) are located at least 15 horizontal ft from the underside (level B) of the hatch opening. Train B safe shutdown components (includes electrical raceway) are located at least 5 horizontal ft from the hatch opening (16 ft at level A, 12 ft at level 1 and 5 ft at level 2). The aggregate separation distance between redundant safe shutdown trains is at least 20 horizontal ft.

There are no combustible materials directly below or above the hatch as these areas are maintained free of obstruction to facilitate equipment moving. There are no intervening combustibles between the hatch opening and the Train B safe shutdown components located above the unrated hatch. There are no intervening combustibles between the hatch opening and the Train A safe shutdown cables/components located below the unrated hatch.

A fire detection system is provided in the areas on both sides of this unrated hatch. In addition, an automatic preaction sprinkler system is provided in the fire zones immediately above and below this unrated hatch.

<u>Unrated hatch cover, Auxiliary Building Level A, Wing Area</u>

Size, ft.	7 x 12
Fire area separation	2-AB-LD-G and 2-AB-LA-B
Fire zone separation	26A and 37

3. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

4. Unrated watertight door:

   Watertight door 159 separates fire zone 46 in fire area 2-AB-LD-B from fire zone 52 in fire area 2-AB-LA-B. Fire zone 46 is the level 1 central part of the auxiliary building which includes the nonsafety-related switchgear/control panel room. Fire zone 52 is the wing area of the auxiliary building which contains the Train B auxiliary components cooling water heat exchanger room.

   The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LD-B and 2-AB-LA-B is acceptable at this location because (also see Appendix 9B, section C.5.a(5)):

   a. Both fire zones 46 and 52 have only Train B safe shutdown components and/or cables. The capability to achieve safe shutdown using Train A is not jeopardized for a fire in either location.

   b. There are no cable trays or other combustible materials of significance in fire zone 46 in the immediate vicinity of the watertight door.

c. There are two cable trays approximately 6 horizontal ft from the watertight door and approximately 6 ft above the watertight door in fire zone 52 which do not contain any safe shutdown or other safety-related cables.

d. The closest safe shutdown cables from the watertight door in fire zone 52 are 16 horizontal ft away. It is provided with an independent automatic fire suppression system protecting the safety-related cable trays in the zone.

e. Train B safe shutdown cables in fire zone 46 are in a pull box (for embedded conduit) located approximately 70 horizontal ft from the watertight door and are spurious actuation concerns only. An independent automatic suppression system is provided between the watertight door and the pull box.

f. Fire zones 46 and 52 are both provided with fire detection systems which would provide early warning of a fire at either location.

Modification of the structure to provide a rated fire door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

9A.2.20 FIRE AREA 2-AB-LA-C

A. Location: Auxiliary Building, Wing Area, Level A

B. Figure: 9A-11

C. Description: Includes fire zone 39C

Vestibule

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LB-B.
- North - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-LA-E, 2-AB-LB-B.
- South - 3-h-rated barrier separates area from 2-AB-LA-B, 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-LA-A, 2-AB-LD-I, 2-AB-LD-A.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LD-A.

E. Area Access

- North - Class A door from 2-AB-LB-B.
- East - Class A door from 2-AB-LD-I, 2-AB-LA-A.
- South - Class A door from 2-AB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown

- Train A safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 39C

- Fixed combustible material

  - Cable insulation
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

- Fixed combustibles	$\leq$ 77,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading $\leq$ 120,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 39C

N. Fire Suppression

1. Automatic

   - Zone 39C preaction sprinkler system – Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.21 FIRE AREA 2-AB-LA-D

A. Location: Auxiliary Building, Wing Area, Level A

B. Figure: 9A-11

C. Description: Includes fire zone 39D

Train A piping penetration room, heat exchanger room, valve gallery.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-LB-B.
- North - Unrated barrier separates area from 2-CTB.
- West - Unrated below grade exterior area boundary.
  - 3-h-rated barrier separates area from 2-AFB-C.
- South - 3-h-rated barrier separates area from 2-AB-LA-E.
- East - 3-h-rated barrier separates area from 2-AB-LA-E.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LA-E.
  - Unrated exterior area boundary.

E. Area Access

- South - Unrated watertight door from 2-AB-LA-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV0190A - Train A boration path valve.
- PT0514 - S/G 1 pressure.
- PT0515 - S/G 1 pressure.
- PT0516 - S/G 1 pressure.
- PT3000 - Atmospheric dump valve pressure transmitter.

- HV8103A - RCP 1 seal water inlet valve.
- HV8103B - RCP 2 seal water inlet valve.
- HV8105 - Train A charging path valve.
- HV8116 - Train A boration path valve.
- HV8809A - Residual heat removal pump to cold legs valve.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns only.)

I. Safety-Related Equipment

- 2-1208-E6-003 - Letdown heat exchanger
- 2-1208-E6-007 - Letdown reheat heat exchanger
- HV8106 - Charging pump to RCS isolation
- HV0781 - Reactor cavity and containment sump isolation
- HV8152 - Letdown isolation
- HV8964 - Accumulator holding tank isolation
- HV8888 - Safety injection accumulator test isolation
- HV8835 - Safety injection cold leg header isolation
- HV8802A - RCS hot leg loops 1/4 header isolation
- HV8100 - RCP seal water return isolation
- TV0381B - Letdown reheat heat exchanger bypass
- TV0381A - Letdown reheat heat exchanger outlet
- PV0131 - Low pressure letdown
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 39D

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat Release

- Fixed combustibles	≤ 39,400,00 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 39D

N. Fire Suppression

1. Automatic

   - Zone 39D - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive process fluids in process piping and equipment.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to locally manually operate HV-8105.

S. Deviations and Justifications

1. Unrated watertight door:

   Watertight door A86 separates fire area 2-AB-LA-D (fire zone 39D) from fire zone 39A in fire area 2-AB-LA-E. Fire area 2-AB-LA-D is the train A piping penetration room and is provided with a watertight door for flooding protection of safety-related equipment within the room. Fire zone 39A is the auxiliary building feedwater piping penetration area.

   The existence of an unrated watertight door in the rated fire area boundary separating fire areas 2-AB-LA-D and 2-AB-LA-E is acceptable because (also see Appendix 9B, Section C.5.(5)):

   a. The capability to achieve safe shutdown using train B is not jeopardized for a fire in either location.

   b. Fire zones 39D and 39A are both provided with fire detection systems which would provide early warning of a fire at either location.

   c. The combustible loading of both fire zones on either side of the watertight door is negligible.

Modification of the structure to provide a fire-rated door to separate these fire areas would not significantly increase the level of protection provided by the existing design.

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

3. Unrated containment building fire area boundary:

   See Section 9A.2.76.S.1.

4. Blind Flange Penetration Seals

   Penetrations 2-08-037-A, 2-08-038-A, 2-08-039-A, 2-08-040-A, and 2-08-041-A all have a blind flanged penetration seal. These penetrations are constructed of noncombustible material and are similar to existing piping runs embedded in/routed through fire-rated barriers. These flanged embedded pipe sleeves are an integral part of the fire barrier in that they are designed to prevent the propagation of fire, smoke, and hot gases from one side of the fire barrier to the other. It is unlikely that the initiation of a fire in one of the penetration rooms will propagate smoke and hot gas through a 6-in. or 8-in. penetration sleeve provided with blind flanges or elevate the temperature on the cold side to the point where ignition can take place in a room with very low combustible loading. The defense in depth at the site, including the fire brigade team rapid response to any fire, and the fire detection and suppression systems does not make this a credible fire scenario.

9A.2.22 FIRE AREA 2-AB-LA-E

A. Location: Auxiliary Building, Wing Area, Levels A, 1, 2

B. Drawings: AX4DJ8016, AX4DJ8018, and AX4DJ8020

C. Description: Includes fire zones 39A, 45

1. Level A

   Feedwater penetration room, vestibule, restraint room.

2. Level 1

   Main steam valve room

D. Description of Boundaries

1. Level A

   - Ceiling - 3-h-rated barrier separates area from 2-AB-LD-A.
   - Floor - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LD-G.
   - North - Unrated barrier separates area from 2-CTB.
   - East - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LA-C.
   - South - 3-h-rated barrier separates area from 2-AB-LD-G.
   - West - 3-h-rated wall separates area from 2-AB-LA-D.
     - Unrated below grade exterior area boundary.

2. Level 1

   - North - Unrated barrier separates area from 2-CTB.
   - South - 3-h-rated barrier separates area from 2-AB-LD-G.
   - West - Unrated exterior area boundary.
   - East - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-L2-A.
   - Floor - 3-h-rated barrier separates area from 2-AB-LD-A.
   - Ceiling - Unrated exterior area boundary.

3. Level 2

- North - Unrated barrier separates area from 2-CTB.
- West - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-L2-E, 2-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level A

- West - Unrated watertight door from 2-AB-LA-D.
- South - Unrated watertight door from 2-AB-LD-G.

2. Level 1

- West - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV13005A - S/G 1 steam isolation bypass valve.
- HY13005A - S/G 1 steam isolation bypass valve solenoid.
- HV13005B - S/G 1 steam isolation bypass valve.
- HY13005B - S/G 1 steam isolation bypass valve solenoid.
- HV13006A - S/G 4 steam isolation bypass valve.
- HY13006A - S/G 4 steam isolation bypass valve solenoid.
- HV13006B - S/G 4 steam isolation bypass valve.
- HY13006B - S/G 4 steam isolation bypass valve solenoid.

- HV15196 - S/G 1 feedwater isolation valve.
- HY15196A - S/G 1 feedwater isolation valve solenoid.
- HY15196B - S/G 1 feedwater isolation valve solenoid.
- HV15199 - S/G 4 feedwater isolation valve.
- HY15199A - S/G 4 feedwater isolation valve solenoid.
- HY15199B - S/G 4 feedwater isolation valve solenoid.
- HV5227 - S/G 1 feedwater isolation valve.
- HY5227A - S/G feedwater isolation valve solenoid.
- HY5227B - S/G feedwater isolation valve solenoid.
- HY5227C - S/G feedwater isolation valve solenoid.
- HY5227D - S/G feedwater isolation valve solenoid.
- HY5227G - S/G feedwater isolation valve solenoid.
- HY5227H - S/G feedwater isolation valve solenoid.
- HY5227J - S/G feedwater isolation valve solenoid.
- HY5227K - S/G feedwater isolation valve solenoid.
- PSV3031 - S/G 4 code safety valve.
- PSV3032 - S/G 4 code safety valve.
- PSV3033 - S/G 4 code safety valve.
- HV5230 - S/G 4 feedwater isolation valve.
- HY5230A - S/G feedwater isolation valve solenoid.
- HY5230B - S/G feedwater isolation valve solenoid.
- HY5230C - S/G feedwater isolation valve solenoid.
- HY5230D - S/G feedwater isolation valve solenoid.
- HY5230G - S/G feedwater isolation valve solenoid.
- HY5230H - S/G feedwater isolation valve solenoid.

- HY5230J - S/G feedwater isolation valve solenoid.
- HY5230K - S/G feedwater isolation valve solenoid.
- PSV3001 - S/G 1 code safety valve.
- PSV3002 - S/G 1 code safety valve.
- PSV3003 - S/G 1 code safety valve.
- PSV3004 - S/G 1 code safety valve.
- PSV3005 - S/G 1 code safety valve.
- PSV3034 - S/G 4 code safety valve.
- PSV3035 - S/G 4 code safety valve.
- PV3000 - S/G 1 atmospheric dump valve.
- PV3030 - S/G 4 atmospheric dump valve.
- HV3036A - S/G 4 main steam isolation valve.
- HV3036B - S/G 4 main steam isolation valve.
- HV3006A - S/G 1 main steam isolation valve.
- HV3006B - S/G 1 main steam isolation valve.
- HV1975 - Auxiliary component cooling water return isolation.
- HV1979 - Auxiliary component cooling water supply isolation.
- HV5137 - Auxiliary feedwater pump A to S/G 4 valve.
- HV5139 - Auxiliary feedwater pump A to S/G 1 valve.
- FT-0510 - S/G 1 feedwater flow (AMSAC).
- FT-0511 - S/G 1 feedwater flow (AMSAC).
- FT-0540 - S/G 4 feedwater flow (AMSAC).
- FT-0541 - S/G 4 feedwater flow (AMSAC).
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

- HV5120 - Train C AFW pump to steam generator No. 4.
- HV5122 - Train C AFW pump to steam generator No. 1.
- LV5242 - Steam generator 4 startup control.
- LV5243 - Steam generator 1 startup control.
- HV8880 - Accumulator nitrogen supply isolation.
- HV5194 - Wet layup chemical addition steam generator 1.
- HV5197 - Wet layup chemical addition steam generator 4.
- FV0540 - Steam generator loop 4 feedwater valve.
- FV0510 - Steam generator loop 1 feedwater valve.
- HV3009 - Steam generator outlet to auxiliary turbine.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1556-B7-003 - Restraint cooling fan.
- 2-1556-B7-004 - Restraint cooling fan.
- 2-1556-B7-005 - Restraint cooling fan.
- 2-1556-B7-006 - Restraint cooling fan.

K. Combustible Loading

1. Zone No. 39A

- Fixed combustible material

  - Oil/grease

- Heat Release

- Fixed combustibles	≤ 63,540,000 Btu
- Transient combustibles	860,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 45

   - Fixed combustible material

     - Cable insulation
     - Rubber goods
     - Oil/grease

   - Heat Release

     - Fixed combustibles ≤ 88,200,000 Btu
     - Transient combustibles 4,400,000 Btu

   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational considerations:

   a. In all postulated cases for fire, the main steam isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, steam flow from steam generators 1 and 4 may require isolation by other means to preclude uncontrolled cooldown and steam generator boil dry.

   b. In all postulated cases for fire, the main feedwater isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, main feedwater flow to steam generators 1 and 4 may require isolation by other means to preclude uncontrolled cooldown and steam generator overfilling.

   c. Fire damage to the electrical cables for the high pressure safety injection containment isolation valve, HV-8801B, may necessitate that reactor coolant system boration and makeup addition be accomplished using the train B charging pump discharging through HV-8801A (free of fire damage).

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

c. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 39A
- Zone 45

N. Fire Suppression

1. Automatic

   - Zone 39A - No zone coverage.
   - Zone 45 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

The fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to local manually operate PY-3000B and PY-3030B (PV-3000, PV-3030 operation), HV-3009, HV-5137, and HV-5139.

S. Deviations and Justifications

1. Unrated watertight door:

   a. See section 9A.2.21.S.1.

   b. See section 9A.2.7.S.1.c.

2. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a.(1).

3. Unrated containment building fire area boundary:

   See section 9A.2.76.S.1.

9A.2.23 FIRE AREA 2-AB-L1-B

A. Location: Auxiliary Building, Central Area, Levels 1, 2

B. Drawings: AX4DJ8017, AX4DJ8019

C. Description: Includes fire zones 43, 149

Train B MCC and SWGR rooms

D. Description of Boundaries

1. Level 1

- Floor - 3-h-rated barrier separates area from 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-AB-LD-B.
- West - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LD-G.
- South - 3-h-rated barrier separates area from 2-AB-LD-B.
- East - 3-h-rated barrier separates area from 2-AB-LD-B.

2. Level 2

- North - 3-h-rated barrier separates area from 2-AB-L2-C.
- West - 3-h-rated barrier separates area from 2-AB-LA-B, 2-AB-LD-G, 2-AB-LD-A.
- South - 2-h-rated barrier separates area from stairwell No. 2.
  - 3-h-rated barrier separates area from 2-AB-LD-F.
- East - 3-h-rated barrier separates area from 2-AB-L2-A.
- Ceiling - Unrated exterior area boundary.
- Floor - 3-h-rated barrier separates area from 2-AB-LD-B.

E. Area Access

1. Level 1

- West - Class A door from 2-AB-LD-A.
- East - Class A door from 2-AB-LD-B.

2. Level 2

- West - Class A door from 2-AB-LD-A.
- East - Class A door from 2-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TISH12201 - Fan 2-1555-A7-002 interlock.
- TISH12205 - Fan 2-1555-A7-006 interlock.
- 2-1555-A7-006 - Train B MCC room cooler.
- 2-1805-S3-BBB - Class 1E 480-V MCC 2BBB.
- 2-1805-S3-B16 - Class 1E 480-V switchgear 2BB16.
- 2-1807-Y3-IB12 - 120-V-ac vital bus inverter 2BD1I12.
- 2-1807-Q3-VI6 - Vital bus distribution panel 2BDY2B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

2-1807-Y3-RX21 - Train B regulated transformer/2BBB40RX.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

1. Zone No. 43

- Fixed combustible material

  - Cable insulation
  - Oil/grease

- Heat Release

  - Fixed combustibles ≤ 23,600,000 Btu

- Transient combustibles	800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

2. Zone No. 149

- Fixed combustible material

  - Cable insulation

- Heat release

- Fixed combustibles	$\leq$ 51,200,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation concerns:

   a. CVCS volume control tank outlet valve, LV-0112C, may close due to a fire in this fire area.

   b. The Train A charging path containment isolation valve, HV-8105, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 43

- Zone 149

N. Fire Suppression

1. Automatic

- Zone 43 preaction sprinkler system - Total zone coverage.

- Zone 149 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 2BB16 and 480-V MCC 2BBB.

S. Deviations and Justifications

1. See oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

2. Unrated exterior fire area boundary

   See Appendix 9B, Section C.5.a.(1).

9A.2.24 FIRE AREA 2-AB-L1-C

A. Location: Auxiliary Building, Central Area, Level 1

B. Drawing: AX4DJ8017

C. Description: Includes fire zone 44

Train A MCC room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-LD-G, 2-AB-L2-A.
- South - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LD-A (HVAC chase).
- East - 3-h-rated barrier separates area from 2-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-L2-C.

E. Area Access

- South - Class A door from 2-AB-LD-B.
- West - Class A door from 2-AB-LD-G.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TISH12204 - Fan 2-1555-A7-005 interlock.
- 2-1555-A7-005 - Train A MCC room cooler.
- 2-1805-S3-ABB - Class 1E 480-V MCC 2ABB.
- 2-1807-Y3-IA11 - 120-V-ac vital bus inverter 2AD1I11.
- 2-1807-Q3-VI5 - Vital bus distribution panel 2AY2A.

- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1807-Y3-RX22 - Train A regulated transformer/2ABB40RX.

- Train A safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 44

- Fixed combustible material.

  - Cable insulation.
  - Oil/grease

- Heat release.

- Fixed combustibles	≤ 42,400,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious Actuation Considerations

   CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 44

N. Fire Suppression

1. Automatic

   - Zone 44 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 120-V-ac panel 2AY2A and 480-V MCC 2ABB.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression protection:

Safety-related cable trays in fire zone 44 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at this location satisfies the accessibility and the fire detection criteria of BTP CMEB 9.5-1, Position C.5.e, and the location has a combustible loading of less than 100,000 Btu/ft^2, which is considered low by the NFPA Fire Protection Handbook (page 5-92, 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9A.2.25 FIRE AREA 2-AB-L2-A

A. Location: Auxiliary Building, Central Area, Level 2; Equipment Building, Levels 1, 2 (el 249 ft - 0 in.); tendon access gallery, and tendon access shafts 1, 2, and 3

B. Drawings: AX4DJ8011, AX4DJ8013, AX4DJ8016, AX4DJ8018, AX4DJ8019, AX4DJ8020, AX4DJ8023, AX4DJ8025, AX4DJ8027, AX4DJ8030, AX4DJ8031, AX4DJ8032, AX4DJ8042, AX4DJ8043, AX4DJ8044, and AX4DJ8045

C. Description: Includes fire zones 53, 141A, 141C, 172

HVAC equipment room, Train A mechanical filtration and exchanger room, purge exhaust unit area, enclosure filter and exhaust unit area tendon access gallery and shafts, storage room

D. Description of Boundaries

1. Level C - Tendon Gallery

- Floor - Unrated concrete base mat.
- North - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - Unrated below-grade exterior area boundary.
- Ceiling - Unrated barrier separates area from 2-CTB.

2. Level C - Tendon Access Shaft No. 1

- North - Unrated below-grade exterior area boundary.
- East - Unrated barrier separates area from 2-CTB.
- South - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
- Floor - Unrated concrete base mat.

3. Level C - Tendon Access Shaft No. 2

- North - Unrated barrier separates area from 2-CTB.
- East - 3-h-rated barrier separates area from 2-FB-LC-A.

- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - 3-h-rated barrier separates area from 2-AB-LD-G.
- Floor - Unrated concrete base mat.

4. Level C - Tendon Access Shaft No. 3

- North - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
- South - Unrated barrier separates area from 2-CTB.
- Floor - Unrated concrete base mat.

5. Level B - Tendon Access Shaft No. 1

- North - 3-h-rated barrier separates area from 2-CB-LB-T.
- East - Unrated barrier separates area from 2-CTB.
- South - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.

6. Level B - Tendon Access Shaft No. 2

- North - Unrated barrier separates area from 2-CTB.
- East - 3-h-rated barrier separates area from 2-FB-LC-A.
- South - 3-h-rated barrier separates area from 2-AB-LB-B.
- West - 3-h-rated barrier separates area from 2-AB-LB-B.

7. Level B - Tendon Access Shaft No. 3

- North - 3-h-rated barrier separates area from 2-CB-LB-G.
- East - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - Unrated barrier separates area from 2-CTB.
- West - 3-h-rated barrier separates area from 2-CB-LB-G.

8. Level A - Tendon Access Shaft No. 1

- North - 3-h-rated barrier separates area from 2-CB-LA-B.
- East - Unrated barrier separates area from 2-CTB.
- South - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
- Ceiling - Unrated exterior area boundary.

9. Level A - Tendon Access Shaft No. 2

- North - Unrated barrier separates area from 2-CTB.
- East - 3-h-rated barrier separates area from 2-FB-LC-A.
- South - 3-h-rated barrier separates area from 2-AB-LB-B, 2-AB-LA-C.
- West - 3-h-rated barrier separates area from 2-AB-LB-B.

10. Level A - Tendon Access Shaft No. 3

- North - 3-h-rated barrier separates area from 2-CB-LA-T.
- East - 3-h-rated barrier separates area from 2-CB-LA-I.
- South - Unrated barrier separates area from 2-CTB.
- West - 3-h-rated barrier separates area from 2-CB-LA-T.

11. Levels 1 and 2 - Equipment Building

- Floor - 3-h-rated barrier separates area from 2-FB-LC-A, 2-CB-LA-I, 2-CB-LA-J, 2-CB-LA-T, 2-CB-LB-G, 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L2-E.
- West - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-CB-LA-D, 2-AB-LA-E.
- South - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-L1-C, 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 1-CB-L1-B, 2-CB-LA-R, 2-CB-LA-Q, 1-AB-LD-B, 2-FB-LC-A, 1-CB-LB-S, 1-CB-L2-E, 2-AB-LD-B.

- Ceiling - Unrated exterior area boundary.

12. Level 2 - Auxiliary Building

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B, 2-AB-LD-A, 2-AB-LD-B, 1-AB-L1-H, 2-AB-LC-B, 2-AB-L1-C.

- North - 3-h-rated barrier separates area from 1-AB-LD-B, 2-AB-LD-B (sample chase).

- West - 3-h-rated barrier separates area from 2-AB-L2-E, 2-AB-L2-C, 2-AB-L1-B, 2-AB-LC-B, 2-AB-LD-F, 2-AB-LA-B, 2-AB-LD-I.

  - 2-h-rated barrier separates area from stairwell No. 2.

- South - Unrated exterior area boundary.

- East - 3-h-rated barrier separates area from 1-AB-LD-B.

- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level B - Tendon Access Shaft No. 1

- East - Containment emergency lock.

2. Level B - Tendon Access Shaft No. 2

- West - Certified Class A door from 2-AB-LB-B.

3. Level A - Tendon Access Shaft No. 1

- Ceiling - Exterior hatch.

4. Level 1 - Equipment Building

- North - 2 Class A doors from 1-CB-L1-B.

- East - Class A door from 1-CB-L1-B, 1-AB-LD-B, 2-FB-LC-A.

- South - Class A door from 2-AB-LD-B.

- West - Containment personnel lock.

5. Level 2 - Auxiliary Building

- West - Class A door from 2-AB-L2-E, 2-AB-LC-B, 2-AB-L2-C,

2-AB-L1-B, 2-AB-LA-B.

- Class B door from stairwell No. 2.

6. Level 2 - Equipment Building

- Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1555-A7-002 - Train B MCC room cooler.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1561-N7-001 - Train A piping penetration exhaust filter unit.
- 2-1561-E7-002 - Piping penetration cooler heat exchanger (NSCW)
- 2-1561-E7-001 - Piping penetration cooler heat exchanger (ESF chilled water).
- HV12614 - Train A piping penetration cooler unit recirculation valve.
- PV2550A - Train A piping penetration cooler unit outlet valve.
- PV2550B - Train A piping penetration cooler unit outlet valve.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1561-U7-001-H01 - Piping penetration unit heater.
- 2-1561-U7-001-H02 - Piping penetration unit heater.
- 2-1561-U7-001-H03 - Piping penetration unit heater.
- 2-1508-N7-001 - Containment post LOCA purge filter unit exhaust.

- 2-1609-S5-001 - Radiation monitor plant vent.
- 2-1609-S5-023 - Radiation monitor.
- 2-1609-S5-002 - Radiation monitor containment vent.
- 2-1526-B7-002 - Equipment building ventilation fan.
- 2-1526-U7-007 - Equipment building heater.
- 2-1526-U7-004 - Equipment building unit heater.
- 2-1526-U7-005 - Equipment building unit heater.
- 2-1526-U7-006 - Equipment building unit heater.
- 2-1506-N7-001 - Containment normal purge exhaust unit.
- 2-1506-B7-002 - Mini purge fan.
- 2-1506-B7-001 - Preaccess purge fan.
- 2-1553-N7-001 - Auxiliary building continuous exhaust unit.
- 2-1553-N7-002 - Auxiliary building continuous exhaust unit.
- 2-1551-A7-002 - Auxiliary building normal air conditioning unit.
- 2-1551-A7-001 - Auxiliary building normal air conditioning unit.
- FV12691 - Auxiliary building continuous exhaust unit valve.
- FV12698 - Auxiliary building continuous exhaust unit valve.
- 2-1553-N7-003 - Auxiliary building continuous exhaust unit.
- HV12693 - Auxiliary building continuous exhaust unit valve.
- HV12660 - Auxiliary building continuous exhaust unit valve.
- HV12700 - Auxiliary building continuous exhaust unit valve.
- HV12662 - Auxiliary building continuous exhaust unit valve.
- HV12707 - Auxiliary building continuous exhaust unit valve.
- HV12664 - Auxiliary building continuous exhaust unit valve.
- FV12705 - Auxiliary building continuous exhaust unit valve.

- PV12670A - Auxiliary building normal ventilation outside air intake.
- PV12670B - Auxiliary building normal ventilation outside air intake.
- Nonsafety-related cables

K. Combustible Loadings

1. Zone No. 53

   - Fixed combustible material

     - Cable insulation
     - Charcoal
     - Rubber goods

   - Heat release

     - Fixed combustibles ≤ 765,820,000 Btu
     - Transient combustibles 122,780,000 Btu

   - Combustible loading ≤ 120,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 141A

   - Fixed combustible material

     - Cable insulation
     - Charcoal
     - Cellulosic materials
     - Oil/grease
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles ≤ 357,300,000 Btu
     - Transient combustibles 78,700,000 Btu

   - Combustible loading ≤ 80,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 60 min

3. Zone No. 141C

   - Fixed combustible material

- Cable insulation
- Cellulosic materials
- Oil/grease
- Plastics

- Heat release

  - Fixed combustibles ≤ 745,600,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 240,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 180 min

4. Zone No. 172

- Fixed combustible material

  - Cable insulation
  - Charcoal

- Heat release

  - Fixed combustibles ≤ 115,575,000 Btu
  - Transient combustibles 79,425,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area use safe shutdown train A.

2. Special operational considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 53

- Zone 141A

- Zone 141C
- Zone 172

N. Fire Suppression

1. Automatic

   - Zone 53 preaction sprinkler system - Partial zone coverage.
   - Zone 141A preaction sprinkler system - Partial zone coverage.
   - Zone 141C - No zone coverage.
   - Zone 172 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective hose stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

3. Charcoal Filters

   Integral water deluge system is provided for charcoal filters.

O. Radioactive Materials

Radioactive solids collected in HVAC filters.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except fire zone 141C). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress / egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

   See Section 9A.2.76.S.1.

2. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

3. Oversize fire dampers:

   See Appendix 9B, Section C.5.a.(4).

4. Unlabeled door:

   See Appendix 9B, Section C.5.a.(5).

9.A.2.26 FIRE AREA 2-AB-L2-C

A. Location: Auxiliary Building, Central Area, Level 2

B. Drawing: AX4DJ8019

C. Description: Includes fire zone 147

Train B mechanical filtration and exchanger room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-L1-C, 2-AB-LD-B, 2-AB-LD-B (sample chase), 2-AB-LD-A.
- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-L2-E, 2-AB-LD-G, 2-AB-LD-I.
- South - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-L1-B, 2-AB-LD-A.
- East - 3-h-rated barrier separates area from 2-AB-LC-B, 2-AB-L2-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- West - Class A door from 2-AB-L2-E.
- South - Class A door from 2-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Equipment

None.

I. Safety-Related Equipment

- PV-2551B - Train B pipe penetration cooler unit outlet valve.
- HV-12616 - Train B pipe penetration cooler unit outlet valve.

- HV-12604 - Train B pipe penetration cooler unit outlet valve.
- 2-1561-N7-002 - Train B pipe penetration HVAC unit.
- PV-2551A - Train B pipe penetration cooler unit outlet valve.
- HV-12607 - Train B pipe penetration cooler unit outlet valve.
- HV12606 - Train B piping penetration room ventilation outside air intake.
- HV12605 - Train B piping penetration room ventilation outside air intake.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 147

- Fixed combustible material
  - Cable insulation
  - Charcoal
- Heat release
  - Fixed combustibles ≤153,375,000 Btu
  - Transient combustibles 79,425,000 Btu
- Combustible loading ≤160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 147

N. Fire Suppression

1. Automatic

   - Zone 147 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

Radioactive solids collected in HVAC filters.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area my not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9.A.2.27 FIRE AREA 2-AB-L2-E

A. Location: Auxiliary Building, Wing Area, Level 2

B. Drawing: AX4DJ8020

C. Description: Includes fire zone 148

Switchgear room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-AB-LD-G.
- North - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-LA-E.
- South - 3-h-rated barrier separates area from 2-AB-LD-G.
- East - 3-h-rated barrier separates area from 2-AB-L2-A, 2-AB-L2-C, 2-AB-LD-I.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- South - Class A door from 2-AB-LD-G.
- East - Class A door from 2-AB-L2-A, 2-AB-L2-C, 2-AB-LD-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PY3000 - Atmospheric dump valve signal converter.
- PY3030 - Atmospheric dump valve signal converter.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 2-1805-S3-B20 - 480-V switchgear.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 148

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 86,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 148

N. Fire Suppression

1. Automatic
   - Zone 148 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.28 FIRE AREA 2-CB-LC-A

A. Location: Control Building, Levels C, B, A
Fuel Handling Building, Level C

B. Drawings: AX4DJ8021, AX4DJ8023, AX4DJ8025, and AX4DJ8030

C. Description: Includes fire zones 42B, 151, 153

Train A electrical tunnel, train A electrical chase, normal electrical shaft.

D. Description of Boundaries

1. Level C - Train A electrical tunnel (fire zone 42B)

- Floor - Unrated concrete basemat.
- North - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LC-B.
- West - 3-h-rated barrier separates area from 2-FB-LC-A.
  - Unrated below-grade exterior area boundary.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LC-B, 2-CB-LB-M, 2-CB-LB-K, 2-CB-LB-L, 2-CB-LB-N, 2-CB-LB-D, 2-CB-LB-E, 2-CB-LB-O, 2-CB-LB-P, 2-CB-LB-I, 1-AB-LD-B, 1-CB-LC-B, 1-CB-LB-S.

2. Level B - Train A electrical shaft (fire zone 42B)

- North - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 1-CB-LC-D.
  - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LB-A.
- West - Unrated below-grade exterior area boundary.

3. Level B - Train A electrical chase (fire zone 151) and normal electrical chase (fire zone 153)

- North - 3-h-rated barrier separates area from 2-CB-LB-A.
- East - 3-h-rated barrier separates area from 2-CB-LB-A.

- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- West - 2-h-rated barrier separates area from elevator No. 1.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-O, 2-CB-LA-P.

4. Level A - Train A electrical shaft (fire zone 42B)

- North - 3-h-rated barrier separates area from the turbine building.
- East - 3-h-rated barrier separates area from 1-CB-LA-E.
- South - 3-h-rated barrier separates area from 2-CB-LA-F.
- West - 3-h-rated barrier separates area from the turbine building.
- Ceiling - 3-h-rated barrier separates area from the turbine building.

E. Area Access

1. Level C

- South - Certified class A[(a)] door from 2-AB-LC-B.
- East - Class A door from 1-AB-LD-B.

2. Level B (fire zone 42B)

- South - Certified class A door from 2-CB-LB-A.
- East - Class A door from 1-CB-LC-D.

3. Level B (fire zones 153 and 151).

- South - Four class A doors from 2-CB-LC-B.

4. Level A (fire zone 42B)

- South - Certified class A door from 2-CB-LA-F.
- East - Class A door from 1-CB-LA-E.

---

a. Indicated fire door is normally open, but is released when smoke is detected.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

Train A safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.
- 2-1540-B7-007 - Electrical chase ventilation fan.

K. Combustibles Loading

1. Zone No. 42B

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 1,417,890,270 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 374,621 Btu/ft^2
- Fire severity (wood equivalent) 281 min

2. Zone No. 151

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 101,326,530 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 638,291 Btu/ft^2

- Fire severity (wood equivalent) 479 min

3. Zone No. 153

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles $\leq$ 69,400,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 520,000 Btu/ft^2
   - Fire severity (wood equivalent) $\leq$ 390 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. CVCS charging pump common miniflow valve, HV-8110, may close due to a fire in this fire area.

   b. CVCS volume control tank outlet valve, LV-0112B, may close due to a fire in this fire area.

   c. Main steam atmospheric dump valve, PV-3000, may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve, PV-3030, may open due to a fire in this fire area.

   e. Pressurizer PORV, PV-0455A, may open due to a fire in this fire area.

   f. Pressurizer PORV, PV-0455A, and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455/PT-0457 circuit damage) due to a fire in this fire area.

   g. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

   h. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

i. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to a fire in this fire area.

j. Train A motor-driven auxiliary feedwater pump, 2-1302-P4-003, may start due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 42B
- Zone 151
- Zone 153

N. Fire Suppression

1. Automatic

- Zone 42B preaction sprinkler system - Partial zone coverage.
- Zone 151 preaction sprinkler system - Total zone coverage.
- Zone 153 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except rooms B22, B23, and B86). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a.(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a.(5).

9A.2.29 FIRE AREA 2-CB-LC-B

A. Location: Control Building, Levels B, A, 1, 2, 3

B. Drawings: AX4DJ8023, AX4DJ8025, AX4DHJ8026, AX4DJ8027, and AX4DJ8028

C. Description: Includes fire zone 80

Nontrain switchgear, HVAC chase

D. Description of Boundaries

1. Level B

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B, 2-CB-LC-A, 2-CB-LB-L,[a] 2-CB-LB-K,[a] 2-CB-LB-M,[a] 2-CB-LB-N,[a] 2-CB-LB-Q,[a] 2-CB-LB-C[a] 2-CB-LB-J,[a] 2-CB-LB-O.[a]
- North - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LC-A.
  - 2-h-rated barrier separates area from elevator No. 1.
- West - 3-h-rated barrier separates area from 2-CB-LB-K, 2-CB-LB-L, 2-CB-LB-M, 2-CB-LB-N, 2-CB-LB-D, 2-CB-LB-Q, 2-CB-LB-C, 2-CB-LB-J, 2-CB-LB-P, 2-CB-LB-I, 2-CB-LB-X, 2-CB-LB-E, 2-CB-LB-H.
- South - 3-h-rated barrier separates area from 1-CB-LC-B, 1-CB-L3-M.
- East - 3-h-rated barrier separates area from 1-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-K, 2-CB-LA-M, 2-CB-LA-L, 2-CB-LA-S.

2. Level A

- North - 3-h-rated barrier separates area from 2-CB-LB-X.
- East - 3-h-rated barrier separates area from 2-CB-LA-S.
- South - 3-h-rated barrier separates area from 2-CB-LA-S.
- West - 3-h-rated barrier separates area from 2-CB-LA-G.

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a. Mezzanine at el 192 ft - 6 in.

3. Level 1

   - North - 3-h-rated barrier separates area from 2-CB-LB-X.
   - East - 3-h-rated barrier separates area from 1-CB-L1-B.
   - South - 3-h-rated barrier separates area from 1-CB-L1-B.
   - West - 3-h-rated barrier separates area from 1-CB-L1-B.

4. Level 2

   - North - 3-h-rated barrier separates area from 2-CB-LB-X.
   - East - 3-h-rated barrier separates area from 1-CB-L2-E.
   - South - 3-h-rated barrier separates area from 1-CB-L2-E.
   - West - 3-h-rated barrier separates area from 1-CB-L2-E.

5. Level 3

   - North - 3-h-rated barrier separates area from 2-CB-LB-X.
   - East - 3-h-rated barrier separates area from 1-CB-L3-H.
   - South - 3-h-rated barrier separates area from 1-CB-L3-H.
   - West - Unrated exterior area boundary.
   - Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level B

   - North - Class A door from 2-CB-LB-A.

     - Four class A doors from 2-CB-LC-A.
   - West - Class A door from 2-CB-LB-M, 2-CB-LB-N, 2-CB-LB-Q, 2-CB-LB-C, 2-CB-LB-J, 2-CB-LB-K, 2-CB-LB-L, 2-CB-LB-P, 2-CB-LB-I.
   - South - Class A door from 1-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1532-B7-001 - CBSF battery room fan.
- 2-1532-B7-002 - CBSF battery room fan.
- 2-1532-B7-003 - CBSF battery room fan.
- 2-1532-B7-004 - CBSF battery room fan.
- HV12727 - CBSF battery room fan damper.
- HV12742 - CBSF battery room fan damper.
- HV12748 - CBSF battery room fan damper.
- HV12749 - CBSF battery room fan damper.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the design and operational considerations of paragraph L.)

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.
- 2-1807-Y3-12 – Regulated transformer 2ABA07RX.
- 2-1807-Y3-10 – Regulated transformer 2ABC09RX

J. Nonsafety-Related Equipment

- 2-1805-S3-B08 - 480-V switchgear 2NB08.
- 2-1805-S3-B09 - 480-V switchgear 2NB09.
- 2-1805-S3-BL1 - 480-V switchgear 2NBL1.
- 2-1805-S3-B17 - 480-V switchgear 2NB17.
- 2-1805-S3-B10 - 480-V switchgear 2NB10.

- 2-1805-S3-B30 - 480-V FLEX switchboard 2NB30.
- 2-1805-S3-NBR - 480-V MCC 2NBR.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 80.

- Fixed combustible material.
  - Cable insulation
  - Plastics
  - Oil/grease
  - Rubber goods
- Heat release.
  - Fixed combustibles $\leq$ 504,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:
   a. Fire damage to the train B CBSF battery room exhaust fans, 2-1532-B7-002 and 2-1532-B7-004, and their associated discharge dampers, HV-12727 and HV-12749, may require use of portable ventilation (not required for at least 48-h) to preclude hydrogen buildup in the train B battery rooms (B32 and B37).
   b. The following raceways are covered with a 3-h-rated fire barrier to protect essential train B safe shutdown cables from a fire in this fire area:
      - 2BE350TLAM
      - 2BE350TSAM
      - 2DE350TXAH
      - 2DE350TQAG
      - 2DE350RQ210
      - 2DE350RX142
      - 2DE350RX145
      - 2DE350RQ127

For a fire in this fire area, PORV block valve 2-HV-8000A may be required to be closed. If the block valve will not close, opening the feeder breaker to PORV 2-PV-0455A to remove all power to the fail close PORV may be required. Opening the feeder breaker allows the PORV to close.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0455A, may open due to a fire in this fire area.

   b. Pressurizer auxiliary spray valve, HV-8145, may open due to a fire in this fire area.

   c. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to a fire in this fire area.

   d. The turbine-driven auxiliary feedwater pump, 2-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within Zone 80.

N. Fire Suppression

1. Automatic

   Zone 80 preaction sprinkler system – partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operated breakers in 480-V switchgear 2NB08, 2NB09, 2NB10.

S. Deviations and Justifications

1. Safety-related cable trays without automatic fire suppression:

   Three safety-related cable trays pass into a mezzanine area in fire zone 80 of this fire area. Within the rest of this fire zone, the safety-related cable trays are either protected by an automatic water fire suppression system or the cable trays are protected by fire proofing having a 3-h rating. While access into the mezzanine area with a charged fire hose may be difficult, the quantities of cable insulation in the unprotected trays (one tray is empty) is very small. In addition, the mezzanine area is essentially devoid of other combustible material, the combustible loading for the entire zone is less than 100,000 Btu/ft^2, and the mezzanine is provided with smoke detectors. By the nature of the difficulty in entering the location, the addition of permanent or transient combustibles is very unlikely. While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in this fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

2. Embedded conduits:

   Conduits 2DE351RS074 and 2DE351RS075 are embedded in the ceiling of fire zone 80 of this fire area. These conduits contain cables which could change the results of the safe shutdown analysis as presented in Paragraph L if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 3.5-in. of concrete coverage over the conduit can be verified to exist.

   Modification of the facility to relocate the cables in these embedded conduits or to otherwise provide additional protection is not warranted because the minimum concrete coverage over the conduits (equivalent to approximately 75 minutes of protection per figure 5-8F of the NFPA Fire Protection Handbook - Fifteenth Edition) provides a margin of safety of at least 100-percent above the calculated combustible loading for the location.

9A.2.30 FIRE AREA 2-CB-LB-A

A. Location: Control Building Level B, Tunnel 2T4A to Diesel Building

B. Drawings: AX4DJ8023, AX4DJ8041, and AX4DJ8046

C. Description: Includes fire zones 59, 69, 72, 73, 143

Train A corridor and electrical mezzanine (el 194 ft - 6 in.), train A HVAC room, rod control equipment room, normal HVAC room, electrical tunnel 2T4A, train C dc room, HVAC duct chase mezzanine (el 194 ft. - 6 in)

D. Description of Boundaries

1a. Control Building Level B

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A, 2-CB-LB-D (electrical mezzanine).
  - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LC-A.
  - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LB-B, 2-CB-LC-A, 2-CB-LB-X, 2-CB-LB-D, 2-CB-LB-F, 2-CB-LB-H, 2-CB-LC-B, 2-CB-LB-T.
  - 2-h-rated barrier separates area from elevator No. 1.
- East - 3-h-rated barrier separates area from 1-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-K, 2-CB-LA-A, 2-CB-LA-N, 2-CB-LA-D, 2-CB-LA-G.
- Interior - 2-h-rated barrier separates area from stairwell No. 4.

1b. Level B HVAC Duct Chase (Mezzanine Level el 194 ft - 6 in. and train C dc Room)

- Floor - 3-h-rated barrier separates area from 2-CB-LB-F.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-G, 2-CB-LA-H.
- North - 3-h-rated barrier separates area from 2-CB-LB-F.
  - 2-h-rated barrier separates area from stairwell No. 4.

- East - 3-h-rated barrier separates area from 2-CB-LB-F.
- South - 3-h-rated barrier separates area from 2-CB-LB-F.

2. Electrical Tunnel (2T4A)

- Floor - Unrated concrete base mat.
- North - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - 3-h-rated barrier separates area from 2-CB-LB-D, 2-DB-L1-A.
  - Unrated below-grade exterior area boundary.
- West - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.
- Ceiling - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.

E. Area Access

1. Control Building - Level B

- North - Certified class A door from 2-CB-LC-A.
- South - Two class A doors from 2-CB-LB-D, 2-CB-LB-B, 2-CB-LB-F.
  - Class A door from 2-CB-LC-B, 2-CB-LB-T (el 192 ft - 6 in.)
  - Class B door from 2-CB-LB-X.
- East - Class A door from 1-CB-LB-A.
- Interior - Certified class A door from stairwell No. 4.

2. Electrical Tunnel (2T4A)

- South - Class A door from 2-DB-L1-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1532-A7-001 - CBSF electrical equipment room HVAC.
- 2-1606-S6-002 - Reactor trip switchgear.
- 2-1804-W3-CB700 - Diesel generator A cable bus.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)

I. Safety-Related Equipment

- HV12736 - CBSF electrical equipment room smoke removal damper.
- 2-1806-S3-DCC - 125-V-dc MCC 2CD1M.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- HV12756A - CB lighting switchgear and normal AC room smoke removal damper.
- HV2737A - CB wing area normal AC unit exhaust damper.
- HV2737B - CB wing area normal AC unit return damper.
- HV2737C - CB wing area normal AC unit inlet damper.
- 2-1606-M6-002 - Train B rod drive M-G set.
- 2-1606-T3-001 - Control power transformer.
- 2-1533-A7-001 - CB wing area normal AC unit
- 2-1533-B7-001 - CB wing area normal exhaust and return fan
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 59

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 44,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 69

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 146,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

3. Zone No. 72

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 43,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

4. Zone No. 73

- Fixed combustible material
  - Cable insulation
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 868,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 240,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 180 min

5. Zone No. 143

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 512,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 240,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 180 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   Fire damage to the reactor trip switchgear may necessitate ensuring reactor trip by some other means.

3. Spurious actuation considerations.

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

d. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 59
- Zone 69
- Zone 72
- Zone 73
- Zone 143

N. Fire Suppression

1. Automatic

   - Zone 59 - No zone coverage.
   - Zone 69 - No zone coverage.
   - Zone 72 preaction sprinkler system - Partial zone coverage.
   - Zone 73 preaction sprinkler system - Partial zone coverage.
   - Zone 143 preaction sprinkler system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except room B80). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior area boundary:

   See Appendix 9B, Section C.5.a.(1).

2. Unlabeled doors:

   See Appendix 9B, Section C.5.a.(5).

3. Class B door separating fire areas:

   See section 9A.2.48.

4. Separation by distance without full area suppression:

   Fire area 2-CB-LB-A (fire zone 143) and fire area 2-CB-LB-D (fire zone 144) are interconnected by a common 2-ft by 2 1/2-ft wide air shaft for ventilation of tunnels 2T4A and 2T4B. The sharing of this interconnecting air shaft is acceptable because:

   a. The total horizontal separation distance between the two fire areas through the air shaft is approximately 39 ft.

   b. No intervening combustibles exist in the air shaft and the air shaft location and size precludes use of the space for storage.

   c. Fire areas 2-CB-LB-A and 2-CB-LB-D (including tunnels 2T4A and 2T4B) are provided with fire detection systems.

   d. Fire areas 2-CB-LB-A and 2-CB-LB-D in tunnels 2T4A and 2T4B are provided with automatic preaction fire suppression systems.

   e. Should a fire occur in one of the fire areas, the physical arrangement of the air shaft interconnections makes the passage of smoke and hot gases to atmosphere more likely than the contamination of the adjacent area.

   Modification of the structure to provide separate air shafts for each area would not significantly increase the level of protection provided by the existing design.

9A.2.31 FIRE AREA 2-CB-LB-B

A. Location: Control Building Level B

B. Figures 9A-18

C. Description: Includes fire zone 75

Train A switchgear room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-A.
- East - 3-h-rated barrier separates area from 2-CB-LB-A.
- South - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-D.
- West - 3-h-rated barrier separates area from 2-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-S.

E. Area Access

- East - Class A doors from 2-CB-LB-A.
- South - Class A door from 2-CB-LB-D.
- West - Class A doors from 2-CB-LB-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1805-S3-B04 - Class 1E 480-V switchgear 2AB04.
- 2-1805-S3-B05 - Class 1E 480-V switchgear 2AB05.
- 2-1805-S3-ABC - Class 1E 480-V MCC 2ABC.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1513-H7-001-H01 - Train A hydrogen recombiner power panel.
- 2-1513-P5-ERA - Train A hydrogen recombiner control panel.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 75

- Fixed combustible material
  - Cable insulation
  - Oil/grease
- Heat release
  - Fixed combustibles ≤ 153,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8008A due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0422A may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 75

N. Fire Suppression

1. Automatic

    - Zone 75 - No zone coverage.

2. Manual

    Hose stations (with portable extinguishers are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 2AB04 and 2AB05.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 75 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible

for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.32 FIRE AREA 2-CB-LB-C

A. Location: Control Building, Level B

B. Figures: 9A-18

C. Description: Includes fire zone 79A

Train B channel 2 switchgear room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
  - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-Q.
- West - 3-h-rated barrier separates area from 2-CB-LB-P, 2-CB-LB-O, 2-CB-LC-B.
- South - 3-h-rated barrier separates area from 2-CB-LB-J, 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- West - Class A door from 2-CB-LC-B.
- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1806-B3-CBA - Battery charger 2BD1CA.
- 2-1806-B3-CBB - Battery charger 2BD1CB.
- 2-1806-S3-DCB - 125-V-dc MCC 2BD1M.
- 2-1805-D3-04T - FLEX Manual Transfer Switch 2BBA04T.

- 2-1806-S3-DSB - 125-V-dc switchgear 2BD1.
- 2-1806-Q3-DB1 - 125-V-dc distribution panel 2BD11.
- 2-1806-Q3-DB2 - 125-V-dc distribution panel 2BD12.
- 2-1807-Q3-VI2 - Vital bus distribution panel 2BY1B.
- 2-1807-Y3-IB2 - 120-V-ac vital bus inverter 2BD1I2.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 79A

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 11,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open due to a fire in this fire area.

b. Safety injection actuation may occur due to a fire damage to solid state protection cabinet 2-1605-Q5-SPB 125-V-dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 79A

N. Fire Suppression

1. Automatic

- Zone 79A - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE fighting.

O. Radioactive Materials

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V-dc panels 2BD12 and 2BD1M.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 79A of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with

fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.33 FIRE AREA 2-CB-LB-D

A. Location: Control Building Level B, Tunnel 2T4B to Diesel Building

B. Drawings: AX4DJ8023, AX4DJ8041, and AX4DJ8046

C. Description: Includes fire zones 60, 62, 65, 66, 67, 68, 70, 144

Train B corridor, M.G. set room, penetration area, train B HVAC room, penetration room, electrical tunnel 2T4B

D. Description of Boundaries

1. Control Building Level B

- Floor - Unrated concrete basemat.

  - 3-h-rated barrier separates area from 2-CB-LC-A, 1-AB-LD-B.

- North - 3-h-rated barrier separates area from 2-CB-LB-H, 2-CB-LB-A, 2-CB-LB-F, 2-CB-LB-B, 2-CB-LB-E, 2-CB-LB-N.

- West - 3-h-rated barrier separates area from 2-CB-LB-A (electrical mezzanine).

- South - 3-h-rated barrier separates area from 2-CB-LB-T, 2-CB-LB-G, 2-CB-LB-Q, 2-CB-LB-O, 1-AB-LD-B, 2-AB-L2-A.

  - Unrated barrier separates area from containment building 2-CTB.

- East - 3-h-rated barrier separates area from 2-CB-LB-E, 2-CB-LC-B, 2-CB-LB-0, 2-CB-LB-P, 2-CB-LB-I, 1-CB-LC-B, 1-CB-LB-S.

- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-A, 2-CB-LA-D, 2-CB-LA-I, 2-CB-LA-T, 2-CB-LA-G, 2-CB-LA-H, 2-CB-LA-K, 2-CB-LA-L, 2-CB-LA-J, 2-CB-LB-A (electrical mezzanine).

2. Electrical Tunnel (2T4B)

- Floor - Unrated concrete basemat.

- North - 3-h-rated barrier separates area from 2-CB-LB-A.

  - Unrated exterior area boundary.

- West - 3-hr-rated barrier separates area from 2-CB-LB-A.
- South - 3-hr-rated barrier separates area from 2-DB-L1-B.
  - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.
- Ceiling - Unrated below-grade exterior area boundary.
  - Unrated exterior area boundary.

E. Area Access

1. Control Building Level B

- North - Class A door from 2-CB-LB-H, 2-CB-LB-B, 2-CB-LB-E, 2-CB-LB-F.
  - Three class A doors from 2-CB-LB-A.
- South - Class A door from 2-CB-LB-T, 2-CB-LB-O.
  - Two class A doors from 2-CB-LB-G.
- East - Class A door from 2-CB-LC-B.

2. Electrical Tunnel (2T4B)

- South - Class A door from 2-DB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- HY0442B - HV0442B I/power converter.
- HY0943B - HV0943B I/power converter.
- 2-1602-P5-NFB - Regulatory Guide 1.97 neutron flux amplifier panel.
- 2-1602-P5-OIB - RG - spout (Regulatory Guide) 1.97 neutron flux optical isolator panel.

- 2-1532-A7-002 - CBSF electrical equipment room HVAC.
- 2-1804-W3-CB800 - Diesel generator B cable bus.
- Train A safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the design considerations of paragraph L.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12719 - CBSF electrical equipment air conditioning unit A7002 damper.
- HV12734 - CBSF electrical equipment air conditioning unit A7001 damper.
- HV12721 - CBSF electrical equipment smoke removal damper.
- Train A safety-related cables.
- Train B safety-related cables.
- 2-1807-Y3-11 - Regulated Transformer 2BBA07RX.
- 2-1807-Y3-13 - Regulated Transformer 2BBC09RX.

J. Nonsafety-Related Equipment

- 2-1606-M6-001 - Train A rod drive M-G set.
- 2-1807-Y3-RX23 - Regulated transformer 2NBR32RX.
- 2-1807-Y3-RX24 - Regulated transformer 2NBS32RX.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 60

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles $\leq$ 42,000,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

2. Zone No. 62

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Rubber goods
- Heat release
  - Fixed combustibles $\leq$ 361,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

3. Zone No. 65

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 99,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 120,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 90 min

4. Zone No. 66

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 63,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 160,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 120 min

5. Zone No. 67

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 187,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

6. Zone No. 68

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 11,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

7. Zone No. 70

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 37,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

8. Zone No. 144

- Fixed combustible material
  - Cable insulation

- Heat release
  - Fixed combustibles ≤ 221,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   The following raceway are covered with a 3-h-rated fire barrier to protect essential train A safe shutdown cables from a fire in this fire area:

   - 2CE340KXH02
   - 2CE361KXH01
   - 2CE340KPH02
   - 2CE361KPH01

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

   c. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   f. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   g. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

   h. Automatic starting of the train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

i. Automatic starting of the train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

j. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

k. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to a fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

l. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

m. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

n. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

o. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

p. It may not be possible to close either letdown isolation valve LV-0459 or LV-0460 due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 60
- Zone 62
- Zone 65
- Zone 66
- Zone 67
- Zone 68
- Zone 70
- Zone 144

N. Fire Suppression

1. Automatic

- Zone 60 preaction sprinkler system - Total zone coverage.
- Zone 62 preaction sprinkler system - Total zone coverage.
- Zone 65 preaction sprinkler system - Total zone coverage.
- Zone 66 preaction sprinkler system - Total zone coverage.
- Zone 67 preaction sprinkler system - Total zone coverage.
- Zone 68 - No zone coverage.
- Zone 70 - No zone coverage.
- Zone 144 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except room B30). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

   See Section 9A.2.76.S.1.

2. Unrated exterior boundary:

   See Appendix 9B, Section C.5.a.(1).

3. Separation by distance without full area suppression:

   See Section 9A.2.30.S.4.

4. Safety-related cable trays without automatic fire suppression protection:

   Safety-related cable trays in fire zone 70 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at this location satisfies the accessibility and the fire detection criteria of

   BTP CMEB 9.5-1, Position C.5.e, and the location has a combustible loading of less than 100,000 Btu/ft^2, which is considered low by the NFPA Fire Protection Handbook (page 5-92, 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9A.2.34 FIRE AREA 2-CB-LB-E

A. Location: Control building - Level B

B. Figure: 9A-18

C. Description: Includes fire zone 76.

Non-train dc room

D. Description of Boundaries

- Floor - Unrated concrete basemat.

  - 3-h-rated barrier separates area from 2-CB-LC-A.

- North - 3-h-rated barrier separates area from 2-CB-LB-L, 2-CB-LC-B.

- West - 3-h-rated barrier separates area from 2-CB-LB-H and 2-CB-LB-D.

- South - 3-h-rated barrier separates area from 2-CB-LB-D.

- East - 3-h-rated barrier separates area from 2-CB-LB-M, 2-CB-LB-N, 2-CB-LC-B.

- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-K, 2-CB-LA-S.

E. Area Access

- South - Class A door from 2-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 2-1806-Q3-DP2 - 125-V-dc distribution panel 2ND31.
- 2-1806-Q3-DP5 - 125-V-dc distribution panel 2ND32.
- 2-1807-Q3-RN1 - 120-V-ac regulated instrument panel 2NYR.
- 2-1807-Q3-SN1 - 120-V-ac regulated instrument panel 2NYS.
- 2-1807-Q3-RSN1 - Regulated instrument bus 2NYRS.
- 2-1807-Q3-VN1 - 120-V-ac distribution panel 2NY1N.
- 2-1807-Q3-VN2 - 120-V-ac distribution panel 2NY2N.
- 2-1807-Y3-I2 - Essential ac inverter 2ND3I2.
- 2-1807-Y3-I3 - Essential ac inverter 2ND3I3.
- 2-1807-Y3-RX18 - Regulated transformer 2NBS21RX.
- 2-1807-Y3-RX17 - Regulated transformer 2NBR21RX.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 76

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 37,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 76

N. Fire Suppression

1. Automatic

   - Zone 76 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V-dc panels 2ND31 and 2ND32.

S. Deviations and Justifications

None.

9A.2.35 FIRE AREA 2-CB-LB-F

A. Location: Control Building, Level B

B. Figure: 9A-18

C. Description: Includes fire zone 74

Nontrain switchgear room

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-A.
  - 2-h-rated barrier separates area from stairwell No. 4.
- West - 3-h-rated barrier separates area from 2-CB-LB-A.
- South - 3-h-rated barrier separates area from 2-CB-LB-D.
- East - 3-h-rated barrier separates area from 2-CB-LB-D, 2-CB-LB-A.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-G, 2-CB-LA-H, 2-CB-LB-A (duct chase mezzanine).

E. Area Access

- North - Class A door from 2-CB-LB-A.
- South - Class A door from 2-CB-LB-D.
- East - Class A door from 2-CB-LB-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 2-1805-S3-B01 - 480-V switchgear 2NB02.
- 2-1805-S3-NBS - 480-V MCC 2NBS.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 74

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 49,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 74

N. Fire Suppression

1. Automatic
   - Zone 74 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 2NB01.

S. Deviations and Justifications

None.

9A.2.36 FIRE AREA 2-CB-LB-G

A. Location: Control Building, Levels B and A

B. Drawings: AX4DJ8023 and AX4DJ8025

C. Description: Includes fire zones 63, 82

MCC room, Train B electrical penetration room

D. Description of Boundaries

1. Level B

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-D.
- East - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-T.

2. Level A

- North - 3-h-rated barrier separates area from 2-CB-LA-I.
- West - 3-h-rated barrier separates area from 2-CB-LA-D.
- South - 3-h-rated barrier separates area from 2-CB-LA-T.
- East - 3-h-rated barrier separates area from 2-CB-LA-T.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.

E. Area Access (Level A)

- North - Two Class A doors from 2-CB-LB-D.
- East - Class A door from 2-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 2-1805-S3-NBF - 480-V MCC 2NBF.
- 2-1807-Q3-CN2 - 120-V-ac regulated instrument panel 2NYC2.
- Nonsafety-related cables.

K. Combustible loading

1. Zone No.63

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 100,200,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 200,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 150 min

2. Zone No. 82

   - Fixed combustible material

- Cable insulation

- Heat release

- Fixed combustibles	$\leq$ 24,800,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading $\leq$160,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 63

- Zone 82

N. Fire Suppression

1. Automatic

   - Zone 63 - No zone coverage.

   - Zone 82 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See Section 9A.2.76.S.1.

9A.2.37 FIRE AREA 2-CB-LB-H

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 71.

Train B switchgear room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-A.
- West - 3-h-rated barrier separates area from 2-CB-LB-D, 2-CB-LB-A.
- South - 3-h-rated barrier separates area from 2-CB-LB-D.
- East - 3-h-rated barrier separates area from 2-CB-LB-X, 2-CB-LB-L, 2-CB-LB-E, 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-G, 2-CB-LA-H.

E. Area Access

- South - Class A door from 2-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1805-S3-B06 - Class 1E 480-V switchgear 2BB06.
- 2-1805-S3-B07 - Class 1E 480-V switchgear 2BB07.
- 2-1805-S3-BBC - Class 1E 480-V MCC 2BBC.
- 2-1807-Y3-14 - Regulated transformer 2BBC42RX.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1513-H7-002-H01 - Train B hydrogen recombiner power panel.
- 2-1513-P5-ERB - Train B hydrogen recombiner control panel.
- 2-1807-Y3-RX26 - Regulated transformer 2BBC20RX.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 71

- Fixed combustible material
  - Cable insulation
  - Oil/grease
- Heat release
  - Fixed combustibles $\leq$ 66,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 71

N. Fire Suppression

1. Automatic

- Zone 71 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 480-V switchgear 2BB06 and 2BB07 and 120-V-ac panel 2BYC1.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 71 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.38 FIRE AREA 2-CB-LB-I

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 83.

Non-train electrical chase.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
- North - 3-h-rated barrier separates area from 2-CB-LB-P.
- West - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - 3-h-rated barrier separates area from 1-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-Q.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- Nonsafety-related spurious actuation concern cables only.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 83

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 148,101,970 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 620,425 Btu/ft^2
- Fire severity (wood equivalent) 465 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

   b. The pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   c. It may not be possible to close either letdown isolation valve LV-0459 or LV-0460 due to a fire in this fire area.

   d. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

   e. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

   f. Train B RHR heat exchanger outlet valve HV-0607 may close due to a fire in this fire area.

   g. Train B RHR heat exchanger bypass valve FV-0619 may open due to a fire in this fire area.

   h. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   i. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 83

N. Fire Suppression

1. Automatic

   - Zone 83 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE fire fighting.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.39 FIRE AREA 2-CB-LB-J

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 56B.

Train D channel 4 battery room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
  - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-C.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- West - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1806-B3-BYD - Battery 2DD1B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 56B

- Fixed combustible material
  - Cable insulation
  - Plastics
- Heat release
  - Fixed combustibles ≤ 13,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 56B

N. Fire Suppression

1. Automatic

   - Zone 56B - No zone coverage.

2. Manual

   - Zone 56B manual sprinkler system - Total zone coverage.
   - Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for

post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.40 FIRE AREA 2-CB-LB-K

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 77B.

Train C channel 3 battery room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2CB-LC-A, 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- South - 3-h-rated barrier separates area from 2-CB-LB-M.
- West - 3-h-rated barrier separates area from 2-CB-LB-L.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1806-B3-BYC - Battery 2CD1B.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 77B

- Fixed combustible material
  - Cable insulation
  - Plastics
- Heat release
  - Fixed combustibles ≤ 23,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 77B

N. Fire Suppression

1. Automatic
   - Zone 77B - No zone coverage.

2. Manual
   - Zone 77B manual sprinkler system - Total zone coverage.
   - Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

None.

9A.2.41 FIRE AREA 2-CB-LB-L

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 77A.

Train C channel 3 switchgear room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LC-B.
- West - 3-h-rated barrier separates area from 1-CB-LB-H.
- South - 3-h-rated barrier separates area from 2-CB-LB-E.
- East - 3-h-rated barrier separates area from 2-CB-LB-M, 2-CB-LB-K.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- North - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1805-Y3-IC5 - Inverter for HV8701B.
- 2-1805-S3-RHR1A - Starter for HV8701B.
- 2-1806-B3-CCA - Battery charger 2CD1CA.
- 2-1806-B3-CCB - Battery charger 2CD1CB.
- 2-1805-D3-37T - FLEX Manual Transfer Switch 2ABE37T.
- 2-1806-S3-DSC - 125-V-dc switchgear 2CD1.
- 2-1807-Q3-VI3 - Vital bus distribution panel 2CY1A.

- 2-1807-Y3-IC3 - 120-V-ac vital bus inverter 2CD1I3.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1806-Q3-DC1 - Train C 125-V-dc distribution panel 2CD11.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 77A

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 11,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:
   a. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.
   b. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 77A

N. Fire Suppression

1. Automatic

   - Zone 77A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 77A of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.42 FIRE AREA 2-CB-LB-M

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 78B.

Train A channel 1 battery room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.

  - 3-h-rated barrier separates area from 2-CB-LC-A, 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LB-K, 2-CB-LC-B.
- West - 3-h-rated barrier separates area from 2-CB-LB-L, 2-CB-LB-E.
- South - 3-h-rated barrier separates area from 2-CB-LB-N.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- TE12740 - CBSF electrical equipment AC unit A7001 CW.
- 2-1806-B3-BYA - Battery 2AD1B.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 78B

- Fixed combustible material
  - Cable insulation
  - Plastics
- Heat release
  - Fixed combustibles $\leq$ 21,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operation and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 78B

N. Fire Suppression

1. Automatic
   - Zone 78B - No zone coverage.

2. Manual

- Zone 78B manual sprinkler system - Total zone coverage.

- Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.43 FIRE AREA 2-CB-LB-N

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 78A.

Train A channel 1 switchgear room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
  - 3-h-rated barrier separates area from 2-CB-LC-A, 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LB-M.
- West - 3-h-rated barrier separates area from 2-CB-LB-E.
- South - 3-h-rated barrier separates area from 2-CB-LB-D, 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1806-B3-CAA - Battery charger 2AD1CA.
- 2-1806-B3-CAB - Battery charger 2AD1CB.
- 2-1805-D3-38T - FLEX Manual Transfer Switch 2ABE38T.
- 2-1806-S3-DCA - 125-V-dc MCC 2AD1M.
- 2-1806-S3-DSA - 125-V-dc switchgear 2AD1.
- 2-1806-Q3-DA1 - 125-V-dc distribution panel 2AD11.

- 2-1806-Q3-DA2 - 125-V-dc distribution panel 2AD12.
- 2-1807-Q3-VI1 - Vital bus distribution panel 2AY1A.
- 2-1807-Y3-IA1 - 120-V-ac vital bus inverter 2AD1I1.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 78A

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	≤ 30,400,000 Btu
- Transient combustibles	800,000 Btu
• Combustible loading	≤ 80,000 Btu/ft^2
• Fire severity (wood equivalent)	≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV, PV-0455A, may open due to a fire in this fire area.

   b. Safety injection actuation may occur due to fire damage to solid state protection cabinet, 2-1605-Q5-SPA, 125-V-dc power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 78A

N. Fire Suppression

1. Automatic

    - Zone 78A - No zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 125-V-dc panels 2AD11, 2AD12, and 2AD1M.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression protection:

Safety-related cable trays in fire zone 78A of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at this location satisfies the accessibility and the fire detection criteria of BTP CMEB 9.5-1 Position C.5.e and the location has combustible loading of less than 100,000 Btu/ft^2 which is considered low by the NFPA Fire Protection Handbook (page 5-92 in the 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one

train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9A.2.44 FIRE AREA 2-CB-LB-O

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 56A.

Train D channel 4 switchgear room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A, 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LB-D.
- West - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - 3-h-rated barrier separates area from 2-CB-LB-P.
- East - 3-h-rated barrier separates area from 2-CB-LB-C, 2-CB-LB-Q.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- North - Class A door from 2-CB-LB-D.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- 2-1805-Y3-ID6 - Inverter for HV8702A.
- 2-1805-S3-RHR2A - Starter for HV8702A.
- 2-1806-B3-CDA - Battery charger 2DD1CA.
- 2-1806-B3-CDB - Battery charger 2DD1CB.
- 2-1805-D3-39T - FLEX Manual Transfer Switch 2BBE39T.
- 2-1807-Q3-VI4 - Vital bus distribution panel 2DY1B.

- 2-1807-Y3-ID4 - 120-V-ac vital bus inverter 2DD1I4.
- 2-1806-S3-DSD - 125-V-dc switchgear 2DD1.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1806-Q3-DD1 - Train D 125-V-dc distribution panel 2DD11.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 56A

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 10,400,00 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   Pressurizer PORV PV-0456A may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 56A

N. Fire Suppression

1. Automatic

- Zone 56A - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.45 FIRE AREA 2-CB-LB-P

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 152.

Train B electrical room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
- North - 3-h-rated barrier separates area from 2-CB-LB-O, 2-CB-LC-B.
- West - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - 3-h-rated barrier separates area from 2-CB-LB-I, 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B, 2-CB-LB-C.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-R.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 152

- Fixed combustible material
    - Cable insulation
- Heat release
    - Fixed combustibles 70,722,660 Btu
    - Transient combustibles 800,000 Btu
- Combustible loading 280,481 Btu/ft^2
- Fire severity (wood equivalent) 210 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   c. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   d. Safety injection actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPB 125-V-dc power feeder circuits in this fire area.

   e. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 152

N. Fire Suppression

1. Automatic

- Zone 152 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

   None.

P. Ventilation

   This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

   A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

   8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

   None.

9A.2.46 FIRE AREA 2-CB-LB-Q

A. Location: Control Building, Level B.

B. Figure: 9A-18.

C. Description: Includes fire zone 79B.

Train B channel 2 battery room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
  - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LC-B, 2-CB-LB-D.
- West - 3-h-rated barrier separates area from 2-CB-LB-0.
- South - 3-h-rated barrier separates area from 2-CB-LB-C.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LC-B.

E. Area Access

- East - Class A door from 2-CB-LC-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed barrier rating.

H. Safe Shutdown Components

- TE12725 - CBSF electrical equipment air conditioning unit A7002 CW.
- 2-1806-B3-BYB - Battery 2BD1B.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

None.

K. Combustible Loading

Zone No. 79B

- Fixed combustible material
  - Plastics
- Heat release

- Fixed combustibles	$\leq$ 18,400,000 Btu
- Transient combustibles	800,000 Btu

• Combustible loading	$\leq$ 80,000 Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 79B

N. Fire Suppression

1. Automatic
   - Zone 79B - No zone coverage.
2. Manual
   - Zone 79B manual sprinkler system - Total zone coverage.
   - Hose stations (with portable extinguishers) are conveniently

located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.47 FIRE AREA 2-CB-LB-T

A. Location: Control Building, Level B

B. Figure: 9A-18

C. Description: Includes fire zones 61, 64 train A penetration room, MCC room.

D. Description of Boundaries:

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-D.
- West - Unrated below grade exterior area boundary.
- South - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 2-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 2-CB-LA-B, 2-CB-LA-C.

E. Area Access

- North - Class A door from 2-CB-LB-D.
  - Class A door from 2-CB-LB-A (el 192 ft-6 in.)

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HY0442A - HV0442A I/power converter.
- HY0943A - HV0943A I/power converter.
- 2-1602-P5-NFA - R.G. 1.97 neutron flux amplifier panel.
- 2-1805-S3-ABE - Class 1E 480-V MCC 2ABE.
- Train A safe shutdown cables.

I. Safety Related Equipment

- 2-1807-Y3-15 - Regulated transformer 2ABE51RX.
- 2-1807-Y3-RX25 - Regulated transformer 2ABC20RX.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 61

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤ 158,400,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 80,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 64

   - Fixed combustible material
     - Cable insulation
     - Oil/grease
   - Heat release
     - Fixed combustibles ≤ 21,200,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operation and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Automatic staring of the train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

   d. Automatic starting of the train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

   e. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

   f. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

   g. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 61
- Zone 64

N. Fire Suppression

1. Automatic

   - Zone 61 Preaction sprinkler system - Total zone coverage.
   - Zone 64 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation (except room B92). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

See section 9A.2.76.S.1.

2. Safety-related cable trays without automatic fire suppression.

Safety-related cable trays in fire zone 64 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.48 Fire Area 2-CB-LB-X

A. Location: Control Building, Levels B, A, 1, 2, 3, 4

B. Drawings: AX4DJ8023, AX4DJ8025, AX4DJ8026, AX4DJ8027, AX4DJ8028, and AX4DJ8029

C. Description: Includes fire zone 200 Stairwell No. 1

D. Description of Boundaries

1. Level B

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LB-A.
- West - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-H.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LC-B.
  - 2-h-rated barrier separates area from elevator no. 1.

2. Level A

- North - 3-h-rated barrier separates area from 2-CB-LA-N.
- West - 3-h-rated barrier separates area from 2-CB-LA-G.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 2-CB-LA-S.
  - 2-h-rated barrier separates area from elevator no. 1.

3. Level 1

- North - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-CB-L1-B.
  - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-L1-B.
  - 2-h-rated barrier separates area from elevator no. 1.

4. Level 2

- North - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 1-CB-L2-E.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-L2-E.
  - 2-h-rated barrier separates area from elevator no. 1.

5. Level 3

- North - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LC-B.
- East - 3-h-rated barrier separates area from 1-CB-L3-H.
  - 2-h-rated barrier separates area from elevator no. 1.

6. Level 4

- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - 2-h-rated barrier separates area from elevator no. 1.
  - Unrated exterior area boundary.

7. Internal

- Cable trays protected for life safety considerations only.

E. Area Access

1. Level B

- North - Class B door from 2-CB-LB-A.

2. Level A

   - North - Class B door from 2-CB-LA-N.

3. Level 1

   - East - Class A door from 1-CB-L1-B.

4. Level 2

   - East - Class B door from 1-CB-L2-E.

5. Level 3

   - East - Class B door from 1-CB-L3-H.
   - West - Exterior door.

6. Level 4

   - East - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- Train A safe shutdown cables.

I. Safety-related Equipment

- Train A safety-related cables.

J. Nonsafety-related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone 200

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles $\leq$ 13,600,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open due to a fire in this area.

   b. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

   c. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   e. Train A motor-driven auxiliary feed water pump 2-1302-P4-003 may start due to a fire in this fire area.

   f. The turbine driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   g. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 200

N. Fire Suppression

1. Automatic

   - Zone 200 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides an alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated, or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire area is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix B, Section C.5.a.(1).

2. Class B door in 3-h-rated fire area boundary:

Fire area 2-CB-LB-X (fire zone 200) is a stairwell interconnecting all levels of the control building.Stairwells are typically enclosed in 2-h-rated fire barriers for access and egress considerations and are not associated with any specific fire area. Stairwells usually do not contain safe shutdown related equipment or cables but because of the location of this stairwell in Unit 2, train A safe shutdown cables must transverse the stairwell at Level A. Rather than protect the raceway in the stairwell with a 3-h-rated enclosure, which would have created a concealed combustibles situation (cables not accessible for firefighting), the barriers forming the stairwell have been upgraded to be 3 h rated. Four class B labeled fire doors (levels A, B, 2 and 3) providing access to the stairwell from the adjoining fire areas have not been upgraded to 3 h rated.

The class B labeled fire door at level 2 is the only non-3-h-rated fire door that separates the train A safe shutdown cables in the stairwell from adjoining fire areas containing train B safe shutdown equipment and/or cables. The adjoining level 2 fire area is 1-CB-L2-E and contains both train B safe shutdown equipment and electrical cables. Fire area 1-CB-L2-E is provided with a fire detection system (as is fire area 2-CB-LB-X) and is

provided with an automatic fire suppression system in the vicinity of the train B safe shutdown equipment and electrical cables and in the immediate vicinity of the class B labeled fire door. This class B labeled fire door, in conjunction with the existence of an automatic fire suppression system and a fire detection system in fire area 1-CB-L2-E in the vicinity of the door provides protection equivalent to a 3-h-rated fire barrier.

Therefore, modification of the facility to provide additional class A labeled fire doors in the 3-h-rated barriers for fire area 2-CB-LB-X at levels A, B, 2, and 3 would not significantly increase the level of protection provided by the existing design.

3. Safety-related cable trays without automatic fire suppression.

Safety-related cable trays in fire zone 200 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. This fire zone is provided with fire detectors and the cable trays are encapsulated in 1-h-rated fire proofing material for life safety considerations. This fire area is an access/egress stairwell and is essentially devoid of combustible material. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9A.2.49 FIRE AREA 2-CB-LA-A

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 101

Train A HVAC room, corridor

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-D.
- North - 3-h-rated barrier separates area from 1-CB-LA-N, 1-CB-LA-S.
- West - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LA-B, 2-CB-LA-C.
- East - 3-h-rated barrier separates area from 2-CB-LA-D.
- Ceiling - Unrated exterior area boundary.

  - 3-h-rated barrier separates area from 2-AFB-C.

E. Area Access

- North - Class A door from 2-CB-LA-N.
- South - Class A door from 2-CB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT0524 - S/G 2 pressure.
- PT0526 - S/G 2 pressure.
- Train A safe shutdown cables. (Spurious actuation concerns and separation concerns eliminated by the operational considerations of

paragraph L.)

- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 101

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 60,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   The main feedwater isolation and bypass valves for steam generators 2 and 3 can be closed from the control room using switches HS-5228B, HS-5229B, HS-15197A, and HS-15198A. The train B electrical circuits associated with these switches are not subject to fire damage in this fire area.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

c. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 101

N. Fire Suppression

1. Automatic

- Zone 101 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixtures(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.50 FIRE AREA 2-CB-LA-B

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 89

Train A electrical penetration area

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-T.
- North - 3-h-rated barrier separates area from 2-CB-LA-A.
- West - 3-h-rated barrier separates area from 2-CB-LA-C.
  - Unrated below-grade exterior area boundary.
- South - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 2-CB-LA-D.
- Ceiling - 3-h-rated barrier separates area from 2-EB-B.

E. Area Access

- North - Class A door from 2-CB-LA-A.
- West - Two class A doors from 2-CB-LA-C.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PT0525 - S/G 2 Pressure.
- PT3010 - Atmospheric dump valve pressure transmitter.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 2-1805-Q3-PB4 - 480-V-ac distribution panel 2NBPB4.
- 2-1807-Q3-002 - 120-V distribution panel 2NY02.
- 2-1808-T3-094 - Distribution transformer 2NBPB419X.

K. Combustible Loading

Zone No. 89

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 175,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 89

N. Fire Suppression

1. Automatic

- Zone 89 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry stand pipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See Section 9A.2.76.S.1.

9A.2.51 FIRE AREA 2-CB-LA-C

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 90 and 159

Switchgear and MCC room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-T.
- North - 3-h-rated barrier separates area from 2-CB-LA-A.
- West - Unrated below-grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LA-B.
- East - 3-h-rated barrier separates area from 2-CB-LA-B.
- Ceiling - 3-h-rated barrier separates area from 2-EB-B.

E. Area Access

- East - Two class A doors from 2-CB-LA-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

- 2-1825-S3-AAA - Train A 13.8-kV RCP switchgear 2AAA.
- 2-1825-S3-BAB - Train B 13.8-kV RCP switchgear 2BAB.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1805-S3-NBE - 480-V MCC 2NBE.
- 2-1805-Q3-OPC - 480-V pressurizer heater panel controller 2NBPC.
- 2-1615-D3-001 - Supply to EHC system transfer switch.
- 2-1201-P5-PHC - Pressurizer heater controller.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 90

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 26,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 159

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 29,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 90
- Zone 159

N. Fire Suppression

1. Automatic

   - Zone 90 - No zone coverage.
   - Zone 159 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provides safe ingress/egress of personnel.

S. Deviations and Justifications

Embedded conduits:

Conduits 2BE373RL008, 2BE373RS009, and 2BE373RX011 are embedded in the ceiling of fire zones 90 and 159 of this fire area. These conduits contain cables which could change the results of the safe shutdown analysis as presented in Paragraph L if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 4.3 in. of concrete coverage over the conduit can be verified to exist.

Modification of the facility to relocate the cables in these embedded conduits or to otherwise provide additional protection is not warranted because the minimum concrete coverage over the conduits (equivalent to approximately 110 minutes of protection per figure 5-8F of the NFPA Fire Protection Handbook - Fifteenth Edition) provides a margin of safety of at least 100-percent above the calculated combustible loading for the location.

9A.2.52 FIRE AREA 2-CB-LA-D

A. Location: Control Building, level A, level 1

B. Drawings: AX4DJ8025 and AX4DJ8044

C. Description: Includes fire zones 99 and 104

Feedwater valve area, main steam valve area

D. Description of Boundaries

1. Level A

- Floor - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-D.
- North - 3-h-rated barrier separates area from 2-CB-LA-N.
- West - 3-h-rated barrier separates area from, 2-CB-LA-N, 2-CB-LA-A, 2-CB-LA-B.
- South - Unrated barrier separates area from 2-CTB.
- East - 3-h-rated barrier separates area from 2-CB-LA-H, 2-CB-LA-I, 2-CB-LA-T, 2-CB-LB-G.

2. Level 1

- North - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-EB-B.
- South - Unrated barrier separates area from 2-CTB.
- East - 3-h-rated barrier separates area from 2-AB-L2-A, 1-CB-L1-B.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- Level 1 - Open passage to yard.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PSV3011 - S/G 2 code safety valve.
- PSV3012 - S/G 2 code safety valve.
- PSV3013 - S/G 2 code safety valve.
- PSV3014 - S/G 2 code safety valve.
- PSV3015 - S/G 2 code safety valve.
- PSV3021 - S/G 3 code safety valve.
- PSV3022 - S/G 3 code safety valve.
- PSV3023 - S/G 3 code safety valve.
- PSV3024 - S/G 3 code safety valve.
- PSV3025 - S/G 3 code safety valve.
- HV3016A - S/G 2 main steam isolation valve.
- HV3016B - S/G 2 main steam isolation valve.
- HV3026A - S/G 3 main steam isolation valve.
- HV3026B - S/G 3 main steam isolation valve.
- HV5228 - S/G 2 feedwater isolation valve.
- HY5228A - S/G feedwater isolation valve solenoid.
- HY5228B - S/G feedwater isolation valve solenoid.
- HY5228C - S/G feedwater isolation valve solenoid.
- HY5228D - S/G feedwater isolation valve solenoid.
- HY5228G - S/G feedwater isolation valve solenoid.
- HY5228H - S/G feedwater isolation valve solenoid.
- HY5228J - S/G feedwater isolation valve solenoid.

- HY5228K - S/G feedwater isolation valve solenoid.
- HV5229 - S/G 3 feedwater isolation valve.
- HY5229A - S/G feedwater isolation valve solenoid.
- HY5229B - S/G feedwater isolation valve solenoid.
- HY5229C - S/G feedwater isolation valve solenoid.
- HY5229D - S/G feedwater isolation valve solenoid.
- HY5229G - S/G feedwater isolation valve solenoid.
- HY5229H - S/G feedwater isolation valve solenoid.
- HY5229J - S/G feedwater isolation valve solenoid.
- HY5229K - S/G feedwater isolation valve solenoid.
- HV5132 - Auxiliary feedwater pump B to S/G 2 valve.
- HV5134 - Auxiliary feedwater pump B to S/G 3 valve.
- PV3010 - S/G 2 atmospheric dump valve.
- PV3020 - S/G 3 atmospheric dump valve.
- HV13007A - S/G 2 steam isolation bypass valve.
- HY13007A - S/G 2 steam isolation bypass valve solenoid.
- HV13007B - S/G 2 steam isolation bypass valve.
- HY13007B - S/G 2 steam isolation bypass valve solenoid.
- HV13008A - S/G 3 steam isolation bypass valve.
- HY13008A - S/G 3 steam isolation bypass valve solenoid.
- HV13008B - S/G 3 steam isolation bypass valve.
- HY13008B - S/G 3 steam isolation bypass valve solenoid.
- HV15197 - S/G 2 feedwater isolation valve.
- HY15197A - S/G 2 feedwater isolation valve solenoid.
- HY15197B - S/G 2 feedwater isolation valve solenoid.

- HV15198 - S/G 3 feedwater isolation valve.
- HY15198A - S/G 3 feedwater isolation valve solenoid.
- HY15198B - S/G 3 feedwater isolation valve solenoid.
- Train A safe shutdown cables. (Separation concerns eliminated by the operational considerations of paragraph L.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV5125 - Turbine-driven AFW pump to steam generator No. 2.
- HV5127 - Turbine-driven AFW pump to steam generator No. 3.
- LV5244 - Steam generator 2 startup control.
- LV5245 - Steam generator 3 startup control.
- FV0530 - Steam generator 3 feedwater valve.
- FV0520 - Steam generator 2 feedwater valve.
- HV5195 - Wet layup chemical addition steam generator No. 2.
- HV5196 - Wet layup chemical addition steam generator No. 3.
- HV3019 - Steam generator outlet to auxiliary feedwater turbine.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1556-B7-007 - Restraint cooling fan.
- 2-1556-B7-008 - Restraint cooling fan.
- 2-1556-B7-009 - Restraint cooling fan.
- 2-1556-B7-010 - Restraint cooling fan.

K. Combustible Loading

1. Zone No. 104

   - Fixed combustible material

- Oil/grease
- Plastics

- Heat release

  - Fixed combustibles ≤ 69,000,000 Btu
  - Transient combustibles 4,400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 99

- Fixed combustible material

  - Oil/grease
  - Plastics

- Heat release

  - Fixed combustibles ≤ 98,340,000 Btu
  - Transient combustibles 860,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational considerations:

   a. In all postulated cases for fire, the main steam isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, steam flow from steam generators 2 and 3 may require isolation by other means to preclude uncontrolled cooldown and steam generator boil dry.

   b. In all postulated cases for fire, the main feedwater isolation valves and their bypass valves will fail close, or one train will be available for automatic or manual isolation. If fire damage does result in inoperable valves, main feedwater flow to steam generators 2 and 3 may require isolation by other means to preclude uncontrolled cooldown and steam generator overfilling.

3. Spurious actuation concerns:

   a. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   c. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 99
- Zone 104

N. Fire Suppression

1. Automatic

   - Zone 99 - No zone coverage.
   - Zone 104 - No zone coverage.

2. Manual

   Hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to locally manually operate PY-3010B, PY-3020B, PV-3010 and PV-3020 operation, and HV-3019.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Section 9B, Section C.5.a.(1).

2. Unrated containment building fire area boundary:

   See Section 9A.2.76.S.1.

9A.2.53 FIRE AREA 2-CB-LA-F

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 84

Electrical tunnel

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
  - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-CB-LC-A, 1-CB-LA-E.
  - Unrated below grade exterior area boundary.
- West - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LA-N.
- East - 3-h-rated barrier separates area from 1-CB-LA-F.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- North - Certified class A door from 2-CB-LC-A.
- South - Three class A doors from 2-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Equipment

None.

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 84

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 275,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of safe shutdown capability

1. For a fire in this area, use safe shutdown Train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may start due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 84

N. Fire Suppression

1. Automatic

   - Zone 84 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated Exterior Fire Area Boundary:

   See Appendix 9B, Section C.5.a.(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a.(5).

9A.2.54 FIRE AREA 2-CB-LA-G

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 91 and 103

Train A 4.16-kV switchgear room, train A shutdown room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LB-H, 2-CB-LB-D, 2-CB-LB-F.
- North - 3-h-rated barrier separates area from 2-CB-LA-N.
  - 2-h-rated barrier separates area from stairwell No. 4.
- West - 3-h-rated barrier separates area from 2-CB-LA-H.
- South - 3-h-rated barrier separates area from 2-CB-LA-H.
- East - 3-h-rated barrier separates area from 2-CB-LA-X, 2-CB-LC-B, 2-CB-LB-X.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B.

E. Area Access

- North - Two class A doors from 2-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1804-S3-A02 - Class 1E 4-kV switchgear 2AA02.
- 2-1804-W3-CB700 - Diesel generator A cable bus.
- 2-1623-D5-002 - Remote processing Unit A2.
- 2-1605-P5-SDA - Shutdown panel 2ACPSDA.
- 2-1623-D5-006A - Display processing Unit A Regulatory Guide 1.97

cabinet.

- 2-1821-U3-001 - Sequencer board 2ACPSQ1.
- Train A safe shutdown cables.
- Train B safe shutdown cables. (Cable damage will not preclude the ability to achieve safe shutdown.)

I. Safety-Related Equipment

- HV12713A - Train A shutdown room smoke exhaust damper.
- HV12731 - Train A CBSF electrical equipment smoke exhaust damper.
- HV12713B - Train A shutdown room smoke exhaust damper.
- 2-1623-D5-001 - Remote processing Unit A1.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 91

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 128,800,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 103

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles ≤ 44,800,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading ≤160,000 Btu/ft^2

- Fire severity (wood equivalent) ≤120 min

L. Evaluation of safe shutdown capacity

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. It may not be possible to close either letdown isolation valve LV-0459 and LV-0460 due to a fire in this fire area.

   c. Pressurizer spray valve PV-0455B may open due to a fire in this fire area.

   d. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve PV-3000 may open due to fire in this fire area.

   f. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   g. CVCS volume control tank outlet valve LV-0112B may close due to fire in this fire area.

   h. CVCS charging, pump common mini-flow valve HV-8110 may close due to a fire in this fire area.

   i. Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may start due to a fire in this fire area.

   j. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   k. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to the under voltage relay LOP signal circuits in this fire area.

l. Reactor vessel head letdown path valves HV-8095A, HV-8096A and HV-0442A may all open due to a fire in this fire area.

m. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

n. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 91
- Zone 103

N. Fire Suppression

1. Automatic

   - Zone 91 preaction sprinkler system - No zone coverage.
   - Zone 103 Halon suppression system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 4.16-kV switchgear 2AA02 and control the plant shutdown from remote shutdown panel A.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 91 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.55 FIRE AREA 2-CB-LA-H

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 92.

Train B 4.16-kV switchgear room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-H, 2-CB-LB-D, 2-CB-LB-F, 2-CB-LB-A.
- North - 3-h-rated barrier separates area from 2-CB-LA-G, 2-CB-LA-N.
- West - 3-h-rated barrier separates area from 2-CB-LA-D.
- South - 3-h-rated barrier separates area from 2-CB-LA-I.
- East - 3-h-rated barrier separates area from 2-CB-LA-X, 2CB-LA-G.
  - 2-h-barrier separates area from stairwell No. 4.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B.

E. Area Access

- North - Class A door from 2-CB-LA-N.
- South - Two class A doors from 2-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- 2-1804-S3-A03 - Class 1E 4-kV switchgear 2BA03.
- 2-1804-W3-CB800 - Diesel generator B cable bus.
- 2-1816-U3-018 - Auxiliary relay panel 2BCPAR9.
- 2-1821-U3-002 - Sequencer board 2BCPSQ2.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12716 - Train B electrical equipment smoke exhaust damper.

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 92

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles ≤184,600,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to fire in this fire area.

   b. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   c. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to the under voltage relay LOP signal circuits in this fire area.

   d. Deleted.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 92

N. Fire Suppression

1. Automatic

    - Zone 92 - No zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to operate breakers in 4.16-kV switchgear 2BA03.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 92 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting.

Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.56 FIRE AREA 2-CB-LA-I

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 88 and 93.

Train B: penetration area and corridor.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B, 2-AB-L2-A.
- North - 3-h-rated barrier separates area from 2-CB-LA-H.
- West - 3-h-rated barrier separates area from 2-CB-LA-D, 2-CB-LA-T, 2-CB-LA-J, 2-CB-LB-G, 2-AB-L2-A.
  - Unrated barrier separates area from 2-CTB.
- South - 3-h-rated barrier separates area from 2-FB-LC-A.
- East - 3-h-rated barrier separates area from 1-CB-LA-U, 2-CB-LA-K, 2-CB-LA-X, 2-CB-LA-L, 2-CB-LA-R, 2-CB-LA-Q, 1-CB-LB-S.
- Interior - 3-h-rated barrier separates fire zone 88 from fire zone 93 and room A14 from room A13 for fire suppression system design considerations only.

E. Area Access

- North - Two class A doors from 2-CB-LA-H.
- West - Two class A doors from 2-CB-LA-T.
  - Class A door from 2-CB-LA-J.
- East - Class A door from 2-CB-LA-K, 2-CB-LA-L.
- Interior - Class A door separates fire zone 88 from fire zone 93 and room A14 from room A13 for fire suppression system design considerations only.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Equipment

- 2-1804-W3-CB800 - Diesel generator B cable bus.
- PT0534 - S/G 3 pressure transmitter.
- PT0536 - S/G 3 pressure transmitter.
- Train A safe shutdown cables. (Spurious actuation concerns only.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12753A - Train B shutdown room smoke exhaust damper.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 88

- Fixed combustible material
  - Cable insulation
- Heat Release
  - Fixed combustibles $\leq$ 94,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

2. Zone No. 93

- Fixed combustible material
  - Cable insulation

- Heat Release

  - Fixed combustibles ≤ 356,200,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 200,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 150 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations.

   a. Pressurizer PORV, PV-0456A, may open and it may may not be possible to close block valve, HV-8000B, due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   c. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

   d. CVCS volume control tank outlet valve LV-0112C may close due to fire in this fire area.

   e. CVCS train A charging pump mini-flow valve HV-8111A may close due to a fire in this fire area.

   f. The train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   g. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

   h. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

   i Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   j. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

   k. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this fire area.

l. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits.

m. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

n. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

o. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

p. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 88
- Zone 93

N. Fire Suppression

1. Automatic

   - Zone 88 preaction sprinkler system - Total zone coverage.
   - Zone 93 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See Section 9A.2.76.S.1.

9A.2.57 FIRE AREA 2-CB-LA-J

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 158.

Motor control center room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-D.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.
- North - 3-h-rated barrier separates area from 2-CB-LA-I.
- South - 3-h-rated barrier separates area from 2-CB-LA-I.
- West - 3-h-rated barrier separates area from 2-CB-LA-T.
- East - 3-h-rated barrier separates area from 2-CB-LA-I.

E. Area Access

- East - Class A door from 2-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1805-S3-BBE - Class 1E 480-V MCC 2BBE.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 158

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 20,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 80,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 158

N. Fire Suppression

1. Automatic

   - Zone 158 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 158 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.58 FIRE AREA 2-CB-LA-K

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 95 and 169.

Train A cable spreading room, corridor.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LB-A, 2-CB-LC-B, 2-CB-LB-D, 2-CB-LB-C, 2-CB-LB-J, 2-CB-LB-K, 2-CB-LB-M, 2-CB-LB-N, 2-CB-LB-Q, 2-CB-LB-E.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B, 1-CB-L1-A.
- North - 3-h-rated barrier separates area from 2-CB-LA-N, 2-CB-LA-O, 2-CB-LA-P.
- South - 3-h-rated barrier separates area from 1-CB-LA-U, 2-CB-LA-M.
- West - 3-h-rated barrier separates area from 2-CB-LA-I, 2-CB-LA-L, 2-CB-LA-R, 2-CB-LA-Q, 2-CB-LA-X.
- East - 3-h-rated barrier separates area from 1-CB-LA-K.

E. Area Access

- West - Class A door from 2-CB-LA-I, 2-CB-LA-R, 2-CB-LA-X.
  - Two Class A doors from 2-CB-LA-Q.
- East - Class A door from 1-CB-LA-K, 2-CB-LA-M.
- North - Class A door from 2-CB-LA-N.
  - Two Class A doors from 2-CB-LA-O, 2-CB-LA-P.
- South - Class A door form 1-CB-LA-U.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1601-U3-T03 - Termination cabinet 2ACPT03.
- 2-1601-U3-T27 - Termination cabinet 2ACPT27.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1601-U3-T01 - Termination cabinet 2NCPT01.
- 2-1601-U3-T05 - Termination cabinet 2ACPT05.
- 2-1601-U3-T07 - Termination cabinet 2ACPT07.
- 2-1601-U3-T09 - Termination cabinet 2NCPT09.
- 2-1601-U3-T11 - Termination cabinet 2ACPT11.
- 2-1601-U3-T15 - Termination cabinet 2ACPT15.
- 2-1601-U3-T19 - Termination cabinet 2CCPT19.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- 2-1601-U3-T13 - Termination cabinet 2NCPT13.
- 2-1601-U3-T17 - Termination cabinet 2NCPT17.
- 2-1601-U3-T21 - Termination cabinet 2NCPT21.
- 2-1601-U3-T23 - Termination cabinet 2NCPT23.
- 2-1601-U3-T25 - Termination cabinet 2NCPT25.
- HV12825B - Computer room ventilation isolation damper.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 95

   - Fixed combustible material

     - Cable insulation
     - Rubber goods

- Heat release

  - Fixed combustibles ≤ 2,090,009,477 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 440,339 Btu/ft^2

- Fire severity (wood equivalent) ≤ 331 min

2. Zone No. 169

   - Fixed combustible material

     - Cable insulation

   - Heat release

     - Fixed combustibles ≤ 72,400,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 240,000 Btu/ft^2

   - Fire severity (wood equivalent) 180 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   Fire damage to instrument cables associated with the train B RCS wide-range pressure transmitter PT-0403 may necessitate use of control room RCS pressure indicator PI-0418.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this area.

   b. Pressurizer PORV PV-0456A may open due to a fire in this fire area.

   c. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   d. It may not be possible to close either letdown isolation valve LV-0459 or LV-0460 due to fire in this fire area.

   e. Pressurizer spray valve PV-0455B may open due to a fire in this fire area.

f. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

g. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

h. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

i. CVCS volume control tank outlet valve LV-0112B may close due to fire in this fire area.

j. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

k. Train B RHR heat exchanger outlet valve HV-0607 may close due to a fire in this fire area.

l. Train B RHR heat exchanger bypass valve FV-0619 may open due to a fire in this fire area.

m. Train A motor-driven auxiliary feed water pump 2-1302-P4-003 may start due to a fire in this fire area.

n. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

o. Automatic starting of the Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

p. Automatic starting of the Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

q. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

r. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

t. Safety injection actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

u. Safety injection actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPA 125-V-dc power feeder circuits in this fire area.

v. Containment spray actuation may occur due to fire damage to the containment pressure circuits in this fire area.

x. Containment spray actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

y. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

z. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPA 120-V-ac power feeder circuits in this fire area.

aa. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPB 120-V-ac power feeder circuits in this fire area.

bb. Reactor vessel head letdown path valves HV-8095A HV-8096A and HV-0442A may all open due to a fire in this fire area.

cc. Excess letdown valves HV-8153, HV-8154, and HV-0123 may all open due to a fire in this fire area.

dd. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 95
- Zone 169

N. Fire Suppression

1. Automatic

   - Zone 95 preaction sprinkler system - Partial zone coverage.
   - Zone 169 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.59 FIRE AREA 2-CB-LA-L

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 98.

Train B shutdown room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LB-D, 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B, 2-CB-LA-R.
- North - 3-h-rated barrier separates area from 2-CB-LA-K.
- South - 3-h-rated barrier separates area from 2-CB-LA-R.
- West - 3-h-rated barrier separates area from 2-CB-LA-I.
- East - 3-h-rated barrier separates area from 2-CB-LA-K.

E. Area Access

- West - Class A door from 2-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1605-P5-SDB - Shutdown panel 2BCPSDB.
- Train A safe shutdown cables. (Cable damage will not preclude the ability to achieve safe shutdown.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- HV12753B - Train B shutdown room ventilation isolation damper.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 98

- Fixed combustible material
  - Cable insulation
- Heat Release
  - Fixed combustibles ≤ 56,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 120,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 90 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Main steam atmospheric damp valve PV-3010 may open due to a fire in this fire area.

   c. Main steam atmospheric damp valve PV-3020 may open due to a fire in this fire area.

   d. CVCS volume control tank outlet valve LV-0112C may close due to fire in this fire area.

   e. CVCS Train A charging pump miniflow valve HV-8111A may close due to fire in this fire area.

   f. The Train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   g. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this fire area.

h. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

i. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

j. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

k. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 98

N. Fire Suppression

1. Automatic

   - Zone 98 Halon system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide the capability to control the plant shutdown from remote shutdown panel B.

S. Deviations and Justifications

None.

9A.2.60 FIRE AREA 2-CB-LA-M

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 96.

Computer room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LC-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B.
- North - 3-h-rated barrier separates area from 2-CB-LA-K.
- South - 3-h-rated barrier separates area from 1-CB-LA-U.
- West - 3-h-rated barrier separates area from 2-CB-LA-K.
- East - 3-h-rated barrier separates area from 1-CB-LA-M.
- Cable trays in the concealed ceiling space are provided with solid covers and bottoms to limit the combustion rate and intensity of a fire should one occur.

E. Area Access

- West - Class A door from 2-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- H12825A - Computer room ventilation/smoke exhaust isolation damper.

- Computer cabinets and equipment.

K. Combustible Loading

Zone No. 96

- Fixed combustible material
  - Cable insulation
  - Cellulosic materials
  - Plastics
- Heat release
  - Fixed combustibles $\leq$ 308,146,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 363,465 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 273 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:
   a. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.
   b. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.
   c. Deleted.
   d. Deleted.
   e. Deleted.
   f. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 96

N. Fire Suppression

1. Automatic

   - Zone 96 Halon system - Partial zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation (except room A31). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.61 FIRE AREA 2-CB-LA-N

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 85 and 86.

East - west, and north-south corridors

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LB-A.
- Ceiling - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 2-CB-LA-F.
  - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-LA-K, 2-CB-LA-O, 2-CB-LA-P, 2-CB-LA-D, 2-CB-LA-G, 2-CB-LA-H, 2-CB-LA-A, 2-CB-LB-X, 2-CB-LA-S.
  - 2-h-rated barrier separates area from stairwell No. 4, elevator No. 1.
- West - Unrated below grade exterior fire area boundary.
- East - 3-h-rated barrier separates area from 1-CB-LA-N.

E. Area Access

- North - Three Class A doors from 2-CB-LA-F.
- South - Two Class A doors from 2-CB-LA-G.
  - Class A door from 2-CB-LA-A, 2-CB-LA-K, 2-CB-LA-S, 2-CB-LA-H.
  - Certified Class A door from stairwell No. 4.
  - Class B door from 2-CB-LB-X.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1804-W3-CB700 - Diesel generator A cable bus.
- FT-0520 - S/G 2 feedwater flow (AMSAC)
- FT-0521 - S/G 2 feedwater flow (AMSAC)
- FT-0530 - S/G 3 feedwater flow (AMSAC)
- FT-0531 - S/G 3 feedwater flow (AMSAC)
- Train A safe shutdown cables.

I. Safety-Related Equipment

- AHV12810B - CB cable spread room air conditioning unit damper.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 85

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	701,693,230 Btu
- Transient combustibles	800,000 Btu

• Combustible loading	548,823 Btu/ft^2
• Fire severity (wood equivalent)	412 min

2. Zone No. 86

   - Fixed combustible material
     - Cable insulation
   - Heat release

- Fixed combustibles	$\leq$ 180,000,000 Btu
- Transient combustibles	800,000 Btu

- Combustible loading ≤160,000 Btu/ft^2
- Fire severity (wood equivalent) ≤120 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this area.

   b. It may not be possible to close either letdown isolation valve LV-0459 or LV-0460 due to a fire in this fire area.

   c. Pressurizer spray valve PV-0455B may open due to a fire in this fire area.

   d. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

   e. CVCS volume control tank outlet valve LV-0112B may close due to fire in this fire area.

   f. Train A motor-driven auxiliary feed water pump 2-1302-P4-003 may start due to a fire in this fire area.

   g. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

   h. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 85

- Zone 86

N. Fire Suppression

1. Automatic

   - Zone 85 preaction sprinkler system - Total zone coverage.

   - Zone 86 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, Section C.5.a(1).

2. Unlabeled door:

   See Appendix 9B, Section C.5.a(5).

3. Class B door separating fire areas:

   See Section 9A.2.48.S.2.

9A.2.62 FIRE AREA 2-CB-LA-0

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 174.

Normal electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 2-CB-L1-E.
- North - 3-h-rated barrier separates area from 2-CB-LA-N.
- South - 3-h-rated barrier separates area from 2-CB-LA-K.
- West - 3-h-rated barrier separates area from 2-CB-LA-P.
- East - 3-h-rated barrier separates area from 2-CB-LA-K.

E. Area Access

- South - Two Class A doors from 2-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

Nonsafety-related spurious actuation concern cables only.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 174

- Fixed combustible material

  - Cable insulation

- Heat release

  - Fixed combustibles 152,020,260 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading 926,183 Btu/ft^2

- Fire severity (wood equivalent) 695 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to fire in this fire area.

   b. Pressurizer spray valve, PV-0455B, may open due to a fire in this fire area.

   c. Train A RHR heat exchanger outlet valve, HV-0606, may close due to a fire in this fire area.

   d. Train A RHR heat exchanger bypass valve, FV-0618, may open due to a fire in this fire area.

   e. Excess letdown valves HV-8153, HV-8154, and HV-0123 may all open due to a fire in this fire area.

   f. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this area.

   g. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 174

N. Fire Suppression

1. Automatic

- Zone 174 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.63 FIRE AREA 2-CB-LA-P

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 173.

Train A electrical shaft

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LC-A.
- Ceiling - 3-h-rated barrier separates area from 2-CB-L1-F,
- North - 3-h-rated barrier separates area from 2-CB-LA-N.
- South - 3-h-rated barrier separates area from 2-CB-LA-K.
- West - 2-h-rated barrier separates area from elevator No. 1.
- East - 3-h-rated barrier separates area from 2-CB-LA-O.

E. Area Access

- South - Two Class A doors from 2-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- Train A safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 173

- Fixed combustible material
  - Cable insulation
- Heat release

- Fixed combustibles	154,076,910 Btu
- Transient combustibles	800,000 Btu

- Combustible loading 999,206 Btu/ft^2
- Fire severity (wood equivalent) 749 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   b. Pressurizer PORVs PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

   c. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

   d. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

   e. CVCS volume control tank outlet valve LV-0112B may close due to fire in this fire area.

   f. CVCS charging pump common miniflow valve HV-8110 may close due to a fire in this fire area.

   g. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

   h. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

   i. Containment spray actuation may occur due to fire damage to the

containment pressure circuits in this fire area.

j. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

k. Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may start due to a fire in this fire area.

l. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 173

N. Fire Suppression

1. Automatic

   - Zone 173 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.64 FIRE AREA 2-CB-LA-Q

A. Location: Control Building, Levels A, 1, 2

B. Drawings: AX4DJ8025, AX4DJ8026, and AX4DJ8027

C. Description: Includes fire zones 175 and 177.

Normal electrical shaft

D. Description of Boundaries:

Level A

- Floor - 3-h-rated barrier separates area from 2-CB-LB-I.
- North - 3-h-rated barrier separates area from 2-CB-LA-R.
- South - 3-h-rated barrier separates area from 1-CB-LA-U.
- West - 3-h-rated barrier separates area from 2-CB-LA-I.
- East - 3-h-rated barrier separates area from 2-CB-LA-K.

Level 1

- North - 3-h-rated barrier separates area from 2-CB-LA-R.
- South - 3-h-rated barrier separates area from 1-CB-L1-B.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-CB-L1-B.

Level 2

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-K, 1-CB-L4-A.
- North - 3-h-rated barrier separates area from 2-CB-LA-R.
- South - 3-h-rated barrier separates area from 1-CB-L2-E.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-CB-L2-E.

E. Area Access

Level A

- East - Two Class A doors from 2-CB-LA-K.

Level 1

- East - Class A door from 1-CB-L1-B.

Level 2

- East - Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- Nonsafety-related spurious actuation concern cables only.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 175

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 168,404,310 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 705,018 Btu/ft^2
- Fire severity (wood equivalent) 529 min

2. Zone 177

- Fixed combustible material
  - Cable insulation

- Rubber goods

- Heat release
  - Fixed combustibles ≤ 319,021,900 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading ≤ 1,084,142 Btu/ft^2

- Fire severity (wood equivalent) ≤ 813 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

   b. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

   c. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

   d. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

   e. Train B RHR heat exchanger outlet valve HV-0607 may close due to a fire in this fire area.

   f. Train B RHR heat exchanger bypass valve FV-0619 may open due to a fire in this fire area.

   g. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   h. Train B RHR system vent valve HV-10466 may open due to fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 175

- Zone 177

N. Fire Suppression

1. Automatic

    - Zone 175 preaction sprinkler system - Total zone coverage.

    - Zone 177 preaction sprinkler system - partial zone coverage.

2. Manual

    Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.65 FIRE AREA 2-CB-LA-R

A. Location: Control Building, Levels A, 1 and 2.

B. Drawings: AX4DJ8025, AX4DJ8026, and AX4DJ8027

C. Description: Includes fire zones 97 and 176.

Train B electrical shaft

D. Description of Boundaries:

Level A

- Floor - 3-h-rated barrier separates area from 2-CB-LB-P.
- North - 3-h-rated barrier separates area from 2-CB-LA-L.
- South - 3-h-rated barrier separates area from 2-CB-LA-Q.
- West - 3-h-rated barrier separates area from 2-CB-LA-I.
- East - 3-h-rated barrier separates area from 2-CB-LA-K.

Level 1

- North - 3-h-rated barrier separates area from 1-CB-L1-B.
- South - 3-h-rated barrier separates area from 2-CB-LA-Q.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-CB-L1-B.

Level 2

- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-K.
- North - 3-h-rated barrier separates area from 1-CB-L2-E.
- South - 3-h-rated barrier separates area from 2-CB-LA-Q.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-CB-L2-E.

E. Area Access

Level A

- East - Class A door from 2-CB-LA-K.

Level 1

- East - Class A door from 1-CB-L1-B.

Level 2

- East - Class A door from 1-CB-L2-E.
- North - Class A door from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 97

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles 230,482,230 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading 856,601 Btu/ft^2
   - Fire severity (wood equivalent) 642 min

2. Zone 176

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 254,681,930 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 740,527 Btu/ft^2
- Fire severity (wood equivalent) 555 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this area.

   b. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   c. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   d. CVCS volume control tank outlet valve LV-0112C may close due to fire in this fire area.

   e. CVCS Train A charging pump common miniflow valve HV-8111A may close due to a fire in this fire area.

   f. Train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   g. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this fire area.

   h. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to a fire in this fire area.

   i. Safety injection actuation may occur due to fire damage to solid state

protection cabinet 2-1605-Q5-SPB 125-V-dc power feeder circuits in fire area.

j. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

k. Automatic starting of the Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

l. Automatic starting of the Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

m. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

n. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

o. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

p. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

q. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

r. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

s. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPA 120-V-ac power feeder circuits in this fire area.

t. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPB 120-V-ac power feeder circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 97
- Zone 176

N. Fire Suppression

1. Automatic

- Zone 97 preaction sprinkler system - Total zone coverage.

- Zone 176 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location
can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Fire zone 176 is a vertical electrical cable chase area that encompasses two elevations (levels 1 and 2) of this fire area. This fire zone is provided with automatic sprinkler protection at level 2 and at level A (fire zone immediately below the location of concern which is the same cable chase and fire area) where manual firefighting with a charged fire hose may be difficult due to the existence of horizontal cable trays. Automatic water fire suppression protection is not provided for the safety-related cable trays at level 1 because accessibility for manual firefighting activities is very good. Smoke detectors are provided for the location, and the physical arrangement of the location would tend to preclude the storage of materials that would represent a significant hazard to the cables in the electrical cable trays. While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in this fire area. Providing automatic water

suppression protection for this location would not significantly increase the existing level of protection.

9A.2.66 FIRE AREA 2-CB-LA-S

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 100.

Train B HVAC room.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LB-B.
- North - 3-h-rated barrier separates area from the 2-CB-LA-N.
- East - 3-h-rated barrier separates area from the 2-CB-LA-N.
- South - 3-h-rated barrier separates area from 2-CB-LA-A.
- West - 3-h-rated barrier separates area from 2-CB-LA-A.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- East - Class A door from 2-CB-LA-N.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PY3010 - S/G 2 Atmospheric dump valve signal converter.
- PY3020 - S/G 3 Atmospheric dump valve signal converter.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train B safety-related cables.

J. Nonsafety-Related Equipment

Nonsafety-related cables.

K. Combustible Loading

Zone No. 100

- Fixed combustible material
  - None.
- Heat release

- Fixed combustibles	$\leq$ 37,200,000 Btu
- Transient combustibles	400,000 Btu
• Combustible loading	$\leq$ 40,000 Btu/ft^2
• Fire severity (wood equivalent)	$\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Main steam atmospheric dump valve, PV-3010, may open due to a fire in this fire area.

   b. Main steam atmospheric dump valve, PV-3020, may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone.

- Zone 100 - None.

N. Fire Suppression

1. Automatic

   - Zone 100 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixtures(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.67 FIRE AREA 2-CB-LA-T

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zones 87 and 102.

13.8-kV switchgear, penetration area.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LB-G, 2-CB-LB-D.
- North - 3-h-rated barrier separates area from 2-CB-LA-I.
- West - 3-h-rated barrier separates area from 2-CB-LA-D, 2-CB-LB-G.
- South - Unrated barrier separates area from 1-CTB.
  - 3-h-rated barrier separates area from 2-CB-LA-I, 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 2-CB-LA-J.
- Ceiling - 3-h-rated barrier separates area from 2-AB-L2-A.

E. Area Access

- North - Two Class A doors from 2-CB-LA-I.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- PT3020 - Atmospheric dump valve pressure transmitter.
- PT0535 - S/G 3 pressure transmitter.
- Train A safe shutdown cables. (Spurious actuation concerns only.)
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1825-S3-CAC - Train A 13.8-kV RCP switchgear 2CAC.

- 2-1825-S3-DAD - Train B 13.8-kV RCP switchgear 2DAD.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 87
    - Fixed combustible material
        - Cable insulation
    - Heat release
        - Fixed combustibles ≤ 23,800,000 Btu
        - Transient combustibles 800,000 Btu
    - Combustible loading ≤ 40,000 Btu/ft^2
    - Fire severity (wood equivalent) ≤ 30 min

2. Zone No. 102
    - Fixed combustible material
        - None.
    - Heat release
        - Fixed combustibles ≤ 5,400,000 Btu
        - Transient combustibles 400,000 Btu
    - Combustible loading ≤ 40,000 Btu/ft^2
    - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational design considerations:

    None.

3. Spurious actuation considerations:

a. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

b. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 87
- Zone 102

N. Fire Suppression

1. Automatic

   - Zone 87 - No zone coverage.
   - Zone 102 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated Containment Building Fire Area Boundary:

See Section 9A.2.76.S.1.

9A.2.68 FIRE AREA 2-CB-LA-X

A. Location: Control Building, Level A

B. Drawing: AX4DJ8025

C. Description: Includes fire zone 94.

Train A HVAC room and auxiliary relay room.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 2-CB-LC-B, 2-CB-LB-E, 2-CB-LB-L.
- North - 3-h-rated barrier separates area from 2-CB-LC-B, 2-CB-LB-X.
  - 2-h-rated barrier separates area from elevator No. 1.
- West - 3-h-rated barrier separates area from 2-CB-LA-H, 2-CB-LA-G.
- South - 3-h-rated barrier separates area from 2-CB-LA-K.
- East - 3-h-rated barrier separates area from 2-CB-LA-K.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L1-B.

E. Area Access

- East - Class A door from 2-CB-LA-K.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1539-A7-001 - Control Building auxiliary relay room ESF cooler.
- 2-1816-U3-001 - Auxiliary relay panel 2ACPAR1.
- 2-1816-U3-002 - Auxiliary relay panel 2ACPAR2.
- 2-1816-U3-017 - Auxiliary relay panel 2ACPAR8.
- Train A safe shutdown cables.

- Train B safe shutdown cables. (Separation concerns eliminated by the design considerations of paragraph L.)

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Normal relay cabinets.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 94

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 172,000,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 240,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 180 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   The following raceways are wrapped to protect essential Train B safe shutdown cables from a fire in this fire area:

   - 2BE342RX135.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open due to a fire in this fire area.

   b. Pressurizer PORV PV-0455A and both pressurizer spray valves

PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

c. Pressurizer PORV PV-0456A may open due to a fire in this fire area.

d. It may not be possible to close either letdown isolation valve LV-0459 or LV-0460 due to a fire in this fire area.

e. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to fire in this fire area.

f. CVCS charging pump common mini-flow valve HV-8110 may close due to a fire in this fire area.

g. Train B RHR heat exchanger bypass valve FV-0619 may open due to a fire in this fire area.

h. Main steam atmospheric dump valve PV-3000 may open due to a fire in this fire area.

i. Main steam atmospheric dump valve PV-3030 may open due to a fire in this fire area.

j. Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may start due to a fire in this fire area.

k. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5105 circuits in this fire area.

l. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

m. Automatic starting of the Train A motor driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

n. Automatic starting of the Train B motor driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

o. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 94

N. Fire Suppression

1. Automatic

- Zone 94 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 94 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.69 FIRE AREA 2-CB-L1-E

A. Location: Control Building, Level 1, Level 2

B. Drawings: AX4DJ8026 and AX4DJ8027

C. Description: Includes fire zone 108.

Normal electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 2-CB-LA-O.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-A.
- West - 3-h-rated barrier separates area from 2-CB-L1-F.
- East - 3-h-rated barrier separates area from 1-CB-L1-A.

2. Level 2

- Ceiling - 3-h-rated barrier separates area from 2-CB-L3-B, 1-CB-L3-H.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-L2-B.
- West - 3-h-rated barrier separates area from 2-CB-L1-F.
- East - 3-h-rated barrier separates area from 2-CB-L2-A.

E. Area Access

Level 2

- South - Class A door from 2-CB-L2-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 108

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 128,838,980 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 894,062 Btu/ft^2
- Fire severity (wood equivalent) 671 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 108

N. Fire Suppression

1. Automatic

- Zone 108 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix B, Section C.5.a(1).

9A.2.70 FIRE AREA 2-CB-L1-F

A. Location: Control Building, Level 1, Level 2

B. Drawings: AX4DJ8026 and AX4DJ8027

C. Description: Includes fire zone 107

Train A Electrical shaft

D. Description of Boundaries:

1. Level 1

- Floor - 3-h-rated barrier separates area from 2-CB-LA-P.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L1-A, 1-CB-L1-B.
- West - 2-h-rated barrier separates area from elevator No. 1.
- East - 3-h-rated barrier separates area from 2-CB-L1-E.

2. Level 2

- Ceiling - 3-h-rated barrier separates area from 2-CB-L3-C.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-CB-L2-B, 1-CB-L2-E.
- West - 2-h-rated barrier separates area from elevator No. 1.
- East - 3-h-rated barrier separates area from 2-CB-L1-E.

E. Area Access

Level 2

- South - Class A door from 2-CB-L2-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- Alternate FLEX Connection Box 2NB3002P.

K. Combustible Loading

Zone No. 107

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 136,631,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 1,195,052 Btu/ft^2
- Fire severity (wood equivalent) 896 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 107

N. Fire Suppression

1. Automatic
   - Zone 107 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a(1).

9A.2.71 FIRE AREA 2-CB-L2-A

A. Location: Control Building, Level 2

B. Drawing: AX4DJ8027

C. Description: Includes fire zones 121.

Train B Auxiliary relay room.

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-L1-A.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-H.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from Unit 2 electrical bridge.
- South - 3-h-rated barrier separates area from 2-CB-L2-B.
- West - 3-h-rated barrier separates area from 2-CB-L1-E.
- East - 3-h-rated barrier separates area from 1-CB-L2-A.

E. Area Access

- North - Class A door from Unit 2 electrical bridge.
- South - Two Class A doors from 2-CB-L2-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1816-U3-015 - Auxiliary relay panel 2BCPAR7.
- 2-1816-U3-003 - Auxiliary relay panel 2BCPAR3.
- 2-1816-U3-004 - Auxiliary relay panel 2BCPAR4.
- 2-1539-A7-002 - Control building auxiliary relay room cooler.
- Train A safe shutdown cables. (Spurious actuation concerns only.)

- Train B safe shutdown cables.

I. Safety-Related Equipment

- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

Zone No. 121

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 59,828,280 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 288,706 Btu/ft^2
- Fire severity (wood equivalent) 217 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this area.

   b. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 121

N. Fire Suppression

1. Automatic

- Zone 121 - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation (except room 270). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a (1).

2. Safety-related cable trays without automatic fire suppression:

Safety-related cable trays in fire zone 121 of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. These locations contain safety-related electrical equipment and are provided with fire protection capability that conforms to the BTP guidelines for switchgear and safety-related panel areas (BTP CMEB 9.5-1, Positions C.7.e and C.7.f). Fire detectors are provided and the location is accessible for manual firefighting. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

9A.2.72 FIRE AREA 2-CB-L2-B

A. Location: Control Building, Level 2

B. Drawing: AX4DJ8027

C. Description: Includes fire zone 120.

Train B cable spreading room

D. Description of Boundaries:

- Floor - 3-h-rated barrier separates area from 1-CB-L1-A, 1-CB-L1-B.
- Ceiling - 3-h-rated barrier separates area from 1-CB-L3-H, 1-CB-L3-J, 1-CB-L3-K.
- North - 3-h-rated barrier separates area from 2-CB-L2-A, 2-CB-L1-E, 2-CB-L1-F.
- South - 3-h-rated barrier separates area from 1-CB-L2-E.
- West - 3-h-rated barrier separates area from 1-CB-L2-E.
- East - 3-h-rated barrier separates area from 1-CB-L2-B.

E. Area Access

- North - Two Class A doors from 2-CB-L2-A.
  - Class A door 2-CB-L1-E, 2-CB-L1-F.
- West - Two Class A doors from 1-CB-L2-E.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1601-U3-T04 - Termination cabinet 2BCPT04.
- 2-1601-U3-T08 - Termination cabinet 2BCPT08.
- 2-1601-U3-T20 - Termination cabinet 2BCPT20
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1601-U3-T06 - Termination cabinet 2BCPT06.
- 2-1601-U3-T10 - Termination cabinet 2BCPT10.
- 2-1601-U3-T12 - Termination cabinet 2NCPT12.
- 2-1601-U3-T14 - Termination cabinet 2BCPT14.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1601-U3-T02 - Termination cabinet 2NCPT02.
- 2-1601-U3-T16 - Termination cabinet 2NCPT16.
- 2-1601-U3-T18 - Termination cabinet 2NCPT18.
- 2-1601-U3-T22 - Termination cabinet 2NCPT22.
- 2-1601-U3-T24 - Termination cabinet 2NCPT24.
- 2-1601-U3-T26 - Termination cabinet 2NCPT26.
- 2-1601-U3-T28 - Termination cabinet 2NCPT28.
- Nonsafety-related cables.

K. Combustible Loading

Zone No. 120

- Fixed combustible material
  - Cable insulation
  - Rubber goods
- Heat release

- Fixed combustibles	≤ 1,369,000,000 Btu
- Transient combustibles	800,000 Btu
• Combustible loading	≤ 360,000 Btu/ft^2
• Fire severity (wood equivalent)	≤ 270 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

   b. Automatic starting of the Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to fire damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

   c. Pressurizer PORV PV-0455A and both pressurizer spray valves PV-0455B and PV-0455C may open due to fire damage to PT-0455/PT-0457 circuits in this fire area.

   d. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

   e. Main steam atmospheric dump valve PV-3020 may open due to a fire in this fire area.

   f. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this fire area.

   g. CVCS Train A charging pump miniflow valve HV-8111A may close due to a fire in this fire area.

   h. Train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   i. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   j. Train B RHR system vent valve HV-10466 may open due to fire in this fire area.

   k. Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may start due to a fire in this fire area.

   l. The turbine-driven auxiliary feedwater pump 2-1302-P4-001 may start due to fire damage in HV-5106 circuits in this fire area.

   m. Automatic starting of the Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

n. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

o. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

p. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

q. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

r. Safety injection actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

s. Safety injection actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPB 125-V-dc power feeder circuits in this fire area.

t. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

u. Containment spray actuation may occur due to fire damage to the manual actuation switch circuits in this fire area.

v. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPA 120-V-ac power feeder circuits in this fire area.

w. Safety injection and containment spray actuation may occur due to fire damage to solid state protection cabinet 2-1605-Q5-SPB 120-V-ac power feeder circuits in this fire area.

x. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

y. Safety injection and containment spray actuation may occur due to fire damage to process control cabinet power feeders in this fire area.

z. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 120

N. Fire Suppression

1. Automatic

   - Zone 120 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

None.

9A.2.73 FIRE AREA 2-CB-L3-B

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 180.

Normal electrical shaft

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-L1-E.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L3-H.
- West - 3-h-rated barrier separates area from 2-CB-L3-C.
- East - 3-h-rated barrier separates area from 1-CB-L3-H.

E. Area Access

- South - Class A door from 1-CB-L3-H.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

None.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 180

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 24,438,090 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 252,381 Btu/ft^2
- Fire severity (wood equivalent) 189 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A or B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 180

N. Fire Suppression

1. Automatic

   - Zone 180 preaction sprinkler system - Total zone coverage.

2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE fire fighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.74 FIRE AREA 2-CB-L3-C

A. Location: Control Building, Level 3

B. Drawing: AX4DJ8028

C. Description: Includes fire zone 178.

Train A electrical shaft.

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-L1-F.
- Ceiling - Unrated exterior area boundary.
  - 2-h-rated barrier separates area from elevator No. 1.
- North - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 1-CB-L3-H.
- West - 2-h-rated barrier separates area from elevator No. 1.
- East - 3-h-rated barrier separates area from 2-CB-L3-B.

E. Area Access

- South - Class A door from 1-CB-L3-H.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-1807-Y3-16 - Regulated transformer 2ABA02RX
- Train A Safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustibles Loading

Zone No. 178

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles 50,968,240 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 450,159 Btu/ft^2
- Fire severity (wood equivalent) 338 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 178

N. Fire Suppression

1. Automatic
   - Zone 178 preaction sprinkler system - Total zone coverage.
2. Manual

   Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE fire fighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, Section C.5.a.(1).

9A.2.75 FIRE AREA 2-FB-LC-A

A. Location: Fuel Building, Levels B, C, A, and 1

B. Drawings: AX4DJ8030, AX4DJ8031, and AX4DJ8032

C. Description: Includes fire zones 15, 132, and 29.

Pipe penetration rooms, spent fuel pit heat exchanger room, electrical chase

D. Description of Boundaries

1. Level C

- Floor - Unrated concrete basemat.
- North - Unrated below grade exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LD-B, and 2-AB-LC-C.
- West - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A
- East - 3-h-rated barrier separates area from 2-CB-LC-A.

2. Level B

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-LD-A, 2-AB-LD-B, and 2-AB-LC-C.
- West - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-AB-L2-A
- East - 3-h-rated barrier separates area from 1-AB-LD-B.

3. Level A

- Floor - 3-h-rated barrier separates area from 1-AB-LD-B.
- North - 3-h-rated barrier separates area from 2-CB-LA-I.
- South - 3-h-rated barrier separates area from 2-AB-LD-B, 2-AB-LA-A, 2-AB-LD-A.
- West - Unrated barrier separates area from 2-CTB.

- 3-rated barrier separates area from 2-AB-L2-A.

- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceilin g - 3-h-rated barrier separates area from 1-AB-LD-B, 2-AB-L2-A.

4. Level 1

- North - 3-h-rated barrier separates area from 1-AB-LD-B.
- South - 3-h-rated barrier separates area from 2-AB-L2-A.
- West - 3-h-rated barrier separates area from 2-AB-L2-A.
- East - 3-h-rated barrier separates area from 1-AB-LD-B.
- Ceiling - 3-h-rated barrier separates area from 2-AB-LD-B (sample chase), 1-AB-LD-B.

E. Area Access

1. Level B

- East - Class A door from 1-AB-LD-B.
- South - Class A door from 1-AB-LD-B.

2. Level A

- East - Class A door from 1-AB-LD-B.
- South - Class A door from 2-AB-LA-A.

3. Level 1

- South - Class door from 2-AB-L2-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

- PT0934 - Containment pressure transmitter.
- PT0936 - Containment pressure transmitter.

- HV8103C - RCP 3 seal water inlet valve.
- HV8103D - RCP 4 seal water inlet valve.
- HV8809B - Residual heat removal pump to cold legs valve.
- HV10466 - Residual heat removal B vent valve.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1555-A7-018 - Air handling unit.
- 2-1513-P5-HMB - Containment hydrogen monitor B.
- HV-9001B - Containment spray valve.
- HV-7136 - Reactor coolant drain tank pump discharge valve.
- HV-7150 - Reactor coolant drain tank vent isolation valve.
- HV-3514 - Pressurizer steam space sample valve.
- HV-3502 - Reactor coolant system hot leg sample valve.
- HV-3508 - Pressurizer liquid space sample valve.
- HV-8220 - Reactor coolant system hot leg sample valve.
- HV-8033 - Pressurizer relief tank vent isolation valve.
- HV-2793A - Hydrogen monitor isolation valve.
- HV-8221 - Hydrogen monitor isolation valve.
- HV-8028 - Pressurizer relief tank isolation valve.
- HV-8208 - PASS liquid sample return condensate valve.
- HV-8212 - PASS gas sample return inlet valve.
- HV-1831 - Containment cooling A7007/A7008 CW valve.
- HV-1809 - Containment cooling A7007/A7008 CW valve.
- HV-1807 - Containment cooling A7003/A7004 CW valve.

- HV-1823 - Containment cooling A7003/A7004 valve.
- HV-2135 - Reactor cavity cooler E7002 CW valve.
- HV-2139 - Reactor cavity cooler E7002 CW valve.
- 2-1206-V4-001 - Encapsulation vessel.
- 2-1206-V4-002 - Encapsulation vessel.
- HV-8986 - Containment sump to PASS isolation valve.
- HV-8811B - RHR pump sump suction valve.
- HV-9003B - Containment spray pump sump suction valve.
- HV8802B - Hot leg safety injection loop 2 and 3.
- HV2791A - Hydrogen monitor containment isolation.
- 2-1213-E6-002 - Spent fuel pit heat exchanger B.
- 2-1213-P6-005 - Spent fuel pit pump.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1227-P4-001 - Penetration area sump pump.
- 2-1227-P4-002 - Penetration area sump pump.
- HV-28206 - Fire protection system valve.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 15

    - Fixed combustible material

        - Cable insulation
        - Cellulosic materials
        - Plastics
        - Rubber goods

    - Heat release

- Fixed combustibles ≤ 457,000,000 Btu
- Transient combustibles 800,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

2. Zone No. 29

   - Fixed combustible material

     - Cable insulation
     - Cellulosic materials
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles ≤ 203,228,820 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 558,983 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 420 min

3. Zone No. 132

   - Fixed combustible material

     - Cable insulation
     - Compressed gas
     - Cellulosic materials
     - Oil/grease
     - Plastics
     - Rubber goods

   - Heat release

     - Fixed combustibles ≤ 69,000,000 Btu
     - Transient combustibles 800,000 Btu

   - Combustible loading ≤ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this fire area use safe shutdown train A.

2. Special operational and design considerations:

None.

3. Spurious actuation considerations:

   a. CVCS volume control tank outlet valve LV-0112C may close due to a fire in this fire area.

   b. CVCS Train A charging pump mini-flow valve HV-8111A may close due to a fire in this fire area.

   c. The Train A charging path containment isolation valve HV-8105 may close due to a fire in this fire area.

   d. Train B RHR system vent valve HV-10466 may open due to a fire in this fire area.

   e. Safety injection actuation may occur due to fire damage to containment pressure circuits in this fire area.

   f. Containment spray actuation may occur due to fire damage to containment pressure circuits in this fire area.

   g. Train A RHR heat exchanger outlet valve HV-0606 may close due to a fire in this fire area.

   h. Train A RHR heat exchanger bypass valve FV-0618 may open due to a fire in this fire area.

   i. Train A RHR system vent valve HV-10465 may open due to a fire in this fire area.

   j. Safety injection actuation may occur due to fire damage to steam line pressure circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 15
- Zone 29
- Zone 132

N. Fire Suppression

1. Automatic

   - Zone 15 preaction sprinkler system - Partial zone coverage.

- Zone 29 preaction sprinkler system - Total zone coverage.

- Zone 132 preaction sprinkler system - Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Radioactive process fluids in piping.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation (except fire zones 29 and 132). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system, which could be used to remove smoke from this area, may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated containment building fire area boundary:

See section 9A.2.76.S.1.

9A.2.76 FIRE AREA 2-CTB

A. Location: Containment

B. Drawings: AX4DJ8042, AX4DJ8043, AX4DJ8044, and AX4DJ8045

C. Description: Includes fire zones 140A, 140B, 140C, and 140E.

D. Description of Boundaries

- The containment wall is an unrated fire area boundary.

E. Area Access

- Emergency lock at el 187 ft - 10-1/2 in. at 225° clockwise.
- Personnel lock at el 220 ft - 0 in. at about 70° clockwise.

F. Sealed Penetrations

The containment penetrations (mechanical and electrical) are not rated.

G. Fire Dampers

There are no dampers in the containment wall which is the boundary barrier.

H. Safe Shutdown Components

- Core exit temperature thermocouples TE-10002, 10003, 10006, 10008 thru 10012, 10014, 10016 thru 10019, 10021 thru 10026, 10028, 10034, 10036, 10037, 10040, and 10050.
- 2-1201-B6-001 - Steam generator loop 1.
- 2-1201-B6-002 - Steam generator loop 2.
- 2-1201-B6-003 - Steam generator loop 3.
- 2-1201-B6-004 - Steam generator loop 4.
- 2-1201-V6-001 - Reactor vessel.
- 2-1201-V6-002 - Pressurizer.
- 2-1201-V6-003 - Pressurizer relief tank.
- HV8095A - Reactor head vent valve.
- HV8095B - Reactor head vent valve.
- HV8096A - Reactor head vent valve.

- HV8096B - Reactor head vent valve.
- HV0442A - Reactor head vent valve.
- HV0442B - Reactor head vent valve.
- HV8000A - Pressurizer PORV block valve.
- HV8000B - Pressurizer PORV block valve.
- HV8145 - CVCS auxiliary spray valve.
- HY8145 - Auxiliary spray valve solenoid.
- LT0459 - Pressurizer level transmitter.
- LT0460 - Pressurizer level transmitter.
- PT0403 - Reactor coolant system wide range pressure transmitter.
- PT0405 - Reactor coolant system wide range pressure transmitter.
- PV0455A - Pressurizer PORV.
- PV0456A - Pressurizer PORV.
- RE13135A - R.G. 1.97 neutron flux chamber.
- TE0413A - Reactor coolant system T-hot wide range loop 1.
- TE0413B - Reactor coolant system T-cold wide range loop 1.
- TE0423B - Reactor coolant system T-cold wide range loop 2.
- TE0433B - Reactor coolant system T-cold wide range loop 3.
- TE0443A - Reactor coolant system T-hot wide range loop 4.
- TE0443B - Reactor coolant system T-cold wide range loop 4.
- PV0455B - Pressurizer spray valve.
- PV0455C - Pressurizer spray valve.
- PT0455 - Pressurizer pressure transmitter.
- PT0456 - Pressurizer pressure transmitter.
- PT0457 - Pressurizer pressure transmitter.

- PT0458 - Pressurizer pressure transmitter.
- PSV8010A - Pressurizer code safety valve.
- RE13135B - R.G. 1.97 neutron flux chamber.
- PSV8010B - Pressurizer code safety valve.
- PSV8010C - Pressurizer code safety valve.
- PSE10459 - Pressurizer relief tank rupture disk.
- PSE10460 - Pressurizer relief tank rupture disk.
- HV8701A - Residual heat removal pump A suction valve.
- HV8701B - Residual heat removal pump A suction valve.
- HV8702A - Residual heat removal pump B suction valve.
- HV8702B - Residual heat removal pump B suction valve.
- HV15216A - S/G 1 blowdown isolation valve.
- HY15216A - S/G 1 blowdown isolation valve solenoid.
- HV15216B - S/G 2 blowdown isolation valve.
- HY15216B - S/G 2 blowdown isolation valve solenoid.
- HV15216C - S/G 3 blowdown isolation valve.
- HY15216C - S/G 3 blowdown isolation valve solenoid.
- HV15216D - S/G 4 blowdown isolation valve.
- HY15216D - S/G 4 blowdown isolation valve solenoid.
- HV15212A - S/G 1 blowdown isolation valve.
- HY15212A - S/G 1 blowdown isolation valve solenoid.
- HV15212B - S/G 2 blowdown isolation valve.
- HY15212B - S/G 2 blowdown isolation valve solenoid.
- HV15212C - S/G 3 blowdown isolation valve.
- HY15212C - S/G 3 blowdown isolation valve solenoid.

- HV15212D - S/G 4 blowdown isolation valve.
- HY15212D - S/G 4 blowdown isolation valve solenoid.
- LT0501 - S/G 1 wide range level transmitter.
- LT0502 - S/G 2 wide range level transmitter.
- LT0503 - S/G 3 wide range level transmitter.
- LT0504 - S/G 4 wide range level transmitter.
- LT0517 - S/G 1 level transmitter.
- LT0518 - S/G 1 level transmitter.
- LT0519 - S/G 1 level transmitter.
- LT0551 - S/G 1 level transmitter.
- LT0527 - S/G 2 level transmitter.
- LT0528 - S/G 2 level transmitter.
- LT0529 - S/G 2 level transmitter.
- LT0552 - S/G 2 level transmitter.
- LT0537 - S/G 3 level transmitter.
- LT0538 - S/G 3 level transmitter.
- LT0539 - S/G 3 level transmitter.
- LT0553 - S/G 3 level transmitter.
- LT0547 - S/G 4 level transmitter.
- LT0548 - S/G 4 level transmitter.
- LT0549 - S/G 4 level transmitter.
- LT0554 - S/G 4 level transmitter.
- LV0460 - Reactor coolant system normal letdown isolation valve.
- LY0460 - Reactor coolant system normal letdown solenoid.
- LV0459 - Reactor coolant system normal letdown isolation valve.

- LY0459 - Reactor coolant system normal letdown solenoid.
- HV1978 - Auxiliary component cooling water supply isolation valve.
- HV1974 - Auxiliary component cooling water return isolation valve.
- HV8146 - Normal charging path valve.
- HV8875A - Safety injection accumulator 1 vent valve.
- HV8875B - Safety injection accumulator 2 vent valve.
- HV8875C - Safety injection accumulator 3 vent valve.
- HV8875D - Safety injection accumulator 4 vent valve.
- HV8875E - Safety injection accumulator 1 vent valve.
- HV8875F - Safety injection accumulator 2 vent valve.
- HV8875G - Safety injection accumulator 3 vent valve.
- HV8875H - Safety injection accumulator 4 vent valve.
- HV0943A - Safety injection accumulator header vent valve.
- HV0943B - Safety injection accumulator header vent valve.
- 2-1208-E6-001 - Regenerative heat exchanger.
- HV0123 - Excess letdown heat exchanger discharge valve.
- HY0123 - Excess letdown heat exchanger discharge valve solenoid.
- HV8153 - Excess letdown isolation valve.
- HY8153 - Excess letdown isolation valve solenoid.
- HV8154 - Excess letdown isolation valve.
- HY8154 - Excess letdown isolation valve solenoid.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

J. Safety-Related Equipment

- 2-1204-V6-002 - Accumulator tank.

- 2-1204-V6-003 - Accumulator tank.
- 2-1204-V6-004 - Accumulator tank.
- 2-1204-V6-005 - Accumulator tank.
- 2-1208-E6-002 - Excess letdown HX.
- 2-1501-A7-001 - Containment cooling units.
- 2-1501-A7-002 - Containment cooling units.
- 2-1501-A7-003 - Containment cooling units.
- 2-1501-A7-004 - Containment cooling units.
- 2-1501-A7-005 - Containment cooling units.
- 2-1501-A7-006 - Containment cooling units.
- 2-1501-A7-007 - Containment cooling units.
- 2-1501-A7-008 - Containment cooling units.
- 2-1513-H7-001 - Electric hydrogen recombiner.
- 2-1513-H7-002 - Electric hydrogen recombiner.
- 2-1612-P5-TRB - Thermocouple reference junction B.
- 2-1612-P5-TRA - Thermocouple reference junction A.
- HV-9554A - S/G 2 blowdown sample isolation.
- HV-9554B - S/G 2 blowdown sample isolation.
- HV-9555A - S/G 3 blowdown sample isolation.
- HV-9555B - S/G 3 blowdown sample isolation.

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a. Spurious actuation concerns and separation concerns eliminated by the operational and design considerations of paragraph L.

- HV-9556A - S/G 4 blowdown sample isolation.
- HV-9556B - S/G 4 blowdown sample isolation.
- HV-9553A - S/G 1 blowdown sample isolation.
- HV-9553B - S/G 1 blowdown sample isolation.
- HV-8141A - RCP 1 seal leakoff isolation.
- HV-8141B - RCP 2 seal leakoff isolation.
- HV-8141C - RCP 3 seal leakoff isolation.
- HV-8141D - RCP 4 seal leakoff isolation.
- HV-8112 - RCP seal water return isolation.
- HV-8149A - Letdown orifice isolation.
- HV-8149B - Letdown orifice isolation.
- HV-8149C - Letdown orifice isolation.
- HV-8890A - Safety injection system recirculation test isolation.
- HV-8890B - Safety injection system recirculation test isolation.
- HV-8889A - Safety injection system recirculation test isolation.
- HV-8889B - Safety injection system recirculation test isolation.
- HV-8889C - Safety injection system recirculation test isolation.
- HV-8889D - Safety injection system recirculation test isolation.
- HV-8823 - Safety injection pumps recirculation test isolation.
- HV-8824 - Safety injection system recirculation test isolation.
- HV-8843 - Safety injection system test line bypass.
- HV-8882 - Safety injection test line.
- HV-8881 - Safety injection pump accumulator fill isolation.
- HV-8871 - Accumulator holding tank isolation.
- HV-8808A - Accumulator isolation loop 1.

- HV-8808B - Accumulator isolation loop 2.
- HV-8808C - Accumulator isolation loop 3.
- HV-8808D - Accumulator isolation loop 4.
- HV-8877A - Accumulator loop 1 test line isolation.
- HV-8877B - Accumulator loop 2 test line isolation.
- HV-8877C - Accumulator loop 3 test line isolation.
- HV-8877D - Accumulator loop 4 test line isolation.
- HV-8878A - Accumulator loop 1 fill line isolation.
- HV-8878B - Accumulator loop 2 fill line isolation.
- HV-8878C - Accumulator loop 3 fill line isolation.
- HV-8878D - Accumulator loop 4 fill line isolation.
- HV-8879A - Accumulator loop 1 injection test line isolation.
- HV-8879B - Accumulator loop 2 injection test line isolation.
- HV-8879C - Accumulator loop 3 injection test line isolation.
- HV-8879D - Accumulator loop 4 injection test line isolation.
- HV-10950 - Accumulator tank 1 local sample isolation.
- HV-10951 - Accumulator tank 2 local sample isolation.
- HV-10952 - Accumulator tank 3 local sample isolation.
- HV-10953 - Accumulator tank 4 local sample isolation.
- HV-8160 - CVCS letdown isolation.
- HV-15214 - CVCS letdown isolation.
- HV-8147 - Charging to reactor coolant system isolation.
- HV-8143 - Excess letdown to volume control tank.
- HV-8825 - RHRS hot leg injection crossover isolation.
- HV-3500 - Reactor coolant system hot leg sample.

- HV-3501 - Reactor coolant system hot leg sample.
- HV-3548 - Reactor coolant system hot leg sample.
- HV-3507 - Pressurizer liquid space sample.
- HV-3513 - Pressurizer steam space sample.
- HV-8209 - PASS liquid sample return to containment.
- HV-8211 - PASS gas sample return to containment.
- HV-8030 - PRT makeup water isolation.
- HV-8047 - PRT vent isolation.
- HV-7699 - Reactor coolant drain tank pump discharge.
- HV-8032 - Reactor vessel leak isolation.
- LV-1003 - Reactor coolant drain tank pumps discharge.
- HV-7126 - Reactor coolant drain tank vent isolation.
- HV-2041 - Thermal barrier cooling water return.
- HV-19051 - Thermal barrier cooling water RCP 1.
- HV-19053 - Thermal barrier cooling water RCP 2.
- HV-19055 - Thermal barrier cooling water RCP 3.
- HV-19057 - Thermal barrier cooling water RCP 4.
- HV-0780 - Reactor cavity & CTMT sump header isolation.
- HV-2628A - CTB normal purge exhaust isolation.
- HV-2628B - CTB normal purge exhaust isolation.
- HV-2626A - CTB normal purge supply isolation.
- HV-2626B - CTB normal purge supply isolation.
- HV-9380A - Containment atmosphere service air supply.
- HV-9380B - Containment atmosphere service air supply.
- HV-2792A - Hydrogen monitor isolation.

- HV-2792B - Hydrogen monitor isolation.
- HV-12975 - Containment air radiation monitor isolation.
- HV-12978 - Containment air radiation monitor isolation.
- HV-2582A - CTB cooling unit A7001 discharge damper.
- HV-2582B - CTB cooling unit A7002 discharge damper.
- HV-2583A - CTB cooling unit A7003 discharge damper.
- HV-2583B - CTB cooling unit A7004 discharge damper.
- HV-2584A - CTB cooling unit A7005 discharge damper.
- HV-2584B - CTB cooling unit A7006 discharge damper.
- HV-2585A - CTB cooling unit A7007 discharge damper.
- HV-2585B - CTB cooling unit A7008 discharge damper.
- HV-2624A - CTB post LOCA purge exhaust isolation.
- HV-2624B - CTB post LOCA purge exhaust isolation.
- Train A safety-related cables.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1201-T4-002 - RCP L.O drain tank.
- 2-1201-T4-003 - RCP L.O drain tank.
- 2-1201-T4-004 - RCP L.O drain tank.
- 2-1201-T4-005 - RCP L.O drain tank.
- 2-1503-B7-001 - CTB air circulator.
- 2-1503-B7-002 - CTB air circulator.
- 2-1503-B7-003 - CTB air circulator.
- 2-1503-B7-004 - CTB air circulator.
- 2-1503-B7-005 - CTB air circulator.

- 2-1503-B7-006 - CTB air circulator.
- 2-1503-B7-007 - CTB air circulator.
- 2-1503-B7-008 - CTB air circulator.
- 2-1512-B7-001 - CTB reactor support cooling fan.
- 2-1512-B7-002 - CTB reactor support cooling fan.
- 2-1512-B7-003 - CTB reactor support cooling fan.
- 2-1512-B7-004 - CTB reactor support cooling fan.
- 2-1301-P4-010 - Wet layup pumps.
- 2-1301-P4-013 - Wet layup pumps.
- 2-1201-V6-003 - Pressurizer relief tank.
- 2-1901-P6-001 - Reactor coolant drain tank pump.
- 2-1901-P6-002 - Reactor coolant drain tank pump.
- 2-1901-E6-001 - RC drain tank HX.
- 2-1901-T6-001 - RC drain tank.
- 2-1214-P4-013 - Reactor cavity sump pump.
- 2-1214-P4-014 - Reactor cavity sump pump.
- 2-1214-P4-015 - Reactor cavity sump pump.
- 2-1214-P4-016 - Reactor cavity sump pump.
- 2-1214-P4-017 - Reactor cavity sump pump.
- 2-1214-P4-018 - Reactor cavity sump pump.
- 2-1515-A7-002 - CTB aux cooling unit.
- 2-1515-A7-001 - CTB aux cooling unit.
- 2-1504-N7-001 - CTB pre-access filtration unit.
- 2-1504-N7-002 - CTB pre-access filtration unit.
- 2-1608-P5-RPA - Rod position indication data cabinet A.

- 2-1608-P5-RPB - Rod position indication data cabinet B.
- 2-2203-P5-REI - Fuel transfer system control console.
- 2-1301-P4-011 - Wet layup pump.
- 2-1301-P4-012 - Wet layup pump.
- HV12644 - CTB reactor support cooling unit.
- HV12645 - CTB reactor support cooling unit.
- HV8031 - Pressure relief tank outlet.
- HV12647 - CTB reactor support cooling unit.
- HV12646 - CTB reactor support cooling unit.
- HV7127 - Reactor coolant drain tank outlet.
- HV7143 - Reactor coolant drain tank circulation bypass.
- HV7141 - Reactor coolant drain tank to pressurizer relief tank.
- LV0180 - Reactor coolant pump 2 standpipe.
- LV0179 - Reactor coolant pump 3 standpipe.
- HV-7144 - Reactor coolant drain tank recirculation.
- LV0181 - Reactor coolant pump 1 standpipe.
- LV0178 - Reactor coolant pump 4 standpipe.
- HV-12985 - CTB unit N7001 charcoal filter deluge.
- TV-12654 - CTB pre-access filter unit N7001.
- TV-12655 - CTB pre-access filter unit N7002.
- HV-12987 - CTB unit N7002 charcoal filter deluge.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 140A

    - Fixed combustible material

- Cable insulation
- Charcoal
- Cellulosic materials
- Plastics
- Rubber goods

- Heat release

  - Fixed combustibles ≤ 644,950,000 Btu
  - Transient combustibles 152,650,000 Btu

- Combustible loading ≤ 160,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 120 min

2. Zone No. 140B

- Fixed combustible material

  - Cable insulation
  - Charcoal
  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles ≤ 644,950,000 Btu
  - Transient combustibles 152,650,000 Btu

- Combustible loading ≤ 160,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 120 min

3. Zone No. 140C

- Fixed combustible material

  - Cable insulation
  - Plastics
  - Oil/grease

- Heat release

  - Fixed combustibles ≤ 446,880,000 Btu
  - Transient combustibles 36,720,000 Btu

- Combustible loading ≤ 120,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 90 min

4. Zone No. 140E

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles ≤ 10,000,00 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading ≤ 40,000 Btu/ft^2
- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B depending on the location of the fire. In general, the east and north portions of the containment annulus area outside the secondary shield wall (fire zone 140B) and the north steam generator/reactor coolant pump area inside the secondary shield contain safe shutdown train B equipment and cables. Similarly, the west and south portions of the containment annulus area outside the secondary shield wall (fire zone 140A), and the south steam generator/reactor coolant pump area inside the secondary shield wall contain safe shutdown train A equipment and cables.

2. Special operational and design considerations.

   a. Separation of safe shutdown trains (equipment and cables) inside containment is as presented in table 9A.2.76-1.

   b. A radiant energy shield is provided for PT-0403 and LT-0459 to preclude simultaneous fire damage to these devices and instrumentation cables of their redundant counterparts.

   c. The following raceways are shielded to protect essential safe shutdown cables from a fire in this fire area:

      - 2AE53AKXJ95
      - 2AE53ARX321
      - 2AE53ARX323
      - 2ARJB0056
      - 2BE52ARX014
      - 2BE53BKXJ01
      - 2BE52AKXJ98
      - 2BE532RX065
      - 2BRJB0050

3. Spurious actuation considerations:

   a. Pressurizer PORV PV-0455A may open and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

b. Pressurizer PORV PV-0456A may open and it may not be possible to close block valve HV-8000B due to a fire in this fire area.

c. Pressurizer PORV PV-0455A and both pressurizer spray valves, PV-0455B and PV-0455C, may open (PT-0455/PT-0457 circuit damage) and it may not be possible to close block valve HV-8000A due to a fire in this fire area.

d. It may not be possible to close either letdown isolation valve, LV-0459 or LV-0460, due to a fire in this fire area.

e. Pressurizer spray valve PV-0455B may open due to a fire in this fire area.

f. Pressurizer spray valve PV-0455C may open due to a fire in this fire area.

g. Pressurizer auxiliary spray valve HV-8145 may open due to a fire in this fire area.

h. Automatic starting of the Train A motor-driven auxiliary feedwater pump 2-1302-P4-003 may occur due to fire damage to steam generator 1 and 4 level or feedwater flow transmitter circuits in this fire area.

i. Automatic starting of the Train B motor-driven auxiliary feedwater pump 2-1302-P4-002 may occur due to file damage to steam generator 2 and 3 level or feedwater flow transmitter circuits in this fire area.

j. Automatic starting of the turbine-driven auxiliary feedwater pump 2-1302-P4-001 may occur due to fire damage to steam generator level or feedwater flow transmitter circuits in this fire area.

k. Safety injection actuation may occur due to fire damage to pressurizer pressure circuits in this fire area.

l. Reactor vessel head letdown path valves HV-8095A, HV-8096A, and HV-0442A may all open due to a fire in this fire area.

m. Reactor vessel head letdown path valves HV-8095B, HV-8096B, and HV-0442B may all open due to a fire in this fire area.

n. Excess letdown valves HV-8153, HV-8154, and HV-0123 may all open due to a fire in this fire area.

M. Fire Detection

- Line-type heat detectors are installed in zone 140A and zone 140B.
- Infrared flame detectors are installed in zone 140C.

N. Fire Suppression

1. Automatic

- Zone 140A - No zone coverage.
- Zone 140B - No zone coverage.
- Zone 140C - No zone coverage.
- Zone 140E - No zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

Primary reactor coolant system, in process piping.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

The containment is equipped with a sump. Flooding of the containment by the fire protection system is not a problem since all available firewater volumes would result in a level less than post-LOCA flood levels.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated containment building fire area boundary:

The personnel lock and the mechanical and electrical penetrations in the containment building fire area boundary were not specifically fire tested and therefore are not rated in hours of resistance to fire. The VEGP personnel lock and the mechanical and electrical penetrations are typical of nuclear power plant installations. They are of special construction, designed to maintain the integrity of the containment system boundary during various postulated accident situations. The containment building area boundary wall

is of heavy concrete construction, which, along with its penetration design, represents a significant barrier to fire propagation.

2. Separation by distance without full area suppression:

   See Appendix 9B, section C.5.e.

9A.2.77 FIRE AREA 2-EB-B

A. Location: Equipment Building West Side el 220 ft-0 in., Level 1

B. Drawing: AX4DJ8044

C. Description: Includes fire zone 141B.

Filter and exhaust unit area, valve room

D. Description of Boundaries

- Floor - 3-h-rated barrier separates area from 2-CB-LA-B and 2-CB-LA-C.
- North - Unrated exterior area boundary above el 224 ft - 0 in.
  - 3-h-rated barrier separates area from 2-AFB-C.
- East - Unrated barrier separates area from 2-CTB.
  - 3-h-rated barrier separates area from 2-CB-LA-D.
- South - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- West - Exterior door.

F. Sealed Penetration

Seals meet or exceed fire barrier rating.

G. Fire Dampers

Dampers meet or exceed fire barrier rating.

H. Safe Shutdown Components

Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment.

J. Nonsafety-Related Equipment

- 2-1505-A7-001 - Containment building normal purge supply unit.
- 2-1505-B7-001 - Preaccess purge fan.
- 2-1505-B7-002 - Mini-purge fan.
- 2-1526-B7-001 - Equipment building vent system fan.
- 2-1526-U7-001 - Equipment building unit heaters.
- 2-1526-U7-002 - Equipment building unit heaters.
- 2-1526-U7-003 - Equipment building unit heaters.
- HV-2593 - CTB normal purge supply unit damper.
- HV-2627A - CTB normal purge supply ISO damper.
- TV-12432A - Equipment building OSA intake damper.
- TV-12432B - Equipment building OSA intake damper.
- TV-12432C - Equipment building OSA intake damper.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 141B

   - Fixed combustible material
     - Cable insulation
   - Heat release
     - Fixed combustibles ≤115,280,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

None.

3. Spurious actuation concerns:

   a. Main steam atmospheric dump valve PV-3010 may open due to a fire in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 141B

N. Fire Suppression

1. Automatic

   - Zone 141B - No zone coverage.

2. Manual

   Hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unrated containment building fire area boundary:

See section 9A.2.76.S.1.

9A.2.78 FIRE AREA 2-DB-L1-A

A. Location: Diesel Generator Building, Levels 1 and 2

B. Drawing: AX4DJ8046

C. Description: Includes fire zone 161.

Train A diesel generator, intake filter, fan room, air plenum room, exhaust silencer room, duct penetration room.

D. Description of Boundaries

1. Level 1

- Floor - Unrated concrete basemat.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-CB-LB-A.
- South - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-NSP-LA-A.
- West - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-DB-L1-B.
  - 3-h-rated barrier separates area from 2-DB-L1-C.

2. Level 2

- Floor - Unrated barrier separates area from 2-DB-L1-C.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- West - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-DB-L1-B.
- Interior - 2-h-rated barrier separates area from stairwell.
- Ceiling - Unrated exterior area boundary.

E. Area Access

1. Level 1

- North - Unlabeled door from 2-CB-LB-A.
  - Exterior door.
- South - Class A door from 2-DB-L1-C.
  - Exterior door.

2. Level 2

- North - Class B door from stairwell.

F. Sealed Penetration

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- TV12086 - Diesel generator building outside air damper.
- TY12086 - Diesel generator building outside air damper solenoid.
- TV12094A - Diesel generator building outside air damper.
- TY12094C - Diesel generator building outside air damper solenoid.
- TY12094D - Diesel generator building outside air damper solenoid.
- TV12094B - Diesel generator building outside air damper.
- TY12094E - Diesel generator building outside air damper solenoid.
- TY12094F - Diesel generator building outside air damper solenoid.
- TV12096 - Diesel generator building outside air damper.
- TY12096 - Diesel generator building outside air damper solenoid.
- TV12097 - Diesel generator building outside air damper.
- TV12100A - Diesel generator building outside air damper.
- TY12100C - Diesel generator building outside air damper solenoid.
- TV12100 - Diesel generator building outside air damper.

- TY12100B - Diesel generator building outside air damper solenoid.
- TISH12051 - Diesel generator building temperature interlock.
- TISH12100 - Diesel generator ventilation temperature interlock.
- HV12050 - Diesel generator building fan damper.
- HV12051 - Diesel generator building fan damper.
- FE12087 - Diesel generator building ventilation flow interlock.
- FS12087 - Diesel generator building ventilation flow interlock.
- 2-1566-B7-001 - Diesel generator building fan.
- 2-1566-B7-003 - Diesel generator building fan.
- 2-2403-G4-001 - Diesel generator package.
- 2-2403-G4-001-V01 - Diesel generator air start receiver.
- 2-2403-G4-001-V02 - Diesel generator air start receiver.
- 2-2403-P5-DG1 - Diesel generator panel DG2A.
- 2-2403-P5-DG2 - Diesel generator panel DG2A.
- 2-1804-W3-CB700 - Diesel generator A cable bus.
- 2-1805-S3-ABF - Class 1E 480-V MCC 2ABF.
- TV-12086A - Diesel generator building outside air damper.
- TV-12094C - Diesel generator building outside air damper.
- TV-12094D - Diesel generator building outside air damper.
- TV-12096A - Diesel generator building outside air damper.
- TV-12097A - Diesel generator building outside air damper.
- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-2403-G4-001-F01 - Diesel Generator intake air filter.
- 2-2403-G4-001-F02 - Diesel generator exhaust silencer.

- 2-1808-T3-114 - Regulated transformer 2ABF13RX
- Train A safety related cables.

J. Nonsafety-Related Equipment

- 2-1566-B7-005 - DGB non ESF exhaust fan.
- 2-1566-U7-005 - DGB unit heater.
- 2-1566-U7-007 - DGB unit heater.
- 2-1566-U7-009 - DGB unit heater.
- 2-1566-U7-011 - DGB unit heater.
- 2-1566-U7-013 - DGB unit heater.
- 2-1566-U7-015 - DGB unit heater.
- 2-1566-U7-017 - DGB unit heater.
- 2-1566-U7-019 - DGB unit heater.
- 2-1566-U7-001 - DGB unit heater.
- 2-1566-U7-003 - DGB unit heater.
- 2-2403-G4-001-K01 - DG air start air dryer.
- 2-2403-T3-NGA - Neutral grounding cabinet.
- 2-2403-G4-001-C02 - DG air start compressor air cooler.
- 2-2403-G4-001-E02 - DG air start compressor after cooler.
- 2-2403-G4-001-K02 - DG air start air dryer.
- 2-2403-S3-001 - DG 480-V MCC.
- 2-1215-P4-019 - DGB oily waste sump pump.
- 2-1805-S3-NBG - 480-V MCC.
- PV-9080 - DG1A start air compressor to after cooler valve.
- HV-28181 - Fire protection system actuation valve.

- HV-28179 - Fire protection system actuation valve.
- HV-12052 - DGB fan damper.

- Nonsafety-related cable.

K. Combustible Loading

1. Zone No. 161

   - Fixed combustible material

     - Cable insulation
     - Cellulosic material
     - Rubber goods
     - Oil/grease
     - Plastics
     - Charcoal

   - Heat release

     - Fixed combustibles $\leq$ 629,200,000 Btu
     - Transient combustibles 106,400,000 Btu

   - Combustible loading $\leq$ 80,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 161

N. Fire Suppression

1. Automatic

   - Zone 161 preaction sprinkler system – Partial zone coverage.

2. Manual

Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Material

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting and 8-h-rated battery fixture(s) provide safe ingress/egress of personnel.

8-h-rated battery fixture(s) provide for operation of the diesel generator at the control panels.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

2. Unlabeled doors:

The unlabeled door at the north boundary (door number 22107L1104) between this area and 2CB-LB-D level 1 is fabricated of the same material of construction as that of a 3-h labeled door.

See Appendix 9B, section C.5.a(5).

3. Unrated hatch:

See section 9A.2.80.S.2.

9A.2.79 FIRE AREA 2-DB-L1-B

A. Location: Diesel Generator Building, Levels 1 and 2 and Tunnel 2T3B

B. Drawings: AX4DJ8046 and AX4DJ8041

C. Description: Includes fire zones 162 and 146A.

Train B diesel generator, intake filter, fan room, air plenum room, exhaust silencer room, duct penetration room, and Tunnel 2T3B

D. Description of Boundaries

1. Level 1

- Floor - Unrated concrete basemat.
- North - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-CB-LB-D.
- South - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 2-DB-L1-A and 2-DB-L1-C.
- East - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-DB-L1-D.

2. Level 2

- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 2-DB-L1-A.
- East - Unrated exterior area boundary.
- Interior - 2-h-rated barrier separates area from stairwell.
- Ceiling - Unrated exterior area boundary.
- Floor - 3-h-rated barrier separates area from 2-DB-L1-D.

3. Below Grade (Tunnel 2T3B)

- Floor - Unrated concrete basemat.
  - 3-h-rated barrier separates area from 2-NSP-LA-A.

- North - Unrated exterior area boundary
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-AB-LA-B.
- West - Unrated exterior boundary.
- Ceiling - Unrated exterior boundary.
  - 3-h-rated boundary separates area from 2-NSP-LA-A.

E. Area Access

1. Level 1

- North - Unlabeled door from 2-CB-LB-D.
  - Exterior door.
- South - Class A door from 2-DB-L1-D.
  - Exterior door.

2. Level 2

- West - Class B door from stairwell.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV12053 - Diesel generator building fan damper.
- HV12054 - Diesel generator building fan damper.
- TV12085 - Diesel generator building outside air damper.
- TV12095A - Diesel generator building outside air damper.
- TY12095C - Diesel generator building outside air damper solenoid.
- TY12095D - Diesel generator building outside air damper solenoid.

- TV12095B - Diesel generator building outside air damper.
- TY12095E - Diesel generator building outside air damper solenoid.
- TY12095F - Diesel generator building fan damper solenoid.
- TV12098 - Diesel generator building outside air damper.
- TY12098 - Diesel generator building outside air damper solenoid.
- TV12099 - Diesel generator building outside air damper.
- TY12099 - Diesel generator building outside air damper solenoid.
- TV12101A - Diesel generator building outside air damper.
- TY12101C - Diesel generator building outside air damper solenoid.
- TV12101 - Diesel generator building outside air damper.
- TY12101B - Diesel generator building outside air damper solenoid.
- TISH12054 - Diesel generator building temperature interlock.
- TISH12101 - Diesel generator ventilation temperature interlock.
- 2-1566-B7-002 - Diesel generator building fan.
- 2-1566-B7-004 - Diesel generator building fan.
- 2-2403-G4-002 - Diesel generator package.
- 2-2403-G4-002-V01 - Diesel generator air start receiver.
- FE12088 - Diesel generator building ventilation flow interlock.
- FS12088 - Diesel generator building ventilation flow interlock.
- 2-2403-G4-002-V02 - Diesel generator air start receiver.
- 2-2403-P5-DG3 - Diesel generator panel DG2B.
- 2-2403-P5-DG4 - Diesel generator panel DG2B.
- 2-1804-W3-CB800 - Diesel generator B cable bus.
- 2-1805-S3-BBF - Class 1E 480-V MCC 2BBF.
- TV-12085A - Diesel generator building outside air damper.

- TV-12095C - Diesel generator building outside air damper.
- TV-12095D - Diesel generator building outside air damper.
- TV-12098A - Diesel generator building outside air damper.
- TV-12099A - Diesel generator building outside air damper.
- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-2403-G4-002-F01 - Diesel generator intake air filter.
- 2-2403-G4-002-F02 - Diesel generator exhaust silencer.
- Train B safety-related cables.
- 2-1808-T3-115 - Regulated transformer 2BBF13RX.

J. Nonsafety-Related Equipment

- 2-1566-B7-006 - DGB non ESF exhaust fan.
- 2-1566-U7-002 - DGB unit heater.
- 2-1566-U7-004 - DGB unit heater.
- 2-1566-U7-006 - DGB unit heater.
- 2-1566-U7-008 - DGB unit heater.
- 2-1566-U7-010 - DGB unit heater.
- 2-1566-U7-012 - DGB unit heater.
- 2-1566-U7-014 - DGB unit heater.
- 2-1566-U7-016 - DGB unit heater.
- 2-1566-U7-018 - DGB unit heater.
- 2-1566-U7-020 - DGB unit heater.
- 2-2403-G4-002-K01 - DG air start air dryer.
- 2-2403-T3-NGB - Neutral grounding cabinet.
- 2-2403-G4-002-CO2 - DG air start compressor air cooler.

- 2-2403-G4-002-E02 - DG air start compressor after cooler.
- 2-2403-G4-002-K02 - DG air start air dryer.
- 2-2403-S3-002 - DG 480-V MCC.
- 2-1215-P4-017 - DGB oily waste sump pump.
- 2-1805-S3-NBQ - 480-V MCC.
- PV-9081 - DG1B start air compressor to after cooler valve.
- HV-28180 - Fire protection system actuation valve.
- HV-28182 - Fire protection system actuation valve.
- HV-12055 - Nonsafety-related cables
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 162

- Fixed combustible material

  - Cable insulation
  - Cellulosic material
  - Rubber goods
  - Oil/grease
  - Plastics

- Heat release

  - Fixed combustibles ≤ 629,200,000 Btu
  - Transient combustibles 106,400,000 Btu

- Combustible loading ≤ 80,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 60 min

2. Zone No. 146A

- Fixed combustible material
  None.

- Heat release

  - Fixed combustibles ≤ 39,200,000 Btu
  - Transient combustibles 0 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation consideration:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 162

N. Fire Suppression

1. Automatic

   - Zone 162 preaction sprinkler system – Partial zone coverage.
   - Zone 146A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation (except fire zone 146A). For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be

operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting and 8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide for operation of the diesel generator at the control panels.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unlabeled doors:

   The unlabeled door at the north boundary (door number 22107L1101) between this area and 2CB-LB-A level 1 is fabricated of the same material of construction as that of a 3-h labeled door.

   See Appendix 9B, section C.5.a(5).

3. Unrated hatch:

   See section 9A.2.81.S.2.

9A.2.80 FIRE AREA 2-DB-L1-C

A. Location: Diesel Generator Building, Level 1

B. Drawing: AX4DJ8046

C. Description: Includes fire zone 163.

Train A fuel oil day tank room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- Ceiling - 3-h-rated barrier separates area from 2-DB-L1-A.
- North - 3-h-rated barrier separates area from 2-DB-L1-A.
- South - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-DB-L1-B.
- West - 3-h-rated barrier separates area from 2-DB-L1-A.

E. Area Access

- North - Class A door from 2-DB-L1-A.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-2403-T4-003 - Diesel fuel oil day tank.
- LSH 9020 - Diesel fuel oil storage tank pump interlock.
- LSL 9020 - Diesel fuel oil storage tank pump interlock.
- LSLL 9020 - Diesel fuel oil storage tank pump interlock.
- Train A safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 2-1566-B7-007 - DGB non-ESF exhaust fan.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 163

- Fixed combustible material
  - Oil/grease
- Heat release
  - Fixed combustibles 189,200,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 1,727,273 Btu/ft^2
- Fire severity (wood equivalent) 1,295 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 163

N. Fire Suppression

1. Automatic
   - Zone 163 preaction sprinkler system - Total zone coverage.
2. Manual

Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unrated hatch:

   A hatch cover is located in the ceiling of the Train A fuel oil day tank room separating the tank room from the rest of the Train A diesel generator building (fire area 2-DB-L1-A). The hatch opening is 3 ft x 7 ft and is used to facilitate access to various manual valve operators. The opening is closed by an access hatch that is fabricated of the same material and methods of construction as that of a 3-h-labeled fire door.

   An "A" label is maintained on the hatch to ensure surveillance per 3-h rating criteria.

   The fire area boundary containing the unrated hatch cover does not separate redundant safe shutdown components.

9A.2.81 FIRE AREA 2-DB-L1-D

A. Location: Diesel Generator Building, Level 1

B. Drawing: AX4DJ8046

C. Description: Includes fire zone 164.

Train B fuel oil day tank room.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- Ceiling - 3-h-rated barrier separates area from 2-DB-L1-B.
- North - 3-h-rated barrier separates area from 2-DB-L1-B.
- South - Unrated exterior area boundary.
- West - 3-h-rated barrier separates area from 2-DB-L1-B.
- East - Unrated exterior area boundary.

E. Area Access

- North - Class A door from 2-DB-L1-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-2403-T4-004 - Diesel fuel oil storage tank.
- LSH 9021 - Diesel fuel oil storage tank pump interlock.
- LSL 9021 - Diesel fuel oil storage tank pump interlock.
- LSLL 9021 - Diesel fuel oil storage tank pump interlock.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

- 2-1566-B7-008 - DGB non-ESF exhaust fan.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 164

   - Fixed combustible material
     - Oil/grease
   - Heat release
     - Fixed combustibles 189,200,000 Btu
     - Transient combustibles 800,000 Btu
   - Combustible loading 1,727,273 Btu/ft^2
   - Fire severity (wood equivalent) 1,295 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 164

N. Fire Suppression

1. Automatic
   - Zone 164 preaction sprinkler system - Total zone coverage.
2. Manual

Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream. Independent Seismic Category 1 dry standpipe system provides alternate source of water for post-SSE firefighting.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

8-h-rated battery fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Unrated hatch:

   A hatch cover is located in the ceiling of the Train B fuel oil day tank room separating the tank room from the rest of the Train B diesel generator building (fire area 2-DB-L1-B). The hatch opening is 3 ft x 7 ft and is used to facilitate access to various manual valve operators. The opening is closed by an access hatch that is fabricated of the same material and methods of construction as a 3-h-labeled fire door.

   The fire area boundary containing the unrated hatch cover does not separate redundant safe shutdown components.

9A.2.82 FIRE AREA 2-DPB-A

A. Location: Diesel Fuel Oil Storage Tank Pumphouse, train A; el 211 ft-6 in.

B. Drawing: AX4DJ8046

C. Description: Includes fire zone 165.

D. Description of Boundaries

- Floor - Unrated concrete basemat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated below-grade exterior area boundary.
- South - Unrated below-grade exterior area boundary.
- East - 3-h-rated barrier separates area from 2-DPB-B.
- West - Unrated below-grade exterior area boundary.

E. Area Access

- East - Class A door from 2-DPB-B.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-2403-P4-001 - Diesel fuel oil storage tank pump.
- 2-2403-P4-002 - Diesel fuel oil storage tank pump.
- 2-2403-T4-001 - Diesel fuel oil storage tank.
- Train A safe shutdown cables

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

1. Zone No. 165

- Fixed combustible material
  - Oil/grease
- Heat release
  - Fixed combustibles 21,106,400,000 Btu
  - Transient combustible 800,000 Btu
- Combustible loading 15,040,000 Btu/ft^2
- Fire severity (wood equivalent) 11,280 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 165

N. Fire Suppression

1. Automatic

   - Zone 165 - No zone coverage.

2. Manual

   Hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire area is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9A.2.83 FIRE AREA 2-DPB-B

A. Location: Diesel Fuel Oil Storage Tank Pumphouse, train B, el 211 ft - 6 in. and el 222 ft - 0 in.

B. Drawing: AX4DJ8046

C. Description: Includes fire zone 166.

D. Description of Boundaries

1. Elevation 211 ft - 6 in.

   - Floor - Unrated concrete basemat.
   - Ceiling - Unrated exterior area boundary.
   - East - Unrated below grade exterior area boundary.
   - South - Unrated below grade exterior area boundary.
   - West - 3-h-rated barrier separates area from 2-DPB-A.
   - North - Unrated below grade exterior area boundary.

2. Elevation 222 ft - 6 in.

   - North - Unrated exterior area boundary.
   - South - Unrated exterior area boundary.
   - East - Unrated exterior area boundary.
   - West - Unrated exterior area boundary.

E. Area Access

1. Elevation 211 ft - 6 in.

   - West - Class A door from 2-DPB-A.

2. Elevation 222 ft - 0 in.

   - South - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- 2-2403-T4-002 - Diesel fuel oil storage tank.
- 2-2403-P4-003 - Diesel fuel oil storage tank pump.
- 2-2403-P4-004 - Diesel fuel oil storage tank pump.
- Train B safe shutdown cables.

I. Safety-Related Equipment

No major equipment other than safe shutdown equipment.

J. Nonsafety-Related Equipment

No major equipment.

K. Combustible Loading

Zone No. 166

- Fixed combustible material
  - Oil/grease
- Heat release
  - Fixed combustibles 12,106,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading 7,761,026 Btu/ft^2
- Fire severity (wood equivalent) 5,821 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train A.
2. Special operational and design considerations:

   None.
3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 166

N. Fire Suppression

1. Automatic

   - Zone 166 - No zone coverage.

2. Manual

   Hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1)

9A.2.84 FIRE AREA 2-AFB-A

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8047

C. Description: Includes fire zone 155.

Auxiliary feedwater pump room, train B.

D. Description of Boundaries

- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- East - 3-h-rated barrier separates area from 2-AFB-B.
- South - 3-h-rated barrier separates area from 2-AFB-C.
- West - Unrated exterior area boundary.
- Floor - Unrated concrete basemat.

E. Area Access

- North - Exterior Door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

F. Safe Shutdown Components

- HV5118 - Auxiliary feedwater pump B suction valve.
- FV5154 - Auxiliary feedwater pump B miniflow valve.
- FT5154 - Auxiliary feedwater pump B valve.
- HV12005 - Auxiliary feedwater pump room B fan damper.
- TIS12005 - Auxiliary feedwater pump room B fan Interlock.
- 2-1302-P4-002 - Auxiliary feedwater pump B.
- 2-1593-B7-002 - Auxiliary feedwater pump room B fan.

- Train B safe shutdown cables.

I. Safety-Related Equipment

- 2-1302-P5-FWB - Vibration amplifier housing.

- Train B safety-related cables.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

G. Zone No. 155

- Fixed combustible material

  None.

- Heat release

  - Fixed combustibles ≤18,600,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading ≤ 40,000 Btu/ft^2

- Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

H. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 155

N. Fire Suppression

1. Automatic

- Zone 155 preaction sprinkler system – Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

I. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.6.a(1)

9A.2.85 FIRE AREA 2-AFB-B

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8047

C. Description: Includes fire zone 156.

Auxiliary feedwater pump room, train A

J. Description of Boundaries

- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- South - 3-h-rated barrier separates area from 2-AFB-C.
- West - 3-h-rated barrier separates area from 2-AFB-A.
- Floor - Unrated concrete basemat.

K. Area Access

- North - Exterior Door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV5119 - Auxiliary feedwater pump A suction valve.
- FV5155 - Auxiliary feedwater pump A mini flow valve.
- FT5155 - Auxiliary feedwater pump A valve.
- HV12006 - Auxiliary feedwater pump room A fan damper.
- TIS12006 - Auxiliary feedwater pump room A fan interlock.
- 2-1302-P4-003 - Auxiliary feedwater pump A.
- 2-1593-B7-001 - Auxiliary feedwater pump room A fan.

- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1302-P5-FWC - Vibration amplifier housing.
- Train A safety-related cables.

J. Nonsafety-Related Equipment.

- 2-1593-U7-001 - Unit heater.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 156

   - Fixed combustible material

     None.

   - Heat release

     - Fixed combustibles ≤ 18,600,000 Btu
     - Transient combustibles 400,000 Btu

   - Combustible loading ≤40,000 Btu/ft^2

   - Fire severity (wood equivalent) ≤30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown Train B.
2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 156

N. Fire Suppression

1. Automatic

- Zone 156 preaction sprinkler system - Total zone coverage.

2. Manual

Hose stations (with portable extinguishers) are conveniently located to each area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

S. Deviations and Justifications

Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

9A.2.86 FIRE AREA 2-AFB-C

A. Location: Auxiliary Feedwater Pumphouse and Tunnels 2T6A and 2T6B

B. Drawings: AX4DJ8041, AX4DJ8044, and AX4DJ8047

C. Description: Includes fire zones 157A, 193, and 194.

Train C auxiliary feedwater pump room and tunnels 2T6A and 2T6B

D. Description of Boundaries

1. Pump House

- Floor - Unrated concrete basemat.
- Ceiling - Unrated exterior area boundary.
- North - 3-h-rated barrier separates area from 2-AFB-A and 2-AFB-B.
- West - Unrated exterior area boundary.
  - 3-h-rated barrier separates area from 2-AFB-D.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.

2. Tunnel 2T6A

- Floor - Unrated concrete basemat.
- West - Unrated below-grade exterior area boundary.
- South - Unrated below-grade exterior area boundary.
- East - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 2-AB-LA-D.
- Ceiling - Unrated exterior area boundary.

3. Tunnel 2T6B

- Floor - Unrated concrete basemat.
  - 3-h-rated barrier separates area from 2-CB-LA-A.
- North - Unrated exterior area boundary.
  - Unrated below-grade exterior area boundary.

- South - 3-h-rated barrier separates area from 2-EB-B.
- East - Unrated exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- West - Class A door from 2-AFB-D.
- South - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV5106 - Steam to auxiliary feedwater pump turbine.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

I. Safety-Related Equipment

- 2-1302-P5-FWA - Vibration amplifier housing.
- 2-1302-P4-001 - Auxiliary feedwater pump turbine driver.
- 2-1302-P5-AFT - Auxiliary feedwater TD control panel.
- 2-1302-P5-AFP - Auxiliary feedwater TD panel.
- Train A safety-related cables.
- Train B safety-related cables.

a. Spurious actuation concern and separation concerns eliminated by the operational considerations of paragraph L.

J. Nonsafety-Related Equipment

- 2-1593-U7-003 - Unit heater.
- 2-1593-U7-004 - Unit heater.
- 2-1593-U7-005 - Unit heater.
- 2-1593-U7-006 - Unit heater.
- 2-1215-P4-021 - Auxiliary feedwater sump pump.
- 2-1215-P4-020 - Auxiliary feedwater sump pump.
- 2-1593-B7-003 - Auxiliary feedwater pump house exhaust fan.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 157A

- Fixed combustible material
  - Oil/grease
- Heat release
  - Fixed combustibles $\leq$ 56,140,000 Btu
  - Transient combustibles 1,460,000 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

2. Zone No. 193

- Fixed combustible material

  None.
- Heat release
  - Fixed combustibles $\leq$18,000,000 Btu
  - Transient combustibles 0 Btu
- Combustible loading $\leq$ 40,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 194

   - Fixed combustible material

     None.

   - Heat release

     - Fixed combustibles $\leq$ 43,400,000 Btu
     - Transient combustibles 0 Btu

   - Combustible loading $\leq$ 40,000 Btu/ft^2

   - Fire severity (wood equivalent) $\leq$ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A or B.

2. Special operational and design considerations:

   Local level indicators LI-5100 and LI-5115 are available should fire damage to the condensate storage tank level transmitter cables result in loss of level indication in the control room due to a fire in this fire area.

3. Spurious actuation consideration:

   The turbine-driven auxiliary feedwater pump, 2-1302-P4-001, may start due to fire damage to HV-5106 circuits in this fire area.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 157A

N. Fire Suppression

1. Automatic

   - Zone 157A preaction sprinkler system - Partial zone coverage.

   - Zone 193 - No zone coverage.

   - Zone 194 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

Smoke can be removed using the normal ventilation system in a once-through-only mode of operation. For areas isolated by fire dampers, smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside. The mechanical ventilation system which could be used to remove smoke from this area may not be operational because electrical cables and/or equipment associated with its operation are located in the fire area.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide for operation of the turbine-driven auxiliary feedwater system including the ability to trip valve PV-15129.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1)

2. Embedded conduits:

   Conduits 2BE373RL008, 2BE373RS009, and 2BE373RX011 are embedded in the floor of fire zone 193 of this fire area. These conduits contain cables which could change the results of the safe shutdown analysis as presented in Paragraph L if they were to be damaged by a fire in this fire area. While it is anticipated that these conduits are embedded to a depth to ensure fire protection equivalent to a 3-h fire barrier, only 4.3 in. of concrete coverage over the conduit can be verified to exist.

   Modification of the facility to relocate the cables in these embedded conduits or to otherwise provide additional protection is not warranted because the minimum concrete coverage over the conduits (equivalent to approximately 110 minutes of protection per figure 5-8F of the NFPA Fire Protection Handbook - Fifteenth Edition) provides a margin of safety of at lease 100 percent above the calculated combustible loading for the location.

9A.2.87 FIRE AREA 2-AFB-D

A. Location: Auxiliary Feedwater Pumphouse

B. Drawing: AX4DJ8047

C. Description: Includes fire zone 157B.

Condensate storage tank room

D. Description of Boundaries (Levels 1 and 2)

- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- West - Unrated exterior barrier separates area from condensate storage tanks 1 and 2.
- East - 3-h-rated barrier separates area from 2-AFB-C.
- Floor (level 1) - Unrated concrete basemat.
- Ceiling (level 2) - Unrated exterior area boundary.

E. Area Access

- East - Class A door from 2-AFB-C.
- North - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- LT5101 - CST 1 level transmitter.
- LT5104 - CST 2 level transmitter.
- LT5111 - CST 1 level transmitter.
- LT5116 - CST 2 level transmitter.
- LI5100 - CST 1 local level indicator.

- LI5115 - CST 2 local level indicator.
- 2-1302-V4-001 - Condensate storage tank 1.
- 2-1302-V4-002 - Condensate storage tank 2.
- Train A safe shutdown cables.[a]
- Train B safe shutdown cables.[a]

I. Safety-Related Equipment

- HV5087 - Condensate storage tank outlet valve.
- HV5088 - Condensate storage tank outlet valve.

J. Nonsafety-Related Equipment

- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 157B

   - Fixed combustible material

     None.

   - Heat release

- Fixed combustibles	≤ 20,800,000 Btu
- Transient combustibles	400,000 Btu

   - Combustible loading ≤ 40,000 Btu/ft^2
   - Fire severity (wood equivalent) ≤ 30 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area use safe shutdown Train A or B.

---

a. Separation concerns eliminated by the operational considerations of paragraph L.

2. Special operational and design considerations:

   Local level indicators LI-5100 and LI-5115 are available should fire damage to the condensate storage tank level transmitters and/or their associated electrical cables result in loss of level indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zone:

- Zone 157B

N. Fire Suppression

1. Automatic

   - Zone 157B - No zone coverage.

2. Manual

   Hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None

P. Ventilation

The fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixture(s) provide the capability to read local condensate storage tank level indicators LI-5100 and LI-5115.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

See Appendix 9B, section C.5.a(1).

2. Separation by distance without full area suppression:

Fire area 2-AFB-D contains both the Trains A and B level transmitters for both condensate storage tanks 2-1302-V4-001 (LT-5101 and LT-5111) and 2-1302-V4-002 (LT-5104 and LT-5116) and their associated electrical cables. While approximately 16 horizontal ft of separation exist between the redundant level transmitters for each tank, the circuits for the transmitters have less separation (cable cross in one case). This fire area is not provided with an automatic fire suppression system, but the fire detection system will alert the plant operators should a fire occur. The combustible loadings in this area are very small, lending to easy extinguishment of a fire using manual fire fighting equipment. The local level indicators (LI-5100 and LI-5115) are located at the rear of the area where a fire, if one should occur, would not result in damage to the local indicator and both sets of level transmitter and the electrical cables. Should a fire occur in this area no other safe shutdown equipment or electrical cables are jeopardized. Providing a full area automatic fire suppression system or installation of a fire barrier to achieve greater separation would not significantly improve the existing capability to achieve safe shutdown.

9A.2.88 FIRE AREA 2-NSP-LA-A

A. Location: Nuclear Service Cooling Water (NSCW) Pumphouse train A

B. Drawings: AX4DJ8041 and AX4DJ8048

C. Description: Includes fire zones 145 and 160A.

Train A NSCW pumphouse, cooling tower, and tunnels 2T2A, 2T3A, and 2T5A

D. Description of Boundaries

1. Cooling tower and pump house

- Floor - Unrated concrete basemat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

2. Tunnels 2T2A, 2T5A, and 2T3A

- Floor - Unrated concrete basemat.
  - 3-h-rated barrier separates 2-NSP-LA-A from 2-DB-L1-B. (Tunnel 2T3B passes under tunnels 2T2A and 2T5A)
- Ceiling - Unrated exterior area boundary.
  - 3-h-rated barrier separates 2-NSP-LA-A from 2-DB-L1-B. (Tunnel 2T3B passes over tunnel 2T3A.)
- North - Unrated below grade exterior area boundary.
  - 3-h-rated barrier separates area from 2-DB-L1-A.
- East - Unrated below-grade exterior area boundary.
  - 3-h-rated barrier separates area from 2-AB-LD-G.
- West - Unrated below-grade exterior area boundary.

E. Area Access

- North - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV1668A - "A" nuclear service cooling water tower valve.
- HV1668B - "A" nuclear service cooling water tower bypass valve.
- TE1668 - "A" nuclear service cooling water tower bypass interlock.
- HV11600 - Nuclear service cooling water pump 001 valve.
- HV11605 - Nuclear service cooling water pump 005 valve.
- HV11606 - Nuclear service cooling water pump 003 valve.
- TE11641 - Nuclear service cooling water pump 001 fan F01 interlock.
- TE11642 - Nuclear service cooling water pump 001 fan F02 interlock.
- TE11643 - Nuclear service cooling water pump 001 fan F03 interlock.
- TE11644 - Nuclear service cooling water pump 001 fan F04 interlock.
- 2-1202-P4-001 - Nuclear service cooling water pump 001.
- 2-1202-P4-003 - Nuclear service cooling water pump 003.
- 2-1202-P4-005 - Nuclear service cooling water pump 005.
- 2-1202-W4-001 - Nuclear service cooling water cooling tower.
- 2-1202-W4-001-F01 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-001-F02 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-001-F03 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-001-F04 - Nuclear service cooling water cooling tower fan.

- Train A safe shutdown cables.

I. Safety-Related Equipment

- 2-1202-P4-007 - Train B nuclear service cooling water transfer pump.
- CV-9446 - NSCW tower blowdown valve.
- Train A safety-related cables.

J. Nonsafety-Related Equipment

- 2-1817-U3-010 Heat tracing panel.
- Nonsafety-related cables.

K. Combustible Loadings

1. Zone No. 145

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustibles $\leq$ 330,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 240,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$180 min

2. Zone No. 160A

- Fixed combustible material
  - Cable insulation
  - Oil/grease
  - Plastics
- Heat release
  - Fixed combustibles $\leq$ 174,400,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 80,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train B.

2. Special operational and design considerations:

   None.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 145
- Zone 160A

N. Fire Suppression

1. Automatic

   - Zone 145 preaction sprinkler system – Partial zone coverage.
   - Zone 160A - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from this area is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/egress of personnel.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Safety-related cable trays without automatic fire suppression protection:

   Safety-related cable trays in fire zone 160A of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at this location satisfies the accessibility and the fire detection criteria of BTP CMEB 9.5-1, Position C.5.e, and the location has a combustible loading of less than 100,000 Btu/ft^2, which is considered low by the NFPA Fire Protection Handbook (page 5-92, 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water suppression protection for this location would not significantly increase the existing level of protection.

9A.2.89 FIRE AREA 2-NSP-LA-B

A. Location: NSCW Pumphouse, train B

B. Drawings: AX4DJ8041 and AX4DJ8048

C. Description: Includes fire zones 146, 160B, and 188.

Train B NSCW: pumphouse, cooling tower, refueling water storage tank, reactor makeup water storage tank, and tunnels 2T2B, 2T5B.

D. Description of Boundaries

1. Cooling tower and pumphouse

- Floor - Unrated concrete basemat.
- Ceiling - Unrated exterior area boundary.
- North - Unrated exterior area boundary.
- South - Unrated exterior area boundary.
- East - Unrated exterior area boundary.
- West - Unrated exterior area boundary.

2. Tunnels 2T2B, 2T5B, refueling water storage tank, reactor makeup storage tank

- Floor - Unrated concrete basemat.
- North - 3-h-rated barrier separates area from 2-AB-LA-B.
- East - Unrated below grade exterior area boundary.
- West - Unrated below grade exterior area boundary.
- Ceiling - Unrated exterior area boundary.

E. Area Access

- West - Exterior door.

F. Sealed Penetrations

Seals meet or exceed fire barrier ratings.

G. Fire Dampers

Dampers meet or exceed fire barrier ratings.

H. Safe Shutdown Components

- HV11607 - Nuclear service cooling water pump 002 valve.
- HV11612 - Nuclear service cooling water pump 006 valve.
- HV11613 - Nuclear service cooling water pump 004 valve.
- TE11646 - Nuclear service cooling water tower 002 fan F01 interlock.
- TE11647 - Nuclear service cooling water tower 002 fan F02 interlock.
- TE11648 - Nuclear service cooling water tower 002 fan F03 interlock.
- TE11649 - Nuclear service cooling water tower 002 fan F04 interlock.
- TE1669 - "B" nuclear service cooling water tower bypass interlock.
- HV1669A - "B" nuclear service cooling water tower valve.
- HV1669B - "B" nuclear service cooling water tower bypass valve.
- 2-1202-P4-002 - Nuclear service cooling water pump 002.
- 2-1202-P4-004 - Nuclear service cooling water pump 004.
- 2-1202-P4-006 - Nuclear service cooling water pump 006.
- 2-1204-T4-001 - Refueling water storage tank.
- 2-1202-W4-002 - Nuclear service cooling water cooling tower.
- 2-1202-W4-002-F01 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-002-F02 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-002-F03 - Nuclear service cooling water cooling tower fan.
- 2-1202-W4-002-F04 - Nuclear service cooling water cooling tower fan.
- LT0990 - RWST level.
- LT0991 - RWST level.
- LI0990C - RWST local level indication.
- Train B safe shutdown cables.
- Train A safe shutdown cables. (Separation concerns eliminated by the

operational considerations of paragraph L.)

I. Safety-Related Equipment

- 2-1202-P4-008 - Train A nuclear service cooling water transfer pump.
- 2-1228-T4-001 - Reactor makeup water storage tank.
- HV-10957 - RWST sludge mixing isolation valve.
- HV-10958 - RWST sludge mixing isolation valve.
- CV-9447 - NSCW tower blowdown valve.
- Train B safety-related cables.

J. Nonsafety-Related Equipment

- 2-1817-U3-006 - Heat tracing panel.
- 2-1817-U3-005A - Heat trace cables (normal) reactor makeup.
- 2-1817-T3-005A - Transformer - Heat trace reactor makeup water.
- 2-1817-U3-005B - Heat trace cables (standby) reactor makeup.
- HV7733B - Reactor makeup storage tank.
- LV7751 - Vacuum degasifier.
- Nonsafety-related cables.

K. Combustible Loading

1. Zone No. 146

- Fixed combustible material
  - Cable insulation
- Heat release
  - Fixed combustible $\leq$ 409,600,000 Btu
  - Transient combustibles 800,000 Btu
- Combustible loading $\leq$ 240,000 Btu/ft^2
- Fire severity (wood equivalent) $\leq$ 180 min

2. Zone No. 188

- Fixed combustible material

  - Cellulosic materials
  - Plastics
  - Rubber goods

- Heat release

  - Fixed combustibles $\leq$ 7,200,000 Btu
  - Transient combustibles 400,000 Btu

- Combustible loading $\leq$ 40,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 30 min

3. Zone No. 160B

- Fixed combustible material

  - Cable insulation
  - Oil/grease
  - Plastics

- Heat release

  - Fixed combustibles $\leq$174,400,000 Btu
  - Transient combustibles 800,000 Btu

- Combustible loading $\leq$ 80,000 Btu/ft^2

- Fire severity (wood equivalent) $\leq$ 60 min

L. Evaluation of Safe Shutdown Capability

1. For a fire in this area, use safe shutdown train A.

2. Special operational and design considerations:

   Local level indicator LI-0990C is available should fire damage to the refueling water storage tank level transmitter cables in fire zone 146 result in loss of level indication in the control room due to a fire in this fire area.

3. Spurious actuation considerations:

   None.

M. Fire Detection

Early warning fire detectors are installed within the following zones:

- Zone 146
- Zone 160B

N. Fire Suppression

1. Automatic

   - Zone 146 - Partial zone coverage.
   - Zone 160B - No zone coverage.
   - Zone 188 - No zone coverage.

2. Manual

   Hose stations (with portable extinguishers) and hydrant and equipment house are conveniently located to this area. Any location can be reached with at least one effective water stream.

O. Radioactive Materials

None.

P. Ventilation

This fire area is not serviced by a ventilation system that can be used for removing smoke. Smoke may be removed by portable fans using flexible tubes to direct the smoke to an area capable of being ventilated or directly to the outside.

Q. Drainage

A flooding analysis has determined that drainage from the fire areas is adequate.

R. Emergency Lighting

Security lighting fixture(s) provide safe ingress/ egress of personnel.

8-h-rated battery fixtures(s) provide the capability to read the local refueling water storage tank level indicator LI-0990C.

S. Deviations and Justifications

1. Unrated exterior fire area boundary:

   See Appendix 9B, section C.5.a(1).

2. Separation by distance without full area suppression:

   Fire area 2-NSP-LA-B contains both the trains A and B level transmitters for the refueling water storage tank (LT-0990 and LT-0991) and their associated electrical cables. While approximately 25 horizontal ft of separation exists between the redundant level transmitters and their associated electrical cables in fire zone 188 (RWST tank room), the cables for the transmitters have less separation (approximately 12 horizontal ft) in the fire zone 146 (NSCW pipe and electrical tunnels). This fire area is provided with an automatic fire suppression system but only in the NSCW electrical tunnel (part of fire zone 146). The combustible loading in fire zone 188 is very small and the NSCW piping tunnel (other part of fire zone 146) is devoid of combustible material. The local level indicator (LI-0990C) is located at one side of fire zone 146 where, if a fire were to occur, it would not jeopardize the redundant remote level indication cables and the local reading device. Providing a full area automatic fire suppression system or installation of a fire barrier to achieve greater separation would not significantly improve the existing capability to achieve safe shutdown.

3. Safety-related cable trays without automatic fire suppression protection:

   Safety-related cable trays in fire zone 160B of this fire area are not protected from the effects of a potential exposure fire by automatic fire suppression systems. The fire protection capability provided at this location satisfies the accessibility and the fire detection criteria of BTP CMEB 9.5-1, Position C.5.e, and the location has a combustible loading of less than 100,000 Btu/ft^2, which is considered low by NFPA Fire Protection Handbook (page 5-92, 15th Edition). While these cable trays do contain cables required to achieve and maintain hot shutdown, only one train of safe shutdown capability could be damaged as a result of a fire in the fire area. Providing automatic water fire suppression protection for this location would not significantly increase the existing level of protection.

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APPENDIX 9B

COMPARISON OF VEGP UNITS 1 AND 2 WITH REQUIREMENTS OF THE BRANCH TECHNICAL POSITION CMEB 9.5-1

This appendix compares Units 1 and 2 of VEGP with requirements of the Nuclear Regulatory Commission Branch Technical Position CMEB 9.5-1.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
C. Position		C. Position
C.1. Fire Protection Program Requirements		C.1. Fire Protection Program Requirements
C.1.a. Fire Protection Program		C.1.a. Fire Protection Program
A fire protection program should be established at each nuclear power plant. The program should establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.		The fire protection program establishes the policy for protection of structures, systems, and components important to safety. It is implemented through procedures, equipment, and adequately trained personnel.
(1) The fire protection program should be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.	Conforms	(1) The vice president-Vogtle, having the necessary authority and staff, has overall responsibility for the fire protection program.
(2) The fire protection program should extend the concept of defense-indepth to fire protection in fire areas important to safety, with the following objectives:	Conforms	(2) The fire protection program extends the concept of defense-in-depth to fire protection in safe shutdown fire areas in the following manner:
• To prevent fires from starting.		• Fire prevention is based on the elimination of combustibles where feasible and minimization of combustibles in areas where elimination is not feasible. Administrative procedures are used to control potential ignition sources.
• To detect rapidly, control, and extinguish promptly those fires that do occur.		• Equipment required for safe shutdown is protected by a combination of automatic fire detection systems, suppression systems, manual hose stations, and/or portable extinguishers.
• To provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.		• A trained fire brigade is onsite to use the manual hose stations and portable extinguishers.
		• Redundant trains of safe shutdown structures, systems, and components are protected as described in Section C.5.b.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(3) Responsibility for the overall fire protection program should be assigned to a person who has management control over all organizations involved in fire protection activities. Formulation and assurance of program implementation may be delegated to a staff composed of personnel prepared by training and experience in fire protection and personnel prepared by training and experience in nuclear plant safety to provide a balanced approach in directing the fire protection program for the nuclear power plant.	Conforms	(3) The vice president-Vogtle is given overall management responsibility for the fire protection program. The formulation and assurance of program implementation is delegated to the fire protection engineer (FPE). The Operations shift is responsible for manning the fire brigade. The Operations shift is trained and experienced in nuclear plant fire protection and plant safety systems operation.
The staff should be responsible for:		
(a) Fire protection program requirements, including consideration of potential hazards associated with postulated fires, knowledge of building layout and systems design.	Conforms	(a) The fire fighting procedures delineate the potential hazards of a fire. They also give building layout. At least 3 members of each shift's fire brigade are knowledgeable of the design and operation of plant safety systems.
(b) Post-fire shutdown capability.	Conforms	(b) Plant personnel are responsible for development of post-fire safe shutdown procedures.
(c) Design, maintenance, surveillance, and quality assurance of all fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment).	Conforms	(c) Programs of preventive maintenance, surveillance, and quality assurance are established to ensure that the fire detection and suppression systems are operable and that all fire area boundaries and fire fighting equipment are in place.
(d) Fire prevention activities (administrative controls and training).	Conforms	(d) The FPE is responsible for formulation and implementation of fire prevention administrative controls. The plant training manager is responsible for the formulation and implementation of the fire training program.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(e) Fire brigade organization and training.	Conforms	(e) The fire brigade consists of one fire team per shift having at least five team members each. Each team has a fire team captain who is responsible for the fire fighting activities at the fire scene. The plant training manager is responsible for ensuring that team members receive adequate training.
(f) Prefire planning.	Conforms	(f) The fire fighting procedures are used as prefire plans.
(4) The organizational responsibilities and lines of communication pertaining to fire protection should be defined between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. The following positions/organizations should be designated:	Conforms	(4) Organizational responsibilities and lines of communication are defined in the administrative fire protection procedures.
(a) The upper level offsite management position which has management responsibility for the formulation, implementation, and assessment of the effectiveness of the nuclear plant fire protection program.	Conforms	(a) The vice president-Vogtle is given responsibility for the effectiveness of the fire protection program.
(b) The offsite management position(s) directly responsible for formulating, implementing, and periodically assessing the effectiveness of the fire protection program for the licensee's nuclear power plant, including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments should be reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary.	Conforms	(b) The vice president-Vogtle is responsible for evaluating the effectiveness of fire drills and training conducted by plant personnel.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(c) The onsite management position responsible for the overall administration of the plant operations and emergency plans which include the fire protection and prevention program and which provide a single point of control and contact for all contingencies.	Conforms	(c) The onsite responsibility for the fire protection program and emergency plans rest with the vice president-Vogtle.
(d) The onsite position(s) which:	Conforms	(d)
i. Implements periodic inspections to: minimize the amount of combustibles in safety-related areas; determine the effectiveness of housekeeping practices; assure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire retardant coatings; assure that prompt and effective corrective actions are taken to correct conditions adverse to fire protection, and preclude their recurrence.		i. The engineering director is responsible for implementation of the fire protection program. The FPE and/or fire protection system engineer (FPSE) are responsible for the referenced duties.

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ii. Is responsible for the fire fighting training for operating plant personnel and the plant's fire brigade; design and selection of equipment; periodic inspection and testing of fire protection systems and equipment in accordance with established procedures; evaluation of test results; and determination of the acceptability of the systems under test.	Conforms	ii. The plant training manager has overall responsibility for implementing the fire training program. The maintenance manager is responsible for tests, inspections, and calibration of fire protection equipment. All tests are performed and results evaluated in accordance with established procedures. The operations manager is responsible for other surveillance tests and inspections of fire protection equipment assigned to operations.
iii. Assists in the critique of all fire drills to determine how well the training objectives have been met.	Conforms	iii. The FPE, FPSE, and/or fire training instructor will assist in the critique of the fire drill effectiveness.
iv. Reviews and evaluates proposed work activities to identify potential transient fire loads.	Conforms	iv. The plant work process/ implementation personnel are responsible for evaluating proposed work activities to identity potential transient fire loads.
v. Implements a program for indoctrination of all plant contractor personnel in appropriate administrative procedures which implement the fire protection program and the emergency procedures relative to fire protection.	Conforms	v. The plant training manager is responsible for implementing the fire training program which includes indoctrination of plant contractor personnel in fire protection administrative controls.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
vi. Implements a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.	Conforms	vi. The plant training manager is responsible for instructing appropriate personnel on the proper handling of accidental leaks or spills of hazardous materials as described in the plant administrative procedures.
(e) The onsite position responsible for fire protection quality assurance. This position should be responsible for assuring the effective implementation of the fire protection program by planned inspections, scheduled audits, and verification that the results of these inspections by audits are promptly reported to cognizant management personnel.	Conforms	(e) The QA supervisor is responsible for the auditing of the fire protection program as part of the overall VEGP QA program.
(f) The positions which are part of the plant fire brigade:		(f)
i. The plant fire brigade positions should be responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire protection should be clearly defined.	Conforms	i. The authority and responsibility of the brigade members are described in the administrative fire procedures.
ii. The responsibilities of each fire brigade position should correspond with the actions required by the fire fighting procedures.	Conforms	ii. The fire fighting procedures do not require action. They are guidance documents used for quick reference and training purposes. The fire training program ensures that all plant personnel know their responsibilities in the event of a fire.
iii. The responsibilities of the fire brigade members under normal plant conditions should not conflict with their responsibilities during a fire emergency.	Conforms	iii. One of the three plant equipment operators (required per shift) can participate as a fire brigade member, consistent with the Emergency Plan.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
iv. The minimum number of trained fire brigade members available onsite for each operating shift should be consistent with the activities required to combat the most significant fire. The size of the fire brigade should be based upon the functions required to fight fires with adequate allowance for injuries.	Conforms	iv. There will be a minimum of five trained fire brigade members for each operating shift. This team will be able to provide immediate application of two effective hose streams. Backup support will be provided as necessary from the local offsite fire department.
v. The recommendations for organization, training, and equipment of "Private Fire Brigades" as specified in NFPA No. 27-1975, including the applicable NFPA publications listed in the appendix to NFPA No. 27, are considered appropriate criteria for organizing, training, and operating a plant fire brigade.	Partial conformance	v. Applicable National Fire Protection Association (NFPA) codes are consulted during development of the fire brigade and its training. Detailed deviations from the codes are described in section 9.5.1 (table 9.5.1-9).
(5) Personnel Qualifications	Conforms	(5) The qualification requirements for personnel in the fire protection program are delineated in administrative fire protection procedures. In addition to site personnel, VEGP has access to engineers as consultants who meet the eligibility requirements for membership in the Society of Fire Protection Engineers.
(a) The position responsible for formulation and implementation of the fire protection program should have within his organization, or as a consultant, a fire protection engineer who is a graduate of an engineering curriculum of accepted standing and shall have completed not less than 6 years of engineering attainment indicative of growth in engineering competency and achievement, 3 years of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a member in the Society of Fire Protection Engineers.		
(b) The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity, and of the fire brigade training described in Position C.3.d.	Conforms	

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(c) The personnel responsible for the maintenance and testing of the fire protection systems should be qualified by training and experience for such work.	Conforms	
(d) The personnel responsible for the training of the fire brigade should be qualified by training and experience for such work.	Conforms	
(6) The following NFPA publications should be used for guidance to develop the fire protection program: No. 4 - "Organization for Fire Services" No. 4A - "Organization of a Fire Department" No. 6 - "Industrial Fire Loss Prevention" No. 7 - "Management of Fire Emergencies" No. 8 - "Management Responsibilities for Effects of Fire on Operations" No. 27 - "Private Fire Brigades"		(6) Those portions of the referenced NFPA codes applicable to power plants are consulted while developing the fire protection program.
(7) On sites where there is an operating reactor and construction or modification of other units is underway, the superintendent of the operating plant should have the lead responsibility for site fire protection.	Conforms	(7) Administrative procedures designate the vice president-Vogtle as having lead responsibility for site fire protection.
C.1.b. Fire Hazards Analysis The fire hazards analysis should demonstrate that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire. The fire hazards analysis should be performed by qualified fire protection and reactor systems engineers to:		C.1.b. Fire Hazards Analysis

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(1) Consider potential in situ and transient fire hazards.	Conforms	(1) The fire hazards analysis (FSAR appendix 9A) was prepared or reviewed by a qualified fire protection engineer and a qualified reactor systems engineer. The in situ combustibles capable of creating a fire were defined to the extent practicable. Transient combustible loads were assumed to be potential fire hazards and are limited by administrative controls.
(2) Determine the consequences of fire in any location in the plant on the ability to safely shut down the reactor or on the ability to minimize and control the release of radioactivity to the environment.	Conforms	(2) The fire hazards analysis evaluates the consequences of a fire within fire area on the ability to safely shut down the reactor, maintain the reactor in a safe shutdown condition, and control the release of radioactivity to the environment.
(3) Specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to safety that are in conformance with NRC guidelines and regulations.	Conforms	(3) The fire hazards analysis specifies the measures for fire prevention, fire detection, fire suppression, and fire containment and shutdown for each fire area. In some portions of the plant the fire areas are subdivided into zones for the discussion of fire detection and suppression.
"Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena.	Conforms	The fire hazards analysis did not postulate worst case fires simultaneously with other failures in safety systems.
On multiple-reactor sites, unrelated fires in two or more units need not be postulated to occur simultaneously. Fires involving facilities shared between units and fires due to man-made site-related events that have a reasonable probability of occurring and affecting more than one reactor unit (such as an aircraft crash) should be considered.	Conforms	The fire hazards analysis did not postulate unrelated fires in two units simultaneously.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety function of the structure, system, or component:		
Fire Damage Limits		Fire Damage Limits
Hot Shutdown - One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of fire damage by a single fire including an exposure fire.	Conforms	One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station will be maintained free of fire damage by a single fire including an exposure fire by meeting the separation requirements as described in Section C.5.b.
Cold Shutdown - Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire; but damage must be limited so that at least one train can be repaired or made operable within 72 h using onsite capability.	Conforms	The plant design and the fire protection program have been developed to limit damage from a single fire, including an exposure fire, so that at least one train of cold shutdown equipment can be repaired or made operable within 72 h using onsite capability.
Design Basis Accidents - Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a single exposure fire.	Conforms	Design Basis Accidents - The fire hazards analysis shows that the defense-in-depth provided for each hazard is adequate.
The most stringent fire damage limit should apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection shall be provided so that a fire within only one such system will not damage the redundant system.		
The fire hazards analysis should separately identify hazards and provide appropriate protection in locations where safety-related losses can occur as a result of:		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(1) Concentrations of combustible contents, including transient fire loads due to combustibles expected to be used in normal operations such as refueling, maintenance, and modifications.	Conforms	(1) The fire hazards analysis describes the concentrations of combustible materials located in each fire area. Combustible loadings are presented by fire zones which represent variable concentrations of combustible hazards within a fire area. Transient combustibles are considered in the fire loadings presented in the fire hazards analysis. Transient fire loads are controlled via administrative fire protection procedures.
(2) Continuity of combustible contents, furnishings, building materials, or combinations thereof in configurations conducive to fire spread.	Conforms	(2) The fire hazards analysis describes the building materials and the ratings of fire barriers for each fire area. In some portions of the plant the fire areas are subdivided into zones and the concentration of combustibles is discussed on a zone basis.
(3) Exposure fire, heat, smoke, or water exposure, including those that may necessitate evacuation from areas that are required to be attended for safe shutdown.	Conforms	(3) The fire hazards analysis indicates safe shutdown areas and whether they are to be attended for safe shutdown.
(4) Fire in control rooms or other locations having critical safety-related functions.	Conforms	(4) The fire hazards analysis addresses the control room and remote shutdown rooms.
(5) Lack of adequate access or smoke removal facilities that impede fire extinguishment in safety-related areas.	Conforms	(5) The fire hazards analysis describes the availability of smoke removal systems in all plant fire areas.
(6) Lack of explosion-prevention measures.	Conforms	(6) The fire hazards analysis includes explosion prevention protection when it is required.
(7) Loss of electric power or control circuits.	Conforms	(7) The fire hazards analysis considers loss of electric power or control circuits in each fire area.
(8) Inadvertent operation of fire suppression systems.	Partial conformance	(8) The consequences of the inadvertent operation of the fire protection system are enveloped by the flooding analysis. The impact of inadvertent operation of suppression systems is minimized through the following design features:

	CMEB 9.5-1 Requirements	VEGP Position		Clarification of Conformance or Justification of Deviation
				(1) All suppression systems in safety-related areas are either Halon or pre-action sprinkler systems. (2) The header piping and supports, up to and including sprinkler system isolation valves and all sprinkler system piping supports in proximity of safety-related equipment, are designed for SSE loads. (3) Redundant safe shutdown equipment is located in separate fire areas to the extent practical. (4) Sprinkler heads are treated as passive components, and only one head is expected to fail at any one time. (5) Drip-proof, totally enclosed or weather-protected type II motors are installed on safety-related pumps. Where the safe shutdown analysis takes credit for distance separation between redundant safe shutdown components in the same fire area, the existence and orientation of intervening structural components are reviewed in consideration of the possibility for damage during manual fire fighting activities (i.e., fire hose stream damage).
	The fire hazards analysis should verify that the NRC fire protection program guidelines have been met. The analysis should list applicable elements of the program, with explanatory statements as needed to identify location, type of system, and design criteria. The analysis should identify and justify any deviations from the regulatory guidelines. Justification for deviations from the regulatory guidelines should show that an equivalent level of protection will be achieved. Deletion of a protective feature without compensating alternative protection measures will not be acceptable, unless it is clearly demonstrated that the protective measure is not needed because of the design and arrangement of the particular plant.	Conforms		FSAR Section 9.5.1 and Appendices 9A and 9B identify and justify specific deviations from the regulatory guidelines.
C.1.c.	Fire Suppression System Design Basis		C.1.c.	Fire Suppression System Design Basis

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(1) Total reliance should not be placed on a single fire suppression system. Appropriate backup fire suppression capability should be provided.	Conforms	(1) A manual backup fire suppression capability is provided for automatic systems.
(2) A single active failure or a crack in a moderate-energy line (pipe) in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, neither the failure of a fire pump, its power supply or controls, nor a crack in a moderate energy line in the fire suppression system should result in loss of function of both sprinkler and hose standpipe systems in an area protected by such primary and backup systems.	Conforms	(2) The fire suppression system which protects safe shutdown areas is designed so that it will remain functional with either a single active failure or a critical crack. For critical cracks in some locations, it may be necessary to isolate the sprinkler system to achieve adequate flow through the hose. (A critical crack is defined in BTP MEB 3-1 Section B.3.C.)
(3) As a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe shutdown earthquake (SSE). In areas of high seismic activity, the staff will consider on a case-by-case basis the need to design the fire detection and suppression systems to be functional following the SSE.	Partial conformance	(3) The seismic design considerations for VEGP standpipe systems serving hose stations located within hose reach of areas containing equipment required for safe shutdown in the event of an earthquake are discussed in the clarification of conformance to CMEB 9.5-1 Requirement C.6.c.(4).
(4) The fire protection systems should retain their original design capability for (a) natural phenomena of less severity and greater frequency than the most severe natural phenomena (approximately once in 10 years) such as tornadoes, hurricanes, floods, ice storms, or small-intensity earthquakes that are characteristic of the geographic region, and (b) potential man-made site-related events such as oil barge collisions or aircraft crashes that have a reasonable probability of occurring at a specific plant site. The effects of lightning strikes should be included in the overall plant fire protection program.	Conforms	(4) To withstand a natural phenomena, the indoor fire protection header piping system, up to and including sprinkler system isolation valves and the sprinkler system piping in proximity to safety-related equipment, is designed for SSE loads, and wind forces have been implemented into the outdoor design features. The hanger criteria used meet or exceed the requirements of NFPA in all seismic Category 1 structures

	CMEB 9.5-1 Requirements	VEGP Position		Clarification of Conformance or Justification of Deviation
	(5) The consequences of inadvertent operation of or a crack in a moderate energy line in the fire suppression system should meet the guidelines specified for moderate-energy systems outside containment in SRP Section 3.6.1.	Partial conformance		(5) The consequences of inadvertent operation of, or a crack in, a moderate energy line in the fire suppression system are only analyzed for spray and flooding. This is justified because redundant trains of safe shutdown equipment are separated such that inadvertent operation of, or a crack in, the fire suppression system will not disable both redundant trains of safe shutdown equipment. Consequently, safe shutdown can be reached after such an event. See Section C.1.b.(8) for additional discussion.
C.1.d.	Alternative or Dedicated Shutdown Alternative or dedicated shutdown capability should be provided where the protection of systems whose functions are required for safe shutdown is not provided by established fire suppression methods or by Position C.5.b.	Conforms	C.1.d.	Alternative or Dedicated Shutdown See Section C.5.c
C.1.e.	Implementation of Fire Protection Programs		C.1.e.	Implementation of Fire Protection Programs
	(1) The fire protection program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire areas that could affect the fuel storage area should be fully operational before fuel is received at the site. Such adjacent areas include those whose flames, hot gases, and fire-generated toxic and corrosive products may jeopardize safety and surveillance of the stored fuel.	Partial conformance		(1) The fire protection program (plans, personnel, and equipment) for areas storing new reactor fuel and for adjacent fire areas that could affect the fuel storage area shall be fully operational before receiving fuel at the site. A temporary fire area is provided for initial fuel receipt and storage prior to initial fuel loading into the Unit 1 reactor and includes fire zones 47 in the auxiliary building and 139 in the fuel handling building which are part of permanent fire area 1-AB-LD-B. To the extent practicable this area has been identified to make use of existing (i.e., permanent) fire area boundaries. Exceptions to this are:

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		(a) The fuel receipt area, fire zone 47, has unrated fire boundaries on the north wall, east wall, and floor slab at elevation 200 ft 0 in. These boundaries will be subject to a fire watch at all times when new fuel is in this fire zone until the entire Unit 1 fire protection program is fully operational. (b) The fuel storage area, fire zone 139, has unrated fire boundaries on the west wall at elevation 263 ft 3 in. and the south wall from approximately F_2 to F_6. The design and construction of these walls has been upgraded to meet 3-h boundary requirements with the exception of the access portal and crane bay between the auxiliary and fuel buildings. The latter are permanent plant openings which will be subject to a fire watch at all times when new fuel is in the fire zone until the entire Unit 1 fire protection program is fully operational. (c) The fuel storage area slab at elevation 220 ft 0 in. is an unrated boundary. The design and construction of this slab has been upgraded to meet 3-h boundary requirements. (d) Spent fuel pool, transfer canal, new fuel pool, and cask loading pit walls are unrated boundaries. The design and construction of these walls meets the 3-h boundary requirements. These temporary fire area boundaries, fire protection equipment and procedures for initial fuel receipt are fully described in the initial fuel receipt fire protection program.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(2) The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.	Conforms	(2) Prior to initial fuel loading, the applicable unit's fire protection program shall be fully operational.
(3) On reactor sites where there is an operating reactor and construction or modification of other units is under way, the fire protection program should provide for continuing evaluation of fire hazards. Additional fire barriers, fire protection capability, and administrative controls should be provided as necessary to protect the operating unit from construction fire hazards.	Conforms	(3) The fire hazards analysis provides for the capability to assess the impact of plant construction or modification activities in any plant area on the ability to achieve safe shutdown for both units. Continuing evaluation of fire hazards for both units during construction or modification activities is provided for in the plant administrative procedures. Fire protection capability for Unit 2 construction during Unit 1 operation will be provided by a temporary fire water standpipe system manned by the construction department fire brigade. Unit 2 administrative controls will be implemented to meet Nuclear Mutual Limited requirements for nuclear plant construction sites as determined by the loss prevention consultant.
C.2. Administrative Controls		C.2. Administrative Controls
Administrative controls should be used to maintain the performance of the fire protection system and personnel. These controls should establish procedures to:		
a. Prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39 provides guidance on housekeeping, including the disposal of combustible materials.	Conforms	a. Combustible material storage areas may be located in or adjacent to safety-related buildings or systems but are administratively controlled through the administrative fire protection procedures. Housekeeping requirements are in accordance with ASME NQA-1-1994, as described in the Quality Assurance Topical Report (QATR).
b. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high-efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.	Conforms	b. The use and handling of flammable gases, liquids, and other combustibles in safety-related areas are governed by the administrative fire protection procedures.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
c. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating, and especially during maintenance, modification, or refueling operations.	Conforms	c. The requirements governing the handling of and limiting transient fire loads in all phases of operation are provided in the administrative fire protection procedures.
d. Designate the onsite staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedures.	Conforms	d. Plant work process/implementation personnel are responsible for identifying the potential transient fire hazards. The FPE, FPSE, or his/her designee is responsible for specifying the additional protection requirements.
e. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit should be issued for each area where work is to be done. If work continues over more than one shift, the permit should be valid for not more than 24 h when the plant is operating or for the duration of a particular job during plant shutdown.	Conforms	e. The administration fire protection procedures govern the use of ignition sources.
f. Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.	Conforms	f. The general fire procedures require that waste combustibles be removed as soon as practical.
g. Govern leak testing; similar procedures such as airflow determination should use one of the commercially available techniques. Open flames or combustion generated smoke should not be permitted.	Conforms	g. The administrative fire protection procedures prohibit testing with an open flame.
h. Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.	Conforms	h. Housekeeping inspections are performed on a periodic basis by the operations department.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
i. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding) should be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials should be removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, should not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior or polyethylene sheeting should be placed in metal containers with tight fitting self closing metal covers.	Conforms	i. The administration fire protection procedures govern the use of specific combustibles in safety-related areas and require that transient combustibles and combustible waste be removed from safety-related areas as soon as practical.
j. Disarming of fire detection or fire suppression systems should be controlled by a permit system. Fire watches should be established in areas where systems are so disarmed.	Conforms	j. The permits for disarming a fire protection system are handled as part of the work order which calls for the system to be disarmed. The shift supervisor and/or the maintenance team will identify the need for a fire watch.
k. Successful fire protection requires testing and maintenance of the fire protection equipment and the emergency lighting and communication. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency, and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.	Conforms	k. Performance and planning of fire protection surveillance tests is the responsibility of the operations manager or his designee. Administrative fire protection procedures determine which controls are required for performance of all work orders.
l. Control actions to be taken by an individual discovering a fire; for example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.	Conforms	l. The administrative fire protection procedures give the actions to be taken by anyone discovering a fire.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
m. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel; for example, announcing the location of the fire over the PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.	Conforms	m. The administrative fire protection procedures give the actions to be taken by the control room when a fire is indicated.
n. Control actions to be taken by the fire brigade after notification by the control room operator of a fire; for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities, including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of preplanned strategies for fighting fires in specific areas.	Conforms	n. The fire fighting training program ensures that fire brigade members know their responsibilities and actions during a fire emergency. Fire protection administrative procedures give general instructions for all personnel during a fire emergency. The fire fighting procedures provide information useful to fire fighters and operators.
o. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies should designate:	Partial conformance	o. The specific requirements, 1 through 10, of Section O will either be a part of the fire training program or will be included as reference information in the fire fighting procedures. The fire fighting procedures do not require action. They are guidance documents used for quick reference and training. Since these procedures will be used by the fire brigade for training and practice, the fire brigade training program will ensure that the fire team captain is knowledgeable of various fire fighting strategies for each fire zone. This will enable him to determine the best method of attack based on his training and experience, and the conditions at the fire scene instead of relying on one predefined method.

CMEB 9.5-1 Requirements	**VEGP Position**	**Clarification of Conformance or Justification of Deviation**
(1) Fire hazards in each area covered by the specific prefire plans.		
(2) Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.		
(3) Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.		
(4) Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of over-pressurization or electrical hazards).		
(5) Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly, hazardous combustibles that need cooling should be designated.		
(6) Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
extinguishant to the fire, communication with the control room, and coordination with outside fire departments.		
(7) Potential radiological and toxic hazards in fire zones.		
(8) Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operation.		
(9) Operations requiring control room and shift engineer coordination or authorization.		
(10) Instructions for plant operators and general plant personnel during fire.		
C.3 Fire Brigade		C.3 Fire Brigade
a. The need for good organization, training, and equipping of fire brigades at nuclear power plant sites requires that effective measures be implemented to ensure proper discharge of these functions. The guidance in Regulatory Guide 1.101, Emergency Planning for Nuclear Power Plants, should be followed as applicable.	Conforms	a. Regulatory Guide 1.101, Emergency Planning for Nuclear Power Plants, will be consulted when developing the fire brigade.
b. A site fire brigade trained and equipped for fire fighting should be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade should have at least five members on each shift. The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members should include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor should not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.	Conforms	b. A site fire brigade of at least five members per shift will be formed. The fire team captain will not be the shift supervisor. The fire team captain and at least two fire brigade members will have sufficient knowledge of safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The fire brigade members will undergo an annual physical examination.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
c. The minimum equipment provided for the brigade should consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatus using full-face positive-pressure masks approved by NIOSH (National Institute for Occupational Safety and Health-approval formerly given by the U.S. Bureau of Mines) should be provided for fire brigade, damage control, and control room personnel. At least 10 masks shall be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir, if practical. Service or rated operating life shall be a minimum of 1/2 h for the self-contained units.	Conforms	c. The fire brigade will be provided the necessary equipment for fire fighting including at least ten self-contained breathing apparatuses. It will be the responsibility of the health physics department to provide emergency breathing capabilities for damage control and control room personnel.
At least two extra air bottles should be located onsite for each self-contained breathing unit. In addition, an onsite 6-h supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.	Conforms	There will be at least two extra air bottles for each of the required breathing apparatus units. Additional bottles or a compressor will be available as required to assure that a 6-h supply of reserve air is available.
d. The fire brigade training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills.	Conforms	d. The fire brigade training program will ensure that the capability to fight potential fires is established and maintained.
(1) The initial classroom instruction should include:	Conforms	(1) This initial classroom instruction will include the specific items (a) through (j).
(a) Indoctrination of the plant fire fighting plan with specific identification of each individual's responsibilities.		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(b) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.		
(c) The toxic and corrosive characteristics of expected products of combustion.		
(d) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes of each area.		
(e) The proper use of available fire fighting equipment and the corrective method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modification (welding), and record file fires.		
(f) The proper use of communication, lighting, ventilation, and emergency breathing equipment.		
(g) The proper method for fighting fires inside buildings and confined spaces.		
(h) The direction and coordination of the fire fighting activities (fire brigade leaders only).		
(i) Detailed review of fire fighting strategies and procedures.		
(j) Review of the latest plant modifications and corresponding changes in fire fighting plans.		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(k) Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. The coordination should be part of the training course and should be included in the training of the local fire department staff.	Conforms	
(l) Local fire departments should be provided training in operational precautions when fighting fires on nuclear power plant sites and should be made aware of the need for radiological protection of personnel and the special hazards associated with a nuclear power plant site.		
Note: Items (i) and (j) may be deleted from the training of no more than two of the nonoperations personnel who may be assigned to the fire brigade.		
(2) The instruction should be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.	Conforms	(2) Instruction of the fire brigade will be provided by qualified individuals suitably trained in fighting the types of fires that could occur in the plant, using the types of equipment available in the plant.
(3) Instruction should be provided to all fire brigade members and fire brigade leaders.	Conforms	(3) Instruction will be provided for the brigade members and leaders.
(4) Regular planned meetings should be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.	Conforms	(4) Meetings will be held at least every 3 months for the fire brigade to review changes in the fire protection program and other subjects as necessary.
(5) Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a 2-year period. These sessions may be concurrent with the regular planned meetings.	Conforms	(5) Refresher classroom training courses will be held for all fire brigade members at least once per 2 years. The refresher classroom training program will be developed from the initial classroom instruction program based on a Systematic Approach to Training (SAT) process.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(6) Practice	Conforms	(6) Practice sessions will be held at least once per year for each shift brigade on the proper methods of fighting possible plant fires, including the proper method of fighting under strenuous conditions.
(a) Practice sessions should be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting.		
(b) These practice sessions should be provided at least once per year for each fire brigade member.		
(7) Drills		(7) Drills
(a) Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team.	Conforms	(a) Fire brigade drills will be performed in the plant so that the fire brigade can practice as a team.
(b) Drills should be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year. A sufficient number of these drills, but not less than one for each shift fire brigade per year, should be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill should ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills should not be scheduled closer than 4 weeks.	Conforms	(b) Fire drills will be performed for each shift's fire brigade. Each fire brigade member must participate in at least two drills per year. At least one of these drills each shift will be unannounced. At least one drill per year will be on a back shift for each shift fire brigade. Unannounced drills will be scheduled at irregular intervals to minimize predictability and may be scheduled closer than 4 weeks to assure participation of all shifts.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
At least one drill per year should be performed on a back shift for each shift fire brigade.		
(c) The drills should be preplanned to establish the training objectives of the drill and should be critiqued to determine how well the training objectives have been met. Unannounced drills should be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members should be remedied by scheduling additional training for the brigade or members. Unsatisfactory drill performance should be followed by a repeat drill within 30 days.	Conforms	(c) Fire drills will be preplanned and critiqued for effectiveness. Deficiencies will be remedied through extra training and/or a repeat drill.
(d) These drills should provide for local fire department participation periodically (at least annually).	Conforms	(d) The Burke County Fire Department of Waynesboro, Georgia will be requested to participate in a fire drill at least annually.
(e) At 3-year intervals, a randomly selected unannounced drill should be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals should be available for NRC review.	Conforms	(e) An outside independent fire protection consultant will critique an unannounced fire drill at least once every 3 years.
(f) Drills should as a minimum include the following:		(f) As a minimum, fire drills will include:
i. Assessment of fire alarm effectiveness, time required to notify and assemble the fire brigade, and selection, placement, and use of equipment and fire fighting strategies.	Conforms	i. Assessment of alarm effectiveness, assembly time, use of equipment, and strategy.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
ii. Assessment of each brigade member's knowledge of his or her roll in the fire fighting strategy for the area assumed to contain the fire.	Conforms	ii. Assessment of each member's knowledge of his/her role in the fire fighting effort.
Assessment of the brigade members' conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment to the extent practicable.	Conforms	
iii. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should differ from those used in the previous drills so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and to organize for the fire, assuming loss of automatic suppression capability.	Conforms	iii. Simulated use of fire fighting equipment required to cope with the situation and fire selected for the drill.
iv. Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.	Conforms	iv. The brigade leader's thoroughness, accuracy, and effectiveness will be addressed by the critiquing body.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(8) Records Individual records of training provided to each fire brigade member, including drill critiques, should be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training should be available for NRC review. Retraining or broadened training for fire fighting within buildings should be scheduled for all those brigade members whose performance records show deficiencies.	Conforms	(8) Records Individual records of training for each fire brigade member, including drill critiques, will be maintained for at least 3 years.
(9) Guidance Documents NFPA 27, Private Fire Brigade, should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, NFPA 197, Training Standard on Initial Fire Attacks, should be utilized as applicable. NFPA booklets and pamphlets listed in NFPA 27 may be used as applicable for training references. In addition, courses in fire prevention and fire suppression that are recognized or sponsored by the fire protection industry should be utilized.	Partial conformance	(9) Guidance Documents NFPA 27 will be consulted when formulating the fire brigade's organization, training, and drills, when applicable to our program. Deviations from the codes are described in table 9.5.1-9. NFPA 197 does not apply to VEGP.
C.4. Quality Assurance Program The quality assurance (QA) programs of applicants and contractors should ensure that the guidelines for design, procurement, installation, and testing and the administrative controls for the fire protection systems for safety-related areas are satisfied. The QA program should be under the management control of the QA organization. This control consists of (1) formulating a fire protection QA program that incorporates suitable requirements and is acceptable to the management responsible for fire protection, or verifying that the program incorporates suitable requirements and is acceptable to the management responsible for fire protection, and (2) verifying the effectiveness of the QA program for fire protection through review, surveillance, and audits.	Conforms	C.4. Quality Assurance Program

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
Performance of other QA program functions for meeting the fire protection program requirements may be performed by personnel outside of the QA organization. The QA program for fire protection should be part of the overall plant QA program. It should satisfy the specific criteria listed below.		The VEGP fire protection quality assurance program will be a part of the overall plant QA program and will ensure that the fire installation and testing and the administration protection program conforms to the required parts of this document as described in paragraph 9.5.1.1.4.
C.4.a. Design and Procurement Document Control Measures should be established to ensure that the guidelines of the regulatory position of this guide are included in design and procurement documents and that deviations there from are controlled.		
C.4.b. Instructions, Procedures, and Drawings Inspections, tests, administrative controls, fire drills, and training that govern the fire protection program should be prescribed by documented instructions, procedures, or drawings and should be accomplished in accordance with these documents.		
C.4.c. Control of Purchased Material, Equipment, and Services Measures should be established to ensure that purchased material, equipment, and services conform to the procurement documents.		
C.4.d. Inspection A program for independent inspection of activities affecting fire protection should be established and executed by or for the organization performing the activity to verify conformance with documented installation drawings and test procedures for accomplishing the activities.		
C.4.e. Test and Test Control A test program should be established and implemented to ensure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on.		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
C.4.f. Inspection, Test, and Operating Status Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.		
C.4.g. Nonconforming Items Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use or installation.		
C.4.h. Corrective Action Measures should be established to ensure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material, and nonconformances are promptly identified, reported, and corrected.		
C.4.i. Records Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program.		
C.4.j. Audits Audits should be conducted and documented to verify compliance with the fire protection program, including design and procurement documents, instructions, procedures, drawings, and inspection and test activities.		
C.5. General Plant Guidelines		C.5. General Plant Guidelines
C.5.a. Building Design		C.5.a. Building Design
(1) Fire barriers with a minimum fire resistance rating of 3 h should be provided to:		(1) Walls, floors and ceiling assemblies constructed of materials that are used as fire barriers are constructed in accordance with designs tested and approved by an independent laboratory. Safe shutdown circuits are protected with 3-hour-rated fire barriers configured, tested, and approved for similar configurations by an independent

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		laboratory. Structural steel that is required to remain functional to provide support to fire barriers is protected by a coating of inorganic (cementation mineral fiber) material that has been tested and approved by Underwriters Laboratories. Fire barriers with a minimum resistance of 3 hours are provided to:
(a) Separate safety-related systems from any potential fires in nonsafety-related areas that could affect their ability to perform their safety function.	Partial conformance	(a) Separate safe shutdown equipment from potential fires in nonsafety-related areas when the potential fire presents a significant hazard to the safe shutdown equipment. Factors considered in determining if the fire hazard is significant include, the amount of combustibles, distance between the combustibles and safe shutdown equipment, susceptibility of the safe shutdown equipment to fire damage, etc. Fire area boundaries which do not separate fire areas (i.e., building exterior ceiling/roof slabs and walls) are not rated. Above grade unrated exterior fire area boundaries are identified as a specific deviation on a fire area by fire area basis in the fire hazards analysis (Appendix 9A). Significant fire hazards are not stored adjacent to exterior fire area boundaries and therefore, the boundary need not be rated. Below grade exterior fire area boundaries (i.e., building basemats and below grade walls adjacent to soil) are not identified as a deviation in the fire hazards analysis because it is not credible that a hazard could exist adjacent to the barrier.
(b) Separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire.	Partial conformance	(b) Separate redundant divisions or trains of safety-related electrical and mechanical equipment from each other so that both are not subject to damage from a single fire. Electrical raceways not carrying safe shutdown cables conform with the separation guidelines of Regulatory Guide 1.75 as described in FSAR Section 8.3. Structures, systems, and equipment, including electrical raceway, important to safe shutdown are separated as listed in C.5.b.
(c) Separate individual units on a	Conforms	(c) General Design Criterion 5 will be met with

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
multiple-unit site unless the requirements of General Design Criterion 5 are met with respect to fires.		respect to fires.
(2) Appropriate fire barriers should be provided within a single safety division to separate components that present a fire hazard to other safety-related components or high concentrations of safety-related cables within that division.	Conforms	(2) Appropriate fire barriers are provided within a single safety division to separate components that present a fire hazard to other safety-related components or high concentrations of safety-related cables within that division.
(3) Openings through fire barriers for pipe, conduit, and cable trays which separate fire areas should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. Openings inside conduit larger than 4 in. in diameter should be sealed at the fire barrier penetration. Openings inside conduit 4 in. or less in diameter should be sealed at the fire barrier unless the conduit extends at least 5 ft on each side of the fire barrier and is sealed either at both ends or at the fire barrier with noncombustible material to prevent the passage of smoke and hot gases. Fire barrier penetrations that must maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.	Partial conformance	(3) The penetration seal test is based on testing designs which envelope the designs used rather than testing each specific configuration used in the plant. This deviation is justified because testing of designs which envelope the design used provides a high level of assurance that the actual designs will provide the required level of fire resistance. Deviations from tested configurations will have a technical justification in the form of a calculation provided. Conduit penetrations of rated fire barriers are sealed internally either at the fire barrier or on both sides of the fire barrier at the first conduit or box or at the end of the conduit, which ever occurs first. Most of the conduit at VEGP is 4 in. or less in diameter. Only a limited amount of 6 in. diameter conduit has been used. The material used for conduit internal seals is noncombustible and will prevent the passage of smoke and hot gases through the conduit.
Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, Fire Test of Building Construction and Materials. The acceptance criteria for the test should require that:	Partial conformance	Penetration seals shall be used to seal openings through fire barriers that separate fire areas. The seal shall provide a fire resistance rating at least equal to the barrier. The seal designs are enveloped by designs that have been tested to ASTM E-119 and/or IEEE 364. In some cases where the penetration openings are larger than tested, the opening is divided into smaller multiple openings by the installation of noncombustible partitions as approved by NML or an engineering evaluation and justification is provided for the deviation. However, the Unit 1 penetration seals separating the train A diesel generator building from control building tunnel 1T4A have a special configuration that may not be enveloped by a tested design. Appendix 9A discusses and justifies this deviation.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		The following information regarding the specific design aspects of the Unit 1 P-90 penetration seals which are in penetrations larger than the tested configuration is provided to justify this deviation.

Oversize P-90 Seal	1-08-105-2
Size	1718 in.^{2}
Instal. Configuration	Vertical
Fill Depth	24 in.
Oversize P-90 Seal	1-08-132-1
Size	1344 in.^{2}
Instal. Configuration	Vertical
Fill Depth	24 in.
Oversize P-90 Seal	1-08-134-D
Size	3556 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-312-B
Size	2544 in.^{2}
Instal. Configuration	Vertical
Fill Depth	33 in.
Oversize P-90 Seal	1-08-320-B
Size	3556 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-329-B
Size	3564 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-330-B
Size	1728 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-357-B
Size	3456 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-371-B
Size	3456 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-409-B

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation

Size	2016 in.^{2}
Instal. Configuration	Vertical
Fill Depth	30 in.
Oversize P-90 Seal	1-08-617-A
Size	1620 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.
Oversize P-90 Seal	1-08-618-A
Size	3630 in.^{2}
Instal. Configuration	Vertical
Fill Depth	36 in.

Construction Technology Laboratories "as tested" configuration utilized a 36 inch x 36 inch (1296 in^2) opening with a fill depth of 12 inches of the P-90 material. The VEGP oversized P-90 seals exceed the fill depth but are larger than the total area (in^2) used in the test.

The following design features are bases for acceptability of the twelve oversized P-90 seals.

a.) P-90 material has a density of 147 ft^3. The minimum density of dry concrete used at Plant Vogtle is 137 lbs/ft.^{3}.

b.) P-90 expands when exposed to a rise in temperature during the fire test. This would tend to hold the seal in place.

c.) P-90 was installed in the affected penetration at full wall depth of 24 inch minimum.

d.) Only 1 inch to 2 inch depth of material was lost in the fire test leaving a considerable volume of the seal in place.

e.) The fire test was conducted in a horizontal position (worst case) where as all of the 12 P-90 seals are in a vertical position.

f.) The fire test was conducted using a steel lined opening which represents a worst case example from a heat transfer aspect as compared with unlined concrete surfaces which were utilized at Plant Vogtle.

g.) Acceptance criteria as set forth in NRC I.N.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		88-04 were fully satisfied by the P-90 material in the tested specimens while impressive performance safety margins, in terms of remarkably low terminal cold side temperatures, were obtained. The deviating seals have been evaluated and found to be acceptable by a registered fire protection engineer.
(a) The fire barrier penetration has withstood the first endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier.		(a) Testing of designs which envelope the designs used will be performed in accordance with ASTM E-119.
(b) The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature does not exceed 325°F.		(b) The cold side temperature will not exceed 325°F.
(c) The fire barrier penetration remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test. The stream shall be delivered through a 1 1/2-in. nozzle set at a discharge angle of 30 percent with a nozzle pressure of 75 psi and a minimum discharge of 75 gal/min with the tip of the nozzle a maximum of 5 ft from the exposed face; or the stream shall be delivered through a 1 1/2-in. nozzle set at a discharge angle of 15 percent with a nozzle pressure of 75 psi and a minimum discharge of 75 gal/min with the tip of the nozzle a maximum of 10 ft from the exposed face; or the stream shall be delivered through a 2 1/2-in. national standard playpipe equipped with 1 1/8-in. tip, nozzle pressure of 30 psi, located 20 ft from the exposed face.		(c) All penetration qualification tests will be in accordance with the ASTM E-119 time-temperature curve and hose stream.
(4) Penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier. (See NFPA-90A, Air Conditioning and Ventilating Systems.) Flexible air duct	Partial Conformance	(4) Penetration openings through rated fire barriers for ventilation systems are protected by fire dampers having a rating equivalent to that required of the barrier. However, there are 6 fire damper assemblies (3 in each unit) installed (2 vertically

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
coupling in ventilation and filter systems should be noncombustible.		and 4 horizontally) in 3-h fire area boundary barriers which do not bear a UL label of approval as their size exceeds the manufacturer's tested configuration. The manufacturer's "as tested" configuration limits the size of a single fire damper in multiple damper assemblies to 36 in. by 36 in. VEGP oversize fire dampers comply with the single damper in damper assembly size multiple limitations. However, the VEGP oversize fire dampers do not comply with the overall damper assembly size requirements which is limited to 36 in. by 72 in. when installed in a horizontal configuration and to 72 in. by 72 in. when installed in a vertical configuration. (Note that a 2-in. wide mullion is provided between single fire dampers in multiple damper assemblies.) VEGP fire area boundaries have been established in accordance with the guidance of BTP CMEB 9.5-1, Section B.3 "Establishment and Use of Fire Areas." In that separation of redundant safety divisions, separation of safety-related systems from fire hazards in nonsafety-related areas and isolation to limit the spread of fires between components that are major fire hazards within a safety division have been considered as well as separation of redundant safe shutdown trains. In spite of the fact that the oversize fire damper assemblies are without a UL label of approval, the manufacturer has certified that the fire dampers have been fabricated of the same material, with the same method, and to the same design and UL procedures as their standard UL approved 3-h multiple fire damper assembly. These oversize fire damper assemblies have been evaluated and found to be acceptable by a registered fire protection engineer. The following information regarding the specific design aspects of the Unit 1 oversize fire dampers and the fire hazards analysis in addition to the above is provided to justify this deviation: a. Unrated Fire Damper: A-1551-S7-612 Size, in.: 94 by 48 Installation: Vertical

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		configuration Number/size of single dampers: 6/30 by 23 Fire area separation[a]: 1-AB-L2-A and 1-AB-L1-B Fire zone separation: 53 and 149 The following design features are additional bases for acceptability regarding this specific damper: 1. Each fire area has been provided with an early warning fire detection system. 2. Fire area 1-AB-L1-B is equipped with partial area automatic sprinkler protection in fire zone 149 in the immediate vicinity of the oversize fire damper. 3. Fire area 1-AB-L2-A (fire zone 53) is equipped with partial area automatic sprinkler protection. 4. The charcoal filtration units in fire area 1-AB-L2-A are provided with an integral water deluge system. 5. Fire area 1-AB-L1-B contains train B safe shutdown electrical distribution equipment and cables. Fire area 1-AB-L2-A contains train A safe shutdown cables and the train B safe shutdown room cooler that serves fire area 1-AB-L1-B. Fire area 1-AB-L1-B is relatively small and therefore little

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		horizontal separation distance is available between the oversize fire damper and the train B shutdown components. However, fire area 1-AB-L2-A is relatively large. The train B safe shutdown room cooler that serves fire area 1-AB-L1-B is just outside the fire area boundary. The train A safe shutdown electrical cables are located approximately 75 horizontal ft from the oversize damper and the train B room cooler unit. The partial area coverage automatic preaction fire suppression system in fire area 1-AB-L2-A protects the intervening separation distance.

b. Unrated Fire Damper 1-1551-S7-626

Size, in.	64 by 54
Installation configuration	Horizontal
Number/size of single dampers	4/31 by 26
Fire area separation[a]	1-AB-L1-B and 1-AB-LD-B
Fire zone separation	149 and 46

The following design features are additional bases for acceptability regarding this specific damper:

1. Each fire area has been provided with an early warning fire detection system.

2. Fire area 1-AB-L1-B is equipped with partial area automatic sprinkler protection in fire zone 149 directly over the fire damper.

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		3. Fire area 1-AB-L1-B contains train B safe shutdown electrical distribution equipment and cables. Fire area 1-AB-L1-B is relatively small and therefore little horizontal separation distance is available between the oversize fire damper and the train B safe shutdown components. Fire area 1-AB-LD-B is a very large fire area encompassing many levels in the central part of the auxiliary building. At level 1 (fire zone 46) of the area just below the oversize fire damper, there are no safe shutdown equipment or cables. There are no cable trays or other combustible materials of significance at level 1 of fire area 1-AB-LD-B in the immediate vicinity of the oversize fire damper. c. Unrated Fire Damper: A-1551-S7-523 Size, in.: 52 by 44 Installation configuration: Horizontal Number/ size of single dampers: 4/25 by 21 Fire area separation[(a)]: 1-AB-LD-B and 1-AB-LD-A Fire zone separation: 46 and 11B The following design features are additional bases for acceptability regarding this specific damper:

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		1. Each fire area has been provided with an early warning fire detection system. 2. Fire area 1-AB-LD-A is equipped with partial automatic sprinkler protection (not in the immediate vicinity of the oversize fire damper). 3. Fire area 1-AB-LD-B is a very large fire area encompassing many levels in the central part of the auxiliary building. At level 1 (fire zone 46) of fire area 1-AB-LD-B just above the oversize fire damper, there are no safe shutdown equipment or cables. Fire area 1-AB-LD-A (fire zone 11B) also encompasses many levels in the eastern part of the central section of the auxiliary building. Fire area 1-AB-LD-A contains predominantly train B safe shutdown residual heat removal system equipment and train B safe shutdown electrical cables. Very little horizontal separation distance is available between the oversize fire damper and the train B safe shutdown components. However, a major radiation shield wall with a labyrinth entrance is located between the oversize fire damper and the portion of fire area 1-AB-LD-A containing the safe shutdown equipment. There are no cable trays or other combustible materials of significance at level 1 of fire area 1-AB-LD-B in the immediate vicinity of the oversize fire damper. The following information regarding the specific design aspects of the Unit 2 oversize fire dampers and the fire hazards analysis in addition to the above is provided to justify this deviation: a. Unrated Fire Damper A-1551-S7-613

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation

Size, in.	80 by 48
Installation configuration	Vertical
Number/ size of single dampers	6/25 by 23
Fire area separation[(a)]	2-AB-L2-A and 2-AB-L1-B
Fire zone separation	53 and 149

The following design features are additional bases for acceptability regarding this specific damper:

1. Each fire area has been provided with an early warning fire detection system.
2. Fire area 2-AB-L1-B is equipped with full area automatic sprinkler protection.
3. Fire area 2-AB-L2-A (fire zone 53) is equipped with partial area automatic sprinkler protection.
4. The charcoal filtration units in fire area 2-AB-L2-A are provided with an integral water deluge fire suppression system.
5. Fire area 2-AB-L1-B contains train B safe shutdown electrical distribution equipment and cables. Fire area 2-AB-L2-A contains train B safe shutdown electrical cables and the train B safe shutdown room cooler that serves fire area 2-AB-L1-B. The capability to achieve safe shutdown using train A is not compromised by a fire in either fire area 2-AB-L2-A or 2-AB-L1-B.

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		b. Unrated Fire Damper: 2-1551-S7-626 Size, in.: 64 by 54 Installation configuration: Horizontal Number/ size of single dampers: 4/31 by 26 Fire area separation[(a)]: 2-AB-L1-B and 2-AB-LD-B Fire zone separation: 149 and 46 The following design features are additional bases for acceptability regarding this specific damper: 1. Each fire area has been provided with an early warning fire detection system. 2. Fire area 2-AB-L1-B is equipped with full area automatic sprinkler protection. 3. Fire area 2-AB-L1-B contains train B safe shutdown electrical distribution equipment and cables. Fire area 2-AB-L1-B is relatively small and therefore little horizontal separation distance is available between the oversize fire damper and the train B safe shutdown components. Fire area 2-AB-LD-B is a very large fire area encompassing many levels in the central part of the auxiliary building. At level 1 (fire zone 46) of the area just below the oversize fire damper, there are no safe shutdown equipment or cables. There are no cable trays or other combustible materials of significance at level 1 of fire area 2-AB-LD-B in the immediate vicinity of the oversize fire damper.

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation

c. Unrated Fire Damper — A-1551-S7-524

Size, in.	52 by 44
Installation configuration	Horizontal
Number/ size of single dampers	4/25 by 21
Fire area separation[a]	2-AB-LD-B and 2-AB-LD-A
Fire zone separation	46 and 11B

The following design features are additional bases for acceptability regarding this specific damper.

1. Each fire area has been provided with an early warning fire detection system.

2. Fire area 2-AB-LD-A is equipped with partial area automatic sprinkler protection (not in the immediate vicinity of the oversize fire damper).

3. Fire area 2-AB-LD-B is a very large fire area encompassing many levels in the central part of the auxiliary building. There are no safe shutdown components or cables at level 1 (fire zone 46) of fire area 2-AB-LD-B just above the oversize fire damper. There are no cable trays or other combustible materials of significance at level 1 of fire area 2-AB-LD-B in the immediate vicinity of the oversize fire damper.

a. The fire hazards analysis, Appendix 9A, presents the combustible loadings on each side of the damper on a fire zone basis.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		4. Fire area 2-AB-LD-A (fire zone 11B) also encompasses many levels in the western part of the central section of the auxiliary building. Fire area 2-AB-LD-A contains predominantly train B safe shutdown residual heat removal system equipment and electrical cables. Very little horizontal separation distance is available between the oversize fire damper and the train B safe shutdown components. However, a major radiation shield wall with a labyrinth entrance is located between the oversize fire damper and the portion of fire area 2-AB-LD-A containing the safe shutdown components and cables. The installation of certain wall and floor fire damper assemblies deviates from the manufacturer's installation requirements and the Underwriters Laboratory (UL) tested configurations in that rigid seismic supports have been provided and/or spacers have been installed between the damper sleeve and the barrier openings. To determine the acceptability of these fire dampers as installed, representative worst-case configuration wall and floor damper assemblies were tested in accordance with the requirements and methods of UL Standard 555, Standard for Fire Dampers and Ceiling Dampers. All of the fire damper assemblies satisfactorily withstood the fire endurance test for the full 3-h test period. Some of the damper assemblies did not meet the acceptance criteria of the hose stream test, but an analysis has been performed which has determined that one train of safe shutdown systems is free of fire damage in the event a damper assembly (including those without connecting ductwork) should fail in use when subjected to the impact and cooling effects of a hose stream. The VEGP fire damper assembly installations provide an adequate level of fire safety. Exact replication of a UL approved or tested fire damper installation cannot always be achieved due to construction constraints. These fire damper installation problems are associated with the manner in which the fire damper sleeve to penetration opening is closed. Each design variation is evaluated for acceptability by a fire protection engineer. These evaluations are documented and are available for audit.

CMEB 9.5-1 Requirements	**VEGP Position**	**Clarification of Conformance or Justification of Deviation**
		When a fire damper is installed in a negative pressure boundary fire barrier, in a floor slab fire barrier above safe shutdown water sensitive equipment, or in the control room boundary fire barrier, the gap between the fire damper sleeve closure and the fire barrier and the openings in the stitch welded attachment of the closure to the fire damper sleeve is caulked with a fire resistive material to provide a watertight and/or airtight seal. This seal is provided to meet requirements associated with accident analyses for which the plant must be designed to experience. The caulking material is not placed between the damper sleeve assembly and the barrier which could restrict thermal growth of the assembly during the postulated fire. Thermal growth of the damper sleeve closure during the fire is also not restricted by the caulking, and little if any fuel or smoke contribution is anticipated due to the small quantities and the type of material being used.
(5) Door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self closing or provided with closing mechanisms and should be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, Fire Doors and Windows.)	Partial conformance	(5) Door openings in rated fire area boundaries are protected with doors, frames and hardware having a rating at least equal to the barrier. These doors have been tested and approved by a nationally recognized laboratory with the following exceptions:

Door Number	Certified Rating	Door Type	Fire Area	Separation Fire Zone
Auxiliary Building				
D03	-	Watertight	2ABLDI/2ABLDG	4/3
D09	-	Watertight	2ABLDJ/2ABLDG	6/3
D10	A	Pressure	2ABLDB/2ABLDG	13/3
D13	B	Pressure	2ABLDB/Stairwell	13/SW
D18	-	Watertight	2ABLDA/2ABLDB	9/13
D20	-	Watertight	2ABLDD/2ABLDB	10/13
D24	A	Pressure	1ABLDB/2ABLDB	12/13
D26	A	Pressure	1ABLDB/2ABLDB	12/13
D34	-	Watertight	1ABLDB/1ABLDD	12/10
D36	-	Watertight	1ABLDB/1ABLDD	12/9
D40	B	Pressure	1ABLDB/Stairwell	12/SW
D43	A	Pressure	1ABLDB/1ABLDG	12/3
D47	-	Watertight	1ABLD1/1ABLDG	3/4
D49	-	Watertight	1ABLDJ/1ABLDG	6/3
C17	A	Pressure	2ABLDG/2ABLDB	14C/24
C27	A	Pressure	2ABLCB/2ABLDB	17/24
C32	B	Pressure	1ABLDB/Stairwell	24/SW
C33	A	Pressure	1ABLDB/2ABLDB	24/24
C34	A	Pressure	1ABLDB/2ABLDG	
C40	A	Pressure	1ABLCB/1ABLDB	
C45	A	Pressure	1ABLDB/1ABLDG	
B13	A	Pressure	1ABLDG/1ABLBB	
B68	A	Pressure	2ABLBB/2ABLDG	
B87	A	Pressure	2ABLBB/2ABL2A	
A86	-	Watertight	2ABLAD/2ABLAE	
A07	-	Watertight	1ABLDB/1ABLAB	
104	A	Pressure	1ABLAB/1ABLDB	
A11	-	Pressure and Watertight	2ABLDG/2ABLAE	
105	-	Watertight	1ABLDB/1ABLAB	
115	A	Pressure	1ABL1G/1ABLDB	150/46
125	A	Pressure	1ABL1G/1ABLDB	150/47
141	A	Pressure	1ABL1G/1RTBL1A	150/301
159	-	Watertight	2ABLDB/2ABLAB	46/52
B18	B	Pressure	2CBLBA/Stairwell	73/SW
B31	A	Pressure	2CBLBA/2CBLCA	73/42B
B69	A	Pressure and airtight	1CBLBS/1CBLCB	57A/58

CMEB 9.5-1 Requirements | **VEGP Position** | **Clarification of Conformance or Justification of Deviation**

Door Number	Certified Rating	Door Type	Fire Area	Separation Fire Zone
Control Building				
B79	A	Pressure	1CBLBA/Stairwell	73/SW
B98	A	Pressure	1CBLCA/1CBLBA	42B/73
A08	B	Pressure	2CBLAN/Stairwell	85/SW
A78	A	Pressure	2CBLAF/2CBLCA	84/42B
A61	A	Pressure	1CBLAN/Stairwell	85/SW
A71	A	Pressure and airtight	1CBLBS/1CBLAU	57A/154
A75	A	Pressure	1CBLCA/1CBLAF	42B/84
141	A	Pressure, airtight and bulletproof	1CBL1B/2ABL2A	118/141 A
159	A	Pressure, airtight and bulletproof	1CBL1B/1ABL2A	118/141 A
182	A	Pressure and airtight	1CBLBS/1CBL1B	57A/118
199Q	A	Pressure and airtight	1CBL1B/1CBL1TS C	650/183 B
253	A	Pressure and airtight	1CBLBS/1CBL2E	57A/122 B
333	A	Pressure and airtight	1CBLBS/1CBL3K	57A/125 B
404	B	Pressure	1CBL4A/Stairwell	170/SW
Fuel Handling Building				
CO1	A	Pressure	2CBLCA/2ABLCB	42B/17
CO2	A	Pressure	1CBLCA/1ABLCB	42B/17
Diesel Generator Building (Unit 1)				
101	A	Pressure	1CBLCA/1ABLCB	428/17
104	A	Pressure	1DBL1A/1CBLBA	143/161
Diesel Generator Building (Unit 2)				
101	A	Pressure	2DBL1A/2CBLBA	161/143
104	A	Pressure	2DBL1B/2CBLBD	162/144
Auxiliary Building (Unit 1)	A05	Pressure and Watertight	2ABLDG/2ABLAE	36/39A

Watertight doors in fire barriers are not fire rated because fire-rated water tight doors are not commercially available. The VEGP watertight doors were manufactured by the Julius Mock Company. SNUPPS and Limerick use these doors. In addition, Baltimore Gas and Electric has had this type of door tested and the door has received a UL rating as a special purpose door. The use of watertight door in a rated fire area boundary is justified on a case by case basis in Appendix 9A.

There are door openings that are required to be designed for pressure loads, bullet resistance, and the combined requirement of pressure and bullet resistance. These doors are specially designed to meet the Vogtle criteria and were never generically tested, as are typically fire rated hollow metal doors. Each door has been fabricated to listed UL procedures for a UL 3-h rating and the NFPA 80 and 252 standards. The construction of each door is certified by a certificate of fire label construction by the manufacturer. The manufacturer cannot affix a label to these doors and frames because they are a special design for the Vogtle project and have not been subjected to an actual physical UL fire test. In each case the thickness of the metal used to construct the door frame, door skin, stiffeners, and strike and butt reinforcements exceeds the thickness of metal used in standard fire rated doors and frames.

Clearances between the door and the door frame may exceed the 1/8-in. gap required by section 2-5.4 of NFPA 80. The gap may extend to a maximum of 3/8-in. on single swinging metal fire doors and to a maximum of 1/4-in. on double swinging metal doors. The gap between meeting edges of double swinging metal doors may also extend to a maximum of 1/4-in. The gap at the strikeplate area will not exceed 1/8-in. in any case. VEGP swinging hollow metal fire doors have been tested by an independent laboratory to the above referenced

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		dimensions. Pressure and bullet proof swinging doors have been evaluated to be comparable to or exceed the qualifications of the hollow metal doors that were tested by the independent laboratory.
		The following fire doors to control building electrical equipment rooms are equipped with hold-open devices for use during station blackout conditions:

V12111L1B54	V22111L1B07
V12111L1B57	V22111L1B25
V12111L1B59	V22111L1B28
V12111L1B61	V22111L1B34
V12111L1B70	V22111L1B36
V12111L1B88	V22111L1B39
V12111L1B102	V22111L1B103

Security doors in 3-h rated fire area boundaries that do not fall into the categories mentioned above are labeled Class A fire doors.

VEGP Normally Open Fire Doors in Rated Fire Area Boundaries

Door No. Auxiliary Building	Fire Area	Separation Fire Zone
D65	1-AB-LD-A/ 1-AB-LD-B	11B/12
C47	1-AB-LD-A/ 1-AB-LD-B	11B/24
B18	1-AB-LD-A/ 1-AB-LD-B	11B/40
A17	1-AB-LD-A/ 1-AB-LD-B	11B/38
D66	2-AB-LD-A/ 2-AB-LD-B	11B/13
C21	2-AB-LD-A/ 2-AB-LD-B	11B/24
B50	2-AB-LD-A/ 2-AB-LD-B	11B/40
A84	2-AB-LD-A/ 2-AB-LD-B	11B/38

The closing mechanisms and latches of normally closed accessible fire doors will be visually inspected at least once per 6 months. Doors with automatic hold-open and release mechanism are functionally tested one per 18 months. Held-open fire doors with automatic hold-open and release mechanisms will be inspected at least once per 6 months.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
One of the following measures should be provided to ensure they will protect the opening as required in case of fire:	Conforms	One of the specified measures will be used to protect door openings.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(a) Fire doors should be kept closed and electrically supervised at a continuously manned location. (b) Fire doors should be locked closed and inspected weekly to verify that the doors are in the closed position. (c) Fire doors should be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions. (d) Fire doors should be kept closed and inspected daily to verify that they are in the closed position.		Due to air balance conditions, some doors at VEGP may require deliberate manual action to close. Personnel receive training on the proper use of doors to ensure they are fully closed and latched following use.
The fire brigade leader should have ready access to keys for any locked fire doors.	Conforms	The fire team captain will have access to keys for locked fire doors.
Areas protected by automatic total flooding gas suppression systems should have electrically supervised self closing fire doors or should satisfy option (a) above.	Conforms	Areas protected by automatic total flooding gas suppression systems will have self-closing fire doors, or be provided with automatic hold-open and release mechanisms.
(6) Personnel access routes and escape routes should be provided for each fire area. Stairwells outside primary containment serving as escape routes, access routes for firefighting, or access routes to areas containing equipment necessary for safe shutdown should be enclosed in masonry or concrete towers with a minimum fire rating of 2 h and self-closing Class B fire doors.	Conforms	(6) Access and escape routes are provided for each fire area. Stairwells outside containment are enclosed in masonry or concrete towers with a minimum fire rating of 2-h and self-closing Class B fire doors.
(7) Fire exit routes should be clearly marked.	Conforms	(7) Fire exit routes are clearly marked.
(8) Each cable spreading room should contain only one redundant safety division. Cable spreading rooms should not be shared between reactors. Cable spreading rooms should be separated from each other and from other areas of the plant by barriers having a minimum fire resistance of 3 h.	Conforms	(8) VEGP, a two-unit plant, has four (two per unit) cable spreading rooms. Each cable spreading room contains Load Groups A and C, or B and D; power for loads are derived from the diesel generator aligned with Load Groups A and C, and B and D. There is some HVAC Class 1E circuitry for the control room routed in each cable spreading room for Unit 1 and Unit 2. Each cable spreading room is separated from each other and the remainder of the plant by 3-h rated fire barriers.
(9) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. Interior finishes should be noncombustible.	Conforms	(9) Interior wall and structural components, thermal insulation, and radiation shielding materials are non-combustible.
Materials that are acceptable for use as interior finish without evidence of test and listing by a nationally recognized laboratory are the following:		Soundproofing, including duct sound traps, are of mineral wool with a flame spread rating of less than 25.
(a) Plaster, acoustic plaster, gypsum plasterboard		

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(gypsum wallboard), either plain, wallpapered, or painted with oil- or water base paint.		
(b) Ceramic tile, ceramic panels.		
(c) Glass, glass blocks.		
(d) Brick, stone, concrete blocks, plain or painted.		
(e) Steel and aluminum panels, plain, painted, or enameled.		
(f) Vinyl tile, vinyl-asbestos tile, linoleum, or asphalt tile on concrete floors.		
(10) Metal deck roof construction should be noncombustible and listed as acceptable for fire in the Underwriters Laboratories (UL) Building Materials Directory, or listed as Class I in the Factory Mutual System Approval Guide.	Partial conformance	(10) Metal roof deck consists of galvanized steel, which is noncombustible. The material is not listed. Fire and uplift resistance is provided by the concrete covering over the deck.
(11) Suspended ceilings and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles except as noted in Position C.7.b.	Conforms	(11) Suspended ceilings and their supports are of noncombustible materials. Concealed spaces are devoid of combustible materials to the extent practicable. Electrical cables in conduit are not considered as combustible material. The existence of combustible material above the main control room dropped ceiling and below the raised floor areas is discussed in Section C.7.b. The Technical Support Center has raised floors with exposed electrical cables in the computer, CRT display, and the communications rooms as do the plant computer rooms. These rooms and their raised floor sections are provided with fire detection systems and are protected by automatic halon fire suppression systems, except for the TSC which has a manual halon fire suppression system. Some of the rooms on levels 1 and 2 and the Unit 2 computer room of the control building have combustible material located above the suspended ceilings. In many cases the combustible material is limited (HVAC dampers, small fan, electrical heater) and the damage potential presented is relatively insignificant. When the concealed combustibles are electrical cables in cable trays, the cable trays are enclosed (solid metal bottom and covers) to ensure that a fire, should one occur, is ventilation controlled. Therefore, a low combustion rate and fire intensity will make fire fighting in the concealed space easier. Where combustible material is present in a concealed space, fire detectors are provided to alert the plant operators of a fire should a fire occur. Where the exposed electrical cables are safety related, they are only one safety division. Fire detection annunciation is provided at each local

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		detection panel and in the control room by zones.
(12) Transformers installed inside fire areas containing safety-related systems should be of the dry type or insulated and cooled with noncombustible liquid. Transformers filled with combustible fluid that are located indoors should be enclosed in a transformer vault. (See Section 450(c) of NFPA 70, National Electrical Code.)	Conforms	(12) All transformers inside structures are dry-type air-cooled and need not be enclosed in a transformer vault. NFPA 70 Section 450(c) is not applicable.
(13) Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 50 ft from the building, or it should be ensured that such building walls within 50 ft of oil-filled transformers are without openings and have a fire resistance rating of at least 3 h.	Conforms	(13) Buildings containing safety-related systems are protected from exposure or spill fires involving oil-filled transformers by being located more than 50 ft away. Confinement dikes are provided.
(14) Floor drains sized to remove expected firefighting waterflow without flooding safety-related equipment should be provided in those areas where fixed water fire suppression systems are installed. Floor drains should also be provided in other areas where hand hose lines may be used if such firefighting water could cause unacceptable damage to safety-related equipment in the area. (See NFPA-92, Waterproofing and Draining of Floors.) Where gas suppression systems are installed, the drains should be provided with adequate seals or the gas suppression system should be sized to compensate for the loss of the suppression agent through the drains. Drains in areas containing combustible liquids should have provisions for preventing the backflow of combustible liquids to safety-related areas, through the inter-connected drain systems. Water drainage from areas that may contain radioactivity should be collected, sampled, and analyzed before discharge to the environment.	Partial conformance	(14) The flooding analysis demonstrates that safe shutdown can be achieved and maintained even if there is some accumulation of fire fighting water in areas containing safe shutdown equipment. Rooms which contain combustible fluids have drains which prevent the spread of burning fluids throughout the plant. In addition, since preaction sprinkler systems are used, only the sprinkler heads in the immediate fire area of a room will open, which minimizes the waterflow. Water drainage from areas which may contain radioactive water will be sampled and analyzed before discharge to the environment.
C.5.b. Safe Shutdown Capability		C.5.b. Safe Shutdown Capability
(1) Fire protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:	Conforms	(1) Fire protection features are provided for structures, systems, and components important to safe shutdown. These features are capable of limiting fire damage so that:
(a) One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage.		(a) One train of systems necessary to achieve and maintain hot standby conditions from either the control room or the emergency control stations is free of fire damage and
(b) Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 h.		(b) Systems necessary to achieve and maintain cold shutdown from either the control room or the emergency control stations can be repaired within 72-h.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		Table 9.5.1-1 identifies the systems and components important to safe shutdown. Appendix 9A identifies the operational and design considerations which are unique to each fire area.
(2) To meet the guidelines of Position C.5.b.1, one of the following means of ensuring that one of the redundant trains is free of fire damage should be provided: (a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-h rating. Structural steel forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier. (b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 ft with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.	Partial conformance	(2) Safe shutdown reviews are performed by calculations and are available for NRC audits. Redundant safe shutdown trains will meet the separation criteria outlined in C.5.b(2) except in the main control room, containment, and some other plant areas. Alternate shutdown capability is provided for the main control room. Where the separation criteria is not met in other plant areas, specific deviations are defined and justified in the fire hazards analysis, Appendix 9A. Radiant energy heat shields are used inside containment. Additionally, fire induced spurious actuation concerns can be eliminated by providing protective wrappings of circuits. Operator actions can also be taken to preclude or terminate those undesired events. NRC staff reviewed and approved these actions in SER Supplement 4, dated August 1986.[2] In hi-lo pressure interface situations, cable-to-cable hot shorts can be precluded by encapsulation of the spurious actuation concern cable in a conduit. Only cables in the same race ways carrying the spurious actuation concern cable have been analyzed for cable -to-cable hot short concerns where multiple conductor contact in the proper phase/polarity arrangement is required to cause the undesired condition to occur.
(c) Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1-h rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.		The control room complex is a shared fire area for Unit 1 and Unit 2, each having its own control area. Separate alternate safe shutdown capability is provided in the form of remote shutdown panels and other local control stations for each unit.
(3) If the guidelines of Positions C5.b.1 and C5.b.2 cannot be met, then alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided.		Sufficient staff resources will be available on each shift to accomplish an alternate shutdown of both units from outside the control room and staff the fire brigade. **Note: [2]Vogtle Electric Generating Plant (VEGP)-NRC Triennial Fire Protection Inspection Report 05000424/2012007 and 05000425/2012007.**
C.5.c. Alternative or Dedicated Shutdown Capability		C.5.c. Alternative or Dedicated Shutdown Capability
(1) Alternative or dedicated shutdown capability provided for a specific fire area should be able to achieve and maintain		(1) Alternative or dedicated shutdown capability is provided where redundant safe shutdown trains do not meet

a. As defined in the Standard Technical Specifications.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
subcritical reactivity conditions in the reactor; maintain reactor coolant inventory; achieve and maintain hot standby[a] conditions for a pressurized water reactor (PWR);hot shutdown* for a boiling water reactor (BWR); achieve cold shutdown* conditions within 72 h; and maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture, or any primary coolant boundary or rupture of the containment boundary.	Partial conformance	separation criteria. With this capability, the plant can achieve and maintain subcritical reactivity conditions in the reactor; maintain reactor coolant inventory; achieve and maintain hot standby; achieve cold shutdown conditions within 72 h and maintain cold shutdown conditions thereafter. With this capability, the reactor coolant system process variables can be maintained within those limits predicted for a loss of normal ac power and the fission product boundary can be maintained during the post-fire shutdown. In addition to tripping the reactor in response to a control room fire, the control room operators (at the discretion of the senior operator) will trip the reactor coolant pumps for loops 1 and 4, close the pressurizer PORV block valves, and will isolate the steam generators by closing (or verifying closed) the main steam isolation valves and bypass valves, the main feedwater and bypass isolation valves, and the blowdown isolation valves and will align the CVCS charging pump suction to the RWST prior to leaving the control room. Tripping the reactor coolant pumps for loops 1 and 4 and closing of the PORV block valves will preclude undesired RCS depressurization and loss of inventory (both spray valves and one PORV could open simultaneously due to a spurious signal). If both spray valves and one PORV were allowed to depressurize the RCS until control is established at the remote shutdown panels and automatic actuation of safety injection does not occur due to the depressurization (signal originates inside the control room), the RCS process variables will not remain within those predicated for a loss of normal loss of ac power. The capability exists at the remote shutdown panels to preclude this event from occurring given any number of fire-induced circuit failures. Isolation of the steam generators is necessary to preclude overfill or boil dry conditions due to fire-induced cable faults (i.e., loss of feedwater control or no turbine trip following reactor trip). Steam generator overfill and boil dry conditions could occur in time frames significantly shorter than the time necessary to establish control at the remote shutdown panels. Because reestablishment of flow through any one of the isolated flow paths would require more than one fire induced circuit failure and because the flow paths will be isolated before the operators leave the control room, providing the capability to control these valves from the remote shutdown panels is not considered necessary. Alignment of the CVCS charging pump suction to the

a. As defined in the Standard Technical Specifications.

CMEB 9.5-1 Requirements	**VEGP Position**	**Clarification of Conformance or Justification of Deviation**
		RWST will preclude centrifugal charging pump damage should a volume control tank outlet valve spuriously closes prior to establishing control at the remote shutdown panels. (See C.5.c.(7).) An area by area analysis of the consequences of a fire in a given fire area is provided in Appendix 9A.
(2) The performance goals for the shutdown functions should be:	Partial conformance	(2)
(a) The reactivity control function should be capable of achieving and maintaining cold shutdown reactivity conditions.		(a) Reactivity control is provided with the control rods and boration. It is monitored with the R.G. 1.97 neutron flux monitor or the source and intermediate range monitors.
(b) The reactor coolant makeup function should be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.		(b) The CVCS system provides for primary coolant makeup from the boric acid storage tank and the RWST through the charging pumps. Level monitoring is provided with pressurizer level instrumentation. To ensure the ability to maintain RCS pressure control following some spurious actuations, it may be necessary to fill the pressurizer and perform a solid plant cooldown.
(c) The reactor heat removal function should be capable of achieving and maintaining decay heat removal.		(c) Heat removal is provided through the team generators or residual heat removal system. Reactor coolant system temperatures are provided from wide range leg temperatures or exit core thermocouples.
(d) The process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the above functions.		(d) Direct indication of the process variables required to achieve and maintain safe shutdown are available at the main control board and the train B remote shutdown panel. Direct indication of the reactor coolant cold leg temperatures may not be available for some fires outside the control room, but indirect indication of this parameter is available to the plant operators (i.e., steam generator pressure). Direct indication of steam generator pressure may not be available for the control room fire, but indirect indication of this parameter is available to the operators at the train B remote shutdown panel (i.e., reactor coolant cold leg temperature).
(e) The supporting functions should be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.		(e) The fire hazards analysis considers the support functions required to achieve and maintain safe shutdown.

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(3) The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 h. Procedures shall be in effect to implement this capability.	Conforms	(3) Safe shutdown can be achieved with either of the two trains of equipment identification in Table 9.5.1-1. Appendix 9A identifies the specific train to be used to achieve safe shutdown on fire area by fire area basis. Appendix 9A also identifies the special operational considerations which are unique to each fire area. Alternative shutdown capability is independent of the fire under consideration and considers the post-fire conditions where offsite power is and is not available.
(4) If the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be onsite at all times.	Conforms	(4) Hot shutdown can be maintained until cold shutdown can be achieved.
(5) Equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 h. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 h after the fire will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system should be provided. Equipment and systems used after 72 h may be powered by offsite power only.	Conforms	(5) Fire damage to equipment required for cold shutdown will be limited to damage that can be repaired in 72 h through separation, fire detection, and suppression. Repair procedures and procedures for maintaining spare parts will ensure that repairs can be made so that cold shutdown can be achieved within 72 h.
(6) Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet Seismic Category 1 criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.	Conforms	(6) The referenced requirements are included in the alternate shutdown panel design bases. Spurious actuation is considered in the safe shutdown analysis.

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(7) The safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, should be such that a postulated fire involving associated circuits will not prevent safe shutdown.	Conforms	(7) Three types of associated circuits (i.e., common power source case, common enclosure case, and circuits of equipment whose spurious operation would effect the safe shutdown capability) have been considered in the safe shutdown analysis. Coordination between protective breakers, relays, and fuses ensures that circuit faults will not result in deenergization of an electrical bus serving safe shutdown equipment necessary to achieve safe shutdown for the fire under consideration. The circuit protection provided for power and control cables precludes fire propagation into an enclosure shared with safe shutdown circuits by interrupting a fault before cable insulation damage due to overheating can occur outside the fire area under consideration. Fire-induced fault current in associated instrument cables will not affect safe shutdown circuits in a common enclosure because the cables carry low level current (mA) and the circuit power source can only provide low level short circuit current. Each fire area has also been evaluated to determine where spurious valve, pump, or electrical breaker actuations can occur which could hinder or preclude the ability to achieve safe shutdown if operator actions are not taken to terminate the undesired event. The design of the VEGP 120-Vac vital busses with respect to safe shutdown and nonsafe shutdown loads has been evaluated as acceptable, although a faulted circuit may result in a loss of bus voltage condition for a time frame of 10 to 17 seconds. The basis for the acceptability of this condition is: • The faulted condition is cleared by the existing circuit protection following the time delay. • The loss of bus voltage condition does not cause damage to any component associated with the bus. • The short duration of the loss of bus voltage condition will not cause significant operator confusion due to erroneous indications during the fault conditions. • Actuation of automatic devices requires loss of at least two vital busses which is not considered credible for the short duration. Because the circuits associated with each bus (channels 1, 2, 3 and 4) have separate raceway systems, a simultaneous fault condition for more than one bus is very unlikely.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		Spurious actuation concerns are identified on an area-by-area basis in Appendix 9A. Assumptions used in the analysis include: • Safe shutdown must be achieved within 72-h with or without offsite power being available. • No design basis events are assumed concurrent with the fire. • No single failures are assumed concurrent with the fire. • No equipment is assumed inoperable prior to the fire. • All plant operating modes except refueling are evaluated (i.e., modes 1, 2, 3, 4, and 5). • A spurious signal action/inaction is defined as being caused by a single hot short, open circuit, or short-to-ground impacting either a single component or the activation/inactivation of multiple components where an ESFAS signal is involved (i.e., safety injection, containment spray, containment isolation). • An unlimited number of spurious control signal actions/inactions can occur where high/low pressure interface (fire-induced LOCA) is involved (RCS only). • Fire-induced failures in three phase power cables can only result in a loss of power to, or the inability to supply power to the component. The analysis defines the time available for taking actions to preclude spurious actuations from preventing achievement of safe shutdown. The compensatory measures taken to correct an undesired spurious actuation are evaluated to ensure that they can be accomplished within the time constraints associated with the concern. The compensatory measures for fires outside the control room spurious actuations are defined in plant procedures. For the control room fire, these compensatory measures are included in the remote shutdown panel operation abnormal operating procedures.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		Fire induced spurious closure of either of the volume control tank (VCT) outlet valves (LV-0112B or LV-0112C) or the charging pump common minimum flow valve (HV-8110) could possibly cause simultaneous damage to the centrifugal charging pumps during a loss of offsite power condition. However, very specific plant conditions must exist making this condition considered not credible. First, the loss of offsite power condition must occur resulting in an automatic starting of both centrifugal charging pumps. Then, either one of the VCT outlet valves must spuriously close before the operators open the refueling water storage tank suction valves (note: VCT outlet valves are closed to preclude inadvertent boron dilution), or the common minimum flow valve must spuriously close when the pressurizer level is high (no flow to the reactor coolant system except via the reactor coolant pump seals). The CVCS charging pump suction will be aligned to the RWST for a fire in those areas where a VCT outlet valve can spuriously close to preclude centrifugal charging pump damage. In those fire areas where spurious closure of a centrifugal charging pump minimum flow valve closure can occur resulting in the inability to ensure the operation of at least one pump (not the control room), centrifugal charging pump operation will be discontinued until a minimum flow path is assured. During the control room fire event, operation of the transfer of control switches at the remote shutdown panel precludes this condition from occurring. [2] **Note:[2]Vogtle Electric Generating Plant (VEGP)-NRC Triennial Fire Protection Inspection Report 05000424/2012007/05000425/2012007.**
C.5.d. Control of Combustibles	Conforms	C.5.d. Control of Combustibles
(1) Safety-related systems should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression, and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are:		(1) Areas containing safe shutdown systems are isolated or separated from combustible materials, where practical, or are provided with sprinkler or spray suppression systems. Specifically:

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(a) Emergency diesel generator fuel oil day tanks.	Conforms	(a) The diesel generator day tanks each contain 1250 gal and are located in the same areas as the associated diesel. The tank is surrounded by a 3-h rated enclosure to contain any spills and fire protection water. The day tank room is equipped with an automatic preaction sprinkler system.
(b) Turbine-generator oil and hydraulic control fluid systems.	Conforms	(b) The turbine-generator oil and hydraulic systems are isolated from all safety-related systems and components, and are equipped with water deluge systems.
(c) Reactor coolant pump lube oil system.	Partial conformance	(c) The reactor coolant pumps are fitted with the Westinghouse oil collection system.
(2) Bulk gas storage (either compressed or cryogenic) should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen should be located outdoors or in separate detached buildings so that a fire or explosion will not adversely affect any safety-related systems or equipment. (Refer to NFPA 50A, Gaseous Hydrogen Systems.) Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, Industrial Fire Loss Prevention.)		(2) Bulk gas storage of hydrogen, nitrogen, and carbon dioxide is provided outdoors. The compressed air system is located in the nonsafety-related turbine building. The only forms of stored compressed gas in safe shutdown buildings is that associated with portable fire extinguishers and the Halon fire protection cylinders. Small quantities of compressed gases will be used for laboratory purposes. A small number of hydrogen cylinders are located in the control building for laboratory purposes. Since the quantities are small and isolated from safe shutdown areas by 3-h barriers, the deviation is justified.
(3) The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute noncombustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with an intensity and Btu production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility		(3) The use of plastic materials is minimized within the plant. With respect to halogenated plastics, PVC is limited. Ethylene propylene rubber (EPR) and cross-linked polyolefin insulation are used on electrical cables. Neoprene is used in a limited number of cables associated with the communication system. However, these communication system cables have steel armor over the neoprene jacket, thus essentially eliminating them as combustibles. PVC is used in monorail hoisting equipment, certain control

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
and can plug air filters, especially charcoal and high-efficiency particulate air (HEPA). The halogenated plastics also release free chlorine and hydrogen chloride when burning, which are toxic to humans and corrosive to equipment.	Partial conformance	panels to a limited extent, and for flexible conduit in general plant areas, including some associated with the NSSS inside containment. PVC is used on the refueling machine for the communication cable reel individual conductor insulation, however, the overall jacket is thermal plastic rubber, (TPR). PVC piping has been used to a limited extent for drain piping where other materials are not suitable for seismic and corrosion considerations.
(4) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, Flammable and Combustible Liquids Code.	Partial conformance	(4) Flammable and combustible liquids will be stored in accordance with NFPA 30, except as noted in C.5.d.(1). Deviations from the code are described in table 9.5.1-9.
(5) Hydrogen lines in safety-related areas should be either designed to Seismic Class 1 requirements, sleeved such that the water pipe is directly vented to the outside, or be equipped with excess flow valves so that in case of a line break the hydrogen concentration in the affected areas will not exceed 2 percent.	Partial conformance	(5) Hydrogen lines in safety-related areas are designed to ensure that the lines will not break under earthquake loadings.
C.5.e. Electrical Cable Construction, Cable Trays, and Cable Penetrations		C.5.e Electrical Cable Construction, Cable Trays, and Cable Penetrations
(1) Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material.	Partial conformance	(1) Nonmetallic flexible conduit is used in short lengths to connect metallic conduit to equipment. PVC conduit is used to limited extent at the nuclear service cooling water towers. The balance of the conduit is metallic, not thin wall. Cable trays are metal.
(2) Redundant safety-related cable systems outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety- related areas by fire barriers with a minimum fire rating of 3 h. These cable trays should be provided with continuous line-type heat detectors and should be accessible for manual firefighting. Cables should be designed to allow wetting down with fire suppression water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided.	Partial conformance	(2) Redundant safety-related cable systems outside the cable spreading rooms are not always separated from each other or from potential fire exposure hazards by fire barriers with a minimum fire rating of 3-h. Separation meeting the guidelines of Regulatory Guide 1.75 as discussed in Section 8.3 is provided for safety-related systems in general. Separation meeting the guidelines of CMEB 9.5-1 Section C.5.b has been provided for safe shutdown systems and equipment.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
Safety-related cable trays of a single division that are separated from redundant divisions by a fire barrier with a minimum rating of 3 h and are normally accessible for manual firefighting should be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. Automatic area protection, where provided, should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present an exposure hazard to the cable system. Manual hose standpipe systems may be relied upon to provide the primary fire suppression (in lieu of automatic water suppression systems) for safety-related cable trays of a single division that are separated from redundant safety divisions by a fire barrier with a minimum rating of 3 h and are normally accessible for manual firefighting if all of the following conditions are met:		Line-type heat detectors are only used inside containment in the cable trays containing safety-related cables and the pressurizer heater cables. Photoelectric, ionization, or heat detectors are provided in other cable areas. Cables are designed to allow wetting down with fire suppression water without causing electrical faulting. Manual hose stations and portable hand extinguishers are provided and are accessible to the cable trays. Areas such as the electrical chase rooms that are not for manual fire fighting are provided with automatic preaction sprinkler systems.
(a) The number of equivalent[a] standard 24-in. wide cable trays (both safety-related and nonsafety-related) in a given fire area is six or less. (b) The cabling does not provide instrumentation, control, or power to systems required to achieve and maintain hot shutdown. (c) Smoke detectors are provided in the area of these cable routings, and continuous line-type heat detectors are provided in cable trays.		The following four criteria are met in zones on which manual fire suppression capability is relied, in lieu of automatic fire suppression: (a) Area is accessible for manual fire fighting. (b) The number of equivalent standard 24-in.-wide cable trays (both safety-related and nonsafety-related) in a given area is six or less. (c) The cables in the trays are not required to achieve and maintain hot shutdown. (d) Smoke detection is provided in area of the cable trays (cable tray line-type heat detectors are not considered to be required when smoke detectors are provided).

a. Trays exceeding 24 inches should be counted as two trays; trays exceeding 48 inches should be counted as three trays, regardless of tray fill.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		VEGP has provided fire suppression (oil collection tank flame arrestors) and/or manual fire fighting capability for all significant fire hazards in containment. Any credible fire which could occur would not impair the ability to achieve and maintain safe (cold) shutdown. This provision of fire protection and this ability to accomplish safe shutdown is not dependent on the existence of automatic fixed sprinkler systems. The installation of automatic fixed sprinkler systems in the VEGP containment would not significantly increase the level of protection beyond that provided by the following protection measures and other design features which will exist:
Safety-related cable trays that are not accessible for manual fire fighting should be protected by a zoned automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur.		1. The reactor coolant pumps are provided with an oil collection system that directs leaking lubricant away from hot surfaces into a remote collection tank. This system is designed, engineered, and installed so as to withstand a safe shutdown earthquake. These collection tanks are provided with flame arrestors in the tank vents. In addition, infrared flame detectors are strategically located in the vicinity of the reactor coolant pumps. This fire detection provides early warning of a fire

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
In other areas where it may not be possible because of other overriding design features necessary for reasons of nuclear safety to separate redundant safety-related cable systems by 3-h-rated fire barriers, cable trays should be protected by an automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. The capability to achieve is provided for each cable tray. Such cable trays should also be protected and maintain safe shutdown, considering the effects of a fire involving fixed and potential transient combustibles, should be evaluated with and without actuation of the automatic suppression system and should be justified on a suitably defined basis.		should one occur. This fire detection system alarms locally in the control room with the Clearance and Tagging (C&T) area being available as a backup. 2. Local standpipe hose stations are strategically located in the containment to allow manual fire occur. Each hose station is also provided with a portable fire extinguisher. 3. Charcoal filter units in containment are provided with an integral water suppression system. 4. Electrical cable trays in containment containing safety-related cables and the trays containing the pressurizer heater cables, are provided with line-type eat detectors which provide early warning of an incipient fire condition by alarming locally and in the control room with the C&T area being available as a backup. 5. All electrical cables used in containment are IEEE 383 qualified (demonstrate minimal flame spread) thereby limiting the capability of a fire to spread along the cables should a fire occur. 6. The effects of a fire are contained locally because the height and volume of the containment structure allow excellent heat dissipation and because of the low combustible loading. 7. The number of equivalent standard 24-in. wide cable trays (both safety-related and nonsafety related stacked one above the other is less than six. There is only one set of cable trays stacked five high. Typically, a "stack: of cable trays consists of only one electrical separation division (i.e., A, B, C, D, or N). Cable trays of the redundant safety-related trains never cross. 8. Separation of safe shutdown trains (equipment and cables) is as presented in Appendix 9A. In general, the west and north (east and north in Unit 2) portions of the containment annulus area outside the secondary shield wall and the north steam generator/reactor coolant pump area inside the secondary shield contains safe shutdown train B equipment and cables. Similarly, the east and south portions (west and south in Unit 2) of the containment annulus area outside the secondary

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		shield wall and the south steam generator/reactor coolant pump area inside the secondary shield contain safe shutdown train A equipment and cables. While the secondary shield walls are not rated fire barriers, their thickness and penetration design for radiation shielding considerations provide a significant impediment to fire propagation past the barrier. In addition, the limited fire hazards inside containment as previously discussed, are not situated so as to significantly challenge the ability of the secondary shield walls to preclude fire propagation.
(3) Electric cable construction should, as a minimum, pass the flame test in the current IEEE Standard 383. (This does not imply that cables passing this test will not require fire protection.)	Partial conformance	(3) Electrical cables meet the requirements of the IEEE 383 flame tests with the following exceptions: (a) Internal wiring within certain equipment items supplied by the NSSS vendor. (b) Internal wiring within the fire alarm signaling system. (c) Certain cables associated with the emergency response facility computer. (d) Cables provided with the turbine generator within the turbine building. (e) Cables and wiring associated with the Security Computer System. (f) Power cables for Refueling Machines. Use of this cable is justified because it is either internal wiring, located in nonsafe shutdown areas, or cable is deenergized during normal plant operations.
(4) Cable raceways should be used only for cables.	Conforms	(4) Cable raceways are only used for cables.
(5) Miscellaneous storage and piping for flammable or combustible liquids or gases should not create a potential exposure hazard to safety-related systems.	Conforms	(5) Miscellaneous storage and piping for flammable or combustible liquids or gases does not create a potential hazard to safety-related systems.
C.5.f. Ventilation		C.5.f Ventilation

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(1) The products of combustion and the means by which they will be removed from each fire area should be established during the initial stages of plant design. Consideration should be given to the installation of automatic suppression systems as a means of limiting smoke and end heat generation. Smoke and corrosive gases should generally be discharged directly outside to an area that will not affect safety-related plant areas. The normal plant ventilation system may be used for this purpose if capable and available. To facilitate manual firefighting, separate smoke and heat vents should be provided in specific areas such as cable spreading rooms, diesel fuel oil storage areas, switchgear rooms, and other areas where the potential exists for heavy smoke conditions. (See NFPA 204 for additional guidance on smoke control.)	Partial conformance	(1) Smoke venting capability is built into the HVAC system. As described in subsection 9.5.1, smoke removal is accomplished by utilizing the normal HVAC ductwork. Smoke accumulation is removed by the building's normal exhaust system where it is then discharged to the environment. Should smoke removal from a space be inhibited by the closure of an isolated fire damper, portable smoke removal fans are utilized to direct the smoke to areas that are served by functioning portions of the exhaust system. The portable smoke removal fans are provided to facilitate manual firefighting measures. Smoke and heat vents are not provided.
(2) Release of smoke and gases containing radioactive materials to the environment should be monitored in accordance with emergency plans as described in the guidelines of Regulatory Guide 1.101, Emergency Planning for Nuclear Power Plants. Any ventilation system designed to exhaust potentially radioactive smoke or gases should be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant design. This requirement includes containment functions for protecting the public and maintaining habitability for operations personnel.	Conforms	(2) Radiation monitors are provided to continuously monitor effluent gaseous streams for the purpose of reporting radioactivity that is released to the environment. There are provisions for sampling the exhaust duct gas flow. If portable equipment is used for smoke removal, then grab samples will be taken to monitor radioactivity levels.
(3) Special protection for ventilation power and control cables may be required. The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system where practical.	Partial conformance	(3) It is not always practical to route the power and control cables for mechanical ventilation systems outside the area served by the system. In many cases, the mechanical components for a ventilation system are located within the area served by that system (i.e., a pump room cooling unit). However, special consideration has been given to the routing of power and control cables for those mechanical ventilation systems used to support the operation of safe shutdown equipment and the ability to remove smoke following a fire. Power and control cables for mechanical ventilation and cooling systems required to support the operation of safe shutdown systems are evaluated against the separation requirements of Section C.5.b.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		Power control cable locations for mechanical ventilation systems serving smoke removal function have been evaluated to identify where a fire may impact the ability to remove smoke from an area served by the system. The fire hazards analysis defines where portable smoke ejectors and flexible ducting may have to be employed following a fire to remove smoke because of possible cable damage. Should the normal exhaust system become unavailable for smoke removal loss of operations, as in the case of offsite power, portable smoke removal fans are available as an alternate means to relieve an area of smoke.
(4) Engineered safety feature filters should be protected in accordance with the guidelines of Regulatory Guide 1.52. Any filter that includes combustible materials and is a potential exposure fire hazard that may affect safety-related components should be protected as determined by the fire hazards analysis.	Conforms	(4) Charcoal filters are protected by manual deluge systems with automatic detection systems. Water supplies to the filters (except inside containment) are positively isolated by removal of a pipe spool or installation of blind spectacle flanges. See Section 1.9 of the FSAR for Regulatory Guide 1.52 conformance. For Unit 2 charcoal filter systems (except inside containment), a manually connected fire hose is provided to supply water to the charcoal filter units.
(5) The fresh air supply intakes to areas containing safety-related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.	Conforms	(5) The fresh air supply intake is separated from exhaust stacks and smoke vents.
(6) Stairwells should be designed to minimize smoke infiltration during a fire.	Conforms	(6) Stairwells are designed to minimize smoke infiltration by providing 2-h rated enclosures with Class B fire doors. The doors are either normally closed or held open with a device that releases the door when smoke is detected.
(7) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should be controlled in accordance with NFPA 12, Carbon Dioxide Systems, and NFPA 12A, Halon 1301 Systems, to maintain the necessary gas concentration.	Conforms	(7) Areas that are provided with halon 1301 suppression system are provided with intake and exhaust ventilation dampers which are closed to permit holding time. See paragraph C.6.d. CO_2 systems are not used at VEGP, therefore NFPA 12 is not applicable.
C.5.g. Lighting and Communication Lighting and two-way voice communication are vital to safe shutdown and emergency response in the event of fire. Suitable fixed and portable emergency lighting and communication devices should be provided as follows:		C.5.g Lighting and Communication

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(1) Fixed self-contained lighting consisting of fluorescent or sealed beam units with individual 8-h minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated.	Partial conformance	(1) Fixed self-contained lighting consisting of sealed beam units with individual 8-h minimum battery power supplies are provided for areas that must be manned for safe shutdown except in the main control room. The main control room is provided with a modular ceiling having fluorescent lighting fixtures. These lighting fixtures are powered from Class 1E power sources backed by the essential diesel generators with approximately half the fixtures powered from Train A and the other half powered from Train B. The power supply circuits for these lighting circuits have been treated like safe shutdown circuits, and an evaluation has been performed to ensure that at least one train of lighting fixtures will be available in the event of any fire where the safe shutdown must be accomplished from the main control room. These control room lighting fixtures are also powered from an integral 1 1/2-h minimum battery power supply. Fixed self-contained lighting consisting of sealed beam units with individual 8-h minimum battery power supplies are also provided for access and egress paths to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated. In some cases the plant operators must pass through outdoor areas to reach locations where actions must be taken to achieve safe shutdown. No fixed self-contained battery powered emergency lighting is provided for those outdoor areas. While security lighting is provided, it has not been verified to be available for all plant fires. Battery powered portable hand lights will be available in the main control room for operator use during emergency situations including a fire event safe shutdown.
(2) Suitable sealed-beam battery-powered portable hand lights should be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.	Conforms	(2) Sealed beam battery powered portable hand lights are provided for use by fire brigade and other operations personnel.
(3) Fixed emergency communications independent of the normal plant communication system should be installed at preselected stations.	Conforms	(3) The sound powered communications system that is used for shutdown, maintenance and refueling will be available for emergency use.
(4) A portable radio communications system should be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should	Partial conformance	(4) Plant communications are discussed in subsection 9.5.2. The fire brigade will be equipped with radios utilizing a fixed repeater system; the repeater is backed by an onsite power source, the Security Diesel Generator.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
be protected from exposure fire damage. Preoperational and periodic testing should demonstrate that the frequencies used for portable radio communication will not affect the actuation of protective relays.		
C.6. Fire Detection and Suppression		C.6. Fire Detection and Suppression
C.6.a. Fire Detection		C.6.a. Fire Detection
(1) Detection systems should be provided for all areas that contain or present a fire exposure to safety-related equipment.	Conforms	(1) Detection systems are provided for all areas that contain or present a fire exposure to safety-related equipment.
(2) Fire detection systems should comply with the requirements of Class A systems as defined in NFPA 72D, Standard for the Installation, Maintenance, and Use of Proprietary Protective Signaling Systems, and Class I circuits as defined in NFPA 70, National Electrical Code.	Partial conformance	(2) The fire detection system will comply with the requirements of Class A systems as defined in NFPA 72D-1975 and Class 1 circuits as defined in NFPA 70 except as noted below. Deviations from the code are described in table 9.5.1-9. Certain fire detection system Class 1 circuits may be routed in the same raceway with other non-Class 1 instrumentation circuits which have no association with the fire detection system. The insulation types used on these cables are not the same as those insulation types identified in NFPA 70 and are listed for Class 1 circuit application. However, they have been fully Class 1E qualified for use on safety-related circuits and have successfully passed the IEEE 383 flame tests. The circuits between the local zone indicating panel and the local suppression indicating panel for actuation of the preaction valves, are supervised two-wire circuits (Class B). However, upon detection of trouble within the circuit, the preaction valve will automatically open to ensure that loss of sprinkler system function will not be impaired. The circuit from the local suppression indicating panel to the preaction valve is also a supervised two-wire circuit, since a four wire circuit is not approved by either Underwriters Laboratories or Factory Mutual.
(3) Fire detectors should be selected and installed in accordance with NFPA 72E, Automatic Fire Detectors. Preoperational and periodic testing of pulsed line-type heat detectors should demonstrate that the frequencies used will not affect the actuation of protective relays in other plant systems.	Conforms	Pulsed line type heat detectors are not used. To ensure the ability of the plant to achieve safe shutdown, VEGP will use engineering judgment supplemented by NFPA-72E for the selection, location, and spacing of the early warning detection system to limit the fire hazard and to take into account the unique structural configuration and protection

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		problems inherent in a power plant. These codes and regulations are basically tailored for the protection of rooms or areas with relatively regular surfaces and features seldom realized in the highly congested conditions encountered in the majority of the rooms in a power plant.
(4) Fire detection systems should give audible and visual alarm and annunciation in the control room. Where zoned detection systems are used in a given fire area, local means should be provided to identify which detector zone has actuated. Local audible alarms should sound in the fire area.	Conforms	(4) Fire detection systems give audible and visual alarm and annunciation in the control room with the C&T area being available as a backup on a fire zone basis. Local audible alarms also sound at the local fire alarm panel associated with the location of the fire. Local display cabinets are provided to identify specific room(s) in alarm when the zone contains multiple rooms.
(5) Fire alarms should be distinctive and unique so they will not be confused with any other plant system alarms.	Conforms	(5) Fire alarms are distinctive and unique and will not be confused with any other plant working system.
(6) Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondary power supplies should satisfy provisions of Section 2220 of NFPA 72D. This can be accomplished by using normal offsite power as the primary supply with a 4-h battery supply as secondary supply, and by providing capability for manual connection to the Class 1E emergency power bus within 4 h of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.	Conforms	(6) NFPA 72D Section 2220 is complied with in the following manner: (a) Fire detection system--Power, via battery chargers is supplied from at least one Class 1E diesel generator with isolation provided per R.G. 1.75. A second non-Class 1E diesel generator provides primary power to an inverter which provides uninterruptible power to the detection system. An inverter secondary power source is provided from a 2-h battery system deriving power from the above indicated battery chargers. Alternately, fire detection panels located remotely from the above power system are provided with 24-h backup batteries. The above backup power sources are provided in addition to normal system power which is derived from offsite sources. (b) Fire suppression system and fire alarm signaling system--These systems are powered from normal power sources and are provided with 24-h battery backup.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		These designs are not always in accordance with all of the requirements of the related NFPA codes, however, the NFPA codes have been used for guidance throughout the plant.
C.6.b. Fire Protection Water Supply Systems		C.6.b. Fire Protection Water Supply Systems
(1) An underground yard fire main loop should be installed to furnish anticipated water requirements. NFPA 24, Standard for Outside Protection, gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Type of pipe and water treatment should be design considerations with tuberculation as one of the parameters. Means for inspecting and flushing the systems should be provided.	Partial conformance	(1) An underground yard fire main loop is installed to furnish anticipated fire water requirements. NFPA No. 24, Standard for Outside Protection, provides necessary guidelines for such installation, references other design codes and standards such as ANSI and AWWA, and was utilized in the design. Since cement-lined pipe is used, internal tuberculation is reduced. Means to inspect and flush the system are provided. Deviations from the codes are described in table 9.5.1-9.
(2) Approved visually indicating sectional control valves such as post-indicator valves should be provided to isolate portions of the fire main for maintenance or repair without shutting off the supply to primary and backup fire suppression systems serving areas that contain or expose safety-related equipment.	Partial conformance	(2) Approved visually indicating sectional control valves such as post-indicator valves have been provided to isolate portions of the fire main for maintenance or repair without shutting off the supply to primary and backup fire suppression systems serving areas that contain or expose safety-related equipment. Due to interference with the security intrusion detection field, certain valves have been modified to remove the post and install a nonlisted dial indicator at ground level.
(3) Valves should be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.	Conforms	(3) Valves have been installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.
(4) The fire main system piping should be separate from service or sanitary water system piping, except as described in Position C.6.c.(4).	Conforms	(4) The fire main system piping is separate from service or sanitary water system piping.
(5) A common yard fire main loop may serve multiunit nuclear power plant sites if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. For multiple reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used.	Conforms	(5) A common yard fire main loop serves the multiunit VEGP site. Sectional control valves permit maintaining independence of the individual supply to each unit, and common water supplies are utilized. Since the VEGP units are in close proximity and the auxiliary building is common to both units, a single cross-connected fire main loop is utilized.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(6) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided to ensure that 100-percent capacity will be available assuming failure of the largest pump or loss of offsite power (e.g., three 50-percent pumps or two 100-percent pumps). This can be accomplished, for example, by providing either: (a) Electric motor-driven fire pump(s) and diesel-driven fire pump(s). (b) Two or more Seismic Category I Class 1E electric motor-driven fire pumps connected to redundant Class 1E emergency power buses. (See Regulatory Guides 1.6, 1.32, and 1.75.) Individual fire pump connections to the yard fire main loop should be separated with sectionalizing valves between connections. Each pump and its driver and controls should be located in a room separated from the remaining fire pumps by a fire wall with a minimum rating of 3 h. The fuel for the diesel fire pump(s) should be separated so that it does not provide a fire source exposing safety-related equipment. Alarms indicating pump running, driver availability, failure to start, and low fire-main pressure should be provided in the control room.	Partial conformance	(6) Two 100-percent (each) capacity diesel-driven pumps, separated by 3-h-rated fire barrier walls are located in the north fire pumphouse. One 100-percent capacity electrically driven pump is located in the south fire pumphouse. The status of the pumps will be indicated on the fire protection control panel in the control room.
The fire pump installation should conform to NFPA 20, Standard for the Installation of Centrifugal Fire Pumps.		The pump installations are in accordance with NFPA No. 20 except that: (a) The diesel fire pumps share a common connection to the yard main separated by sectionalizing valves. (b) Each diesel fire pump has its own separate fuel supply. The fuel tanks are located outside the pumphouse and are separated from each other. No threat is posed to safety related equipment. (c) UL listed 16-in. butterfly valves are used at the fire tanks since the largest UL listed gate valve available is 14 in. (d) The motor driven pump utilizes a 4160 V-ac switchgear instead of a NFPA 20 pump controller. UL/FM 4-kV motor controllers are not available and the switchgear is considered more reliable.

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		(e) The gauges used on the suction side of the fire pumps read 0-30 in. of mercury for the suction range and 0-30 psi for the pressure range. Since the maximum pressure on the suction side of the pump will be the tank head (approximately 30 ft), the 0-30 psi gauge dial will have better accuracy. (f) The motor driven pump has been fitted with a larger impeller for increased performance which voids the UL listing on the pump.
(7) Outside manual hose installation should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize safety-related equipment. Hydrants should be installed approximately every 250 ft on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24, Outside Protection, should be provided as needed, but at least every 1000 ft. Alternatively, mobile means of providing hose and associated equipment, such as hose carts or trucks, may be used. When provided, such mobile equipment should be equivalent to the equipment supplied by three hose houses.	Partial conformance	(7) Outside manual hose installation is sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize safety-related equipment. Hydrants have been installed approximately 250 to 300 ft on the yard main system. This deviation is acceptable as a hydrant hose and equipment cart will provide easy deployment of hose and fire fighting equipment. The hydrant hose and equipment cart will be equipped with the equivalent of at least three hose houses worth of equipment and hoses. The required equipment and hoses are described in NFPA 24. If all carts become inoperable, the hydrant hose houses listed in table 9.5.1-10d will be stocked with the equipment necessary to place the hydrant houses in an operable condition per NFPA 24.
(8) Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.	Conforms	(8) Threads compatible with those of the local fire department are provided on all hydrants, hose couplings, and standpipe risers.
(9) Two separate, reliable freshwater supplies should be provided. Salt-water or brackish water should not be used unless all freshwater supplies have been exhausted. If tanks are used, two 100-percent (minimum of 300,000 gal each) system capacity tanks should be installed. They should be so interconnected that pumps can take suction from either or both. However, a failure in one tank or its piping should not cause both tanks to drain. Water supply capacity should be capable of refilling either tank in 8 h or less.	Conforms	(9) Two separate reliable water supplies consisting of two 100-percent system capacity tanks of 300,000 gal each for fire protection water are installed. The tanks are interconnected so that the fire pumps can take suction from either or both tanks. A leak in one tank or its piping will not cause both tanks to drain. The plant makeup well water supply capacity is capable of refilling either tank in less than 8 h.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(10) Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by passive means, for example, use of a vertical standpipe for other water services. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.	Conforms	(10) The fire protection water tanks are used for fire protection only, except for supplying alternate cooling water to the turbine plant cooling water pumps' bearings.
(11) The fire water supply should be calculated on the basis of the largest expected flowrate for a period of 2 h, but not less than 300,000 gal. This flowrate should be based (conservatively) on 500 gal/min for manual hose streams plus the largest design demand of any sprinkler or deluge system as determined in accordance with NFPA 13 or NFPA 15. The fire water supply should be capable of delivering this design demand over the longest route of the water supply system.	Partial conformance	(11) The fire water supply is calculated on the basis of the largest expected flowrate for a period of 2 h, but not less than 300,000 gal. This flowrate is based (conservatively) on 500 gal/min for manual those streams plus the largest design demand of any sprinkler or deluge system as determined in accordance with NFPA 13 or NFPA 15. Supply to the largest demand system has multiple parallel routes. The fire water supply is capable of delivering this design demand through these routes even if the shortest route becomes unavailable.
(12) Freshwater lakes or ponds of sufficient size may qualify as the sole source of water for fire protection, but require separate redundant suctions in one or more intake structures. These supplies should be separated so that a failure of one supply will not result in a failure of the other supply.	Conforms	(12) Freshwater lakes or ponds are not used in the VEGP.
(13) When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied: (a) The additional fire protection water requirements are designed into the total storage capacity. (b) Failure of the fire protection system should not degrade the function of the ultimate heat sink.	Conforms	(13) The fire protection water supply and ultimate heat sink are independent systems in VEGP.
(14) Other water systems that may be used as one of the two fire water supplies should be permanently connected to the fire main system and should be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems should satisfy the requirements for the main fire pumps. The use of other water systems for fire protection should not be incompatible with their functions required for safe plant shutdown. Failure of the other system should not degrade the fire main system.	Conforms	(14) Other water systems are not used as one of the fire water supplies on VEGP.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
C.6.c. Water Sprinkler and Hose Standpipe Systems		C.6.c Water Sprinkler and Hose Standpipe System
(1) Sprinkler systems and manual hose station standpipes should have connections to the plant underground water main so that a single active failure or a crack in a moderate energy line cannot impair both the primary and backup fire suppression systems. Alternatively, headers fed from each end are permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, Power Piping, are used for the headers up to and including the first valve supplying the sprinkler systems, where such headers are part of the seismically analyzed hose standpipe system. When provided, such headers are considered an extension of the yard main system. Each sprinkler and standpipe system should be equipped with an outside screw and yoke gate valve or other approved shutoff valve and waterflow alarm. Safety-elated equipment that does not itself require sprinkler water fire protection but is subject to unacceptable damage if wet by sprinkler water discharge should be protected by water shields or baffles.	Partial conformance	(1) Automatic sprinkler systems and hose station standpipes are fed directly from the fire main or from headers inside the buildings. The headers supplying the systems in the containment buildings are fed only from one end. The remaining systems are supplied from headers fed from two directions. The fire protection system is designed such that no single failure can impair both the primary and backup fire protection system. Unit 1 and 2 fire water risers for the auxiliary, control, and fuel buildings are cross-connected at each level by a common header such that fire water may be supplied by the opposite unit should one unit's primary supply route experience failure. Portable extinguishers and hose streams from fire hydrants will be available. Each sprinkler system is equipped with an outside screw and yoke gate valve and alarm. The standpipe system is provided with a hose valve at each fire hose station for isolation.
(2) Control and sectionalizing valves in the fire water systems should be electrically supervised or administratively controlled. The electrical supervision signal should indicate in the control room. All valves in the fire protection system should be periodically checked to verify position. (See NFPA 26, Supervision of Valves.)	Conforms	(2) All interior valves in the fire water system are supervised either by being locked in the proper position or electrically supervised with the exception of the hose valves which are normally closed. The electrical supervision signal provides an indication in the control room. All exterior post indicator and fire pump house valves are locked in their normal operating position and are periodically checked in lieu of being electrically supervised. Detailed deviations from the Code are described in table 9.5.1-9.
(3) Fixed water extinguishing systems should conform to requirements of appropriate standards such as NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 15, Standard for Water Spray Fixed Systems.	Partial conformance	(3) Automatic sprinkler systems are guided by the requirements of appropriate NFPA standards such as NFPA No. 13, Standard for the installation of Sprinkler Systems, and NFPA no. 15, Standard for Water Spray Fixed Systems. VEGP will utilize a combination of NFPA Nos. 13 and 15 to limit the fire hazard and to take into

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
		account the unique structural configuration and protection problems inherent in a power plant. These codes and regulations are basically tailored for protection of rooms or areas with relatively regular surfaces and features. This is a situation seldom realized in the highly congested conditions encountered in the majority of the rooms in a power plant. In recognition of such conditions and of the special hazards encountered in a nuclear power plant, sound engineering judgment will be exercised in the design and installation of its fire protection systems rather than routine, absolute compliance with rules which are not always appropriate to the situation. These conditions may necessitate deviations from the code to accommodate specific design problems. All such code deviations will be reviewed and approved by a registered fire protection engineer. Deviations from the code are described in table 9.5.1-9.
(4) Interior manual hose installation should be able to reach any location that contains or could present a fire exposure hazard to safety-related equipment with at least one effective hose stream. To accomplish this, standpipes with hose connections equipped with a maximum of 100 ft of 1 1/2-in. woven-jacket, lined fire hose, and suitable nozzles should be provided in all buildings on all floors. Individual standpipes should be at least 4 in. in diameter for multiple hose connections and 2 1/2-in. in diameter for single hose connections. These systems s requirements of NFPA 14, Standpipe and Hose Systems, for sizing, spacing, and pipe support requirements.	Conforms	(4) Interior manual fire hose installations are capable of reaching any location with at least one effective hose stream. To accomplish this, standpipes with fire hose connections, equipped with a maximum of 100 ft of 1 1/2-in. woven jacket-lined fire hose and suitable nozzles are provided on all floors in all buildings. Individual standpipes are minimum 4-in. diameter for multiple fire hose connections and 2 1/2-in. diameter for single fire hose connections. The system design conforms to the requirements of NFPA no. 14,"Standpipe and Hose Systems," for Class II, wet type systems. Standpipes located in seismic category 1 buildings are provided with seismically designed supports to preclude their collapse and subsequent damage to safety-related systems.
Hose stations should be located, as dictated by the fire hazards analysis, to facilitate access and use for firefighting operations. Alternative hose stations should be provided for an area if a fire hazard could block access to a single hose station serving that area.		Hose stations for the interior of buildings are generally located just outside the entrance to the hazard being protected. Fire hose stations are located just outside the control room entrances but not inside the control room.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
Provisions should be made to supply water, at least to standpipes and hose connections, for manual firefighting in areas containing equipment required for safe plant shutdown in the event of an SSE. The piping system serving such hose stations should be analyzed for SSE loading and should be provided with supports to ensure system pressure integrity. The piping and valves for the portion of hose standpipe system affected by this functional requirement should, as a minimum, satisfy ANSI B31.1, Power Piping. The water supply for this condition may be obtained by manual operator actuation of valves in a connection to the hose standpipe header from a normal Seismic Category 1 water system such as the essential service water system. The cross connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gal/min per hose station), and (b) designed to the same standards as the Seismic Category 1 water system; it should not degrade the performance of the Seismic Category 1 water system.		Water from the Seismic Category 1 nuclear service cooling water system will be available for manual fire fighting in the event of a fire after an SSE. This water source is connected to a Seismic Category 1 dry standpipe system within the control, containment, auxiliary, and diesel generator buildings. The dry standpipe system is not provided in the auxiliary feedwater pumphouse because the building can be reached by hoses from the diesel generator building. It is not provided in the nuclear service cooling water towers because the combustibles loading is minimal. It is not provided in the fuel handling building because this building can be reached by hoses from the auxiliary building. This arrangement will be entirely independent of the normal fire protection water system, thus protecting the integrity of the Seismic Category 1 nuclear service cooling water system. This water supply is obtained by manual operator actuation of valves. All piping will be designed and installed to ASME Boiler and Pressure Vessel Code, Section III - Class 3 (no N-stamping required). The Seismic Category 1 standpipe system does not conform with the guidelines of NFPA 14. Although the Seismic Category 1 standpipe system is not designed to conform to NFPA 14, it will be tested in accordance with Section 8-1.2 and Section 8-2.1 of NFPA 14-1983. The standard provides the suitable requirements for testing and inspections of the system to maintain the defense-in-depth concept.
(5) The proper type of hose nozzle to be supplied to each area should be based on the fire hazards analysis. The usual combination spray/ straight-stream nozzle should not be used in areas where the straight stream can cause unacceptable mechanical damage. Fixed fog nozzles should be provided at locations where high-voltage shock hazards exist. All hose nozzles should have shutoff capability. (Guidance on safe distances for water application to live electrical equipment may be found in the NFPA Fire Protection Handbook.)	Conforms	(5) Electrically safe hose nozzles are used in all internal building areas.
(6) Fire hose should be hydrostatically tested in accordance with the recommendations of NFPA 1962, Fire Hose Care, Use, Maintenance. Hose stored in outside hose houses should be tested annually. Interior standpipe hose should be tested every 3 years.	Conforms	(6) All VEGP fire hoses are hydrostatically tested annually for outside hoses and every 3 years for interior hoses. Reference FSAR table 9.5.1.9 for specific conformance to NFPA 1962.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
	Not applicable	(7) VEGP does not use AFFF foam systems.
C.6.d. Halon Suppression Systems		C.6.d Halon Suppression Systems
Halon fire extinguishing systems should comply with the requirements of NFPA 12A and NFPA 12B, Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211. Only UL-listed or FM-approved agents should be used. Provisions for locally disarming automatic Halon systems should be key-locked and under strict administrative control. Automatic Halon extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.	Conforms	The use of Halon fire extinguishing agents and systems is guided by the requirements of NFPA 12A. Only UL- or FM-approved agents and systems are used. Provisions for locally disarming automatic Halon systems are key locked and under administrative control. Deviations from the code are described in table 9.5.1-9.
In addition to the guidelines of NFPA 12A and 12B, preventive maintenance and testing of the systems, including check weighing of the Halon cylinders, should be done at least quarterly.	Partial conformance	In addition to the guidelines of NFPA No. 12A, preventative maintenance and testing of the systems are done in accordance with the FSAR. Halon cylinders will be either weighed or level checked for halon quantity. NFPA 12B is not applicable to VEGP. Deviations from the codes are discussed in table 9.5.1-9.
Particular consideration should also be given to:		Particular consideration was given to:
(1) Minimum required Halon concentration, distribution, soak time, and ventilation control.		(1) Minimum required Halon concentration and soak time, and ventilation control.
(2) Toxicity of Halon.		(2) Toxicity of Halon.
(3) Toxicity and corrosive characteristics of the thermal decomposition products of Halon.		(3) Toxicity and corrosive characteristics of thermal decomposition products of Halon.
(4) Location and selection of the activating detectors.		(4) Location and selection of the activating detectors.
C.6.e. Carbon Dioxide Suppression Systems		C.6.e. Carbon Dioxide Suppression Systems
Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12, Carbon Dioxide Extinguishing Systems. Where automatic carbon dioxide systems are used, they should be equipped with a predischarge alarm system and a discharge delay to permit personnel egress. Provisions for locally disarming automatic carbon dioxide systems should be key-locked and under strict administrative control. Automatic carbon dioxide extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.	Not applicable	There are no carbon dioxide suppression systems at VEGP.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
Particular consideration should also be given to: (1) Minimum required CO_2 concentration, distribution, soak time, and ventilation control. (2) Anoxia and toxicity of CO_2. (3) Possibility of secondary thermal shock (cooling) damage. (4) Conflicting requirements for venting during CO_2 injection to prevent overpressurization versus sealing to prevent loss of agent. (5) Location and selection of the activating detectors.		
C.6.f. Portable Extinguishers Fire extinguishers should be provided in areas that contain or could present a fire exposure to safety-related equipment in accordance with guidelines of NFPA 10, Portable Fire Extinguishers, Installation, Maintenance and Use. Dry chemical extinguishers should be installed with due consideration given to possible adverse effects on safety-related equipment installed in the area.	Conforms	C.6.f. Portable Extinguishers Fire extinguishers are provided in accordance with guidelines of NFPA No. 10, Portable Fire Extinguishers, Installation; and Portable Fire Extinguishers, Maintenance and Use. Dry chemical extinguishers are installed with due consideration given to cleanup problems after use and possible adverse effects on equipment installed in the area.
C.7. Guidelines for Specific Plant Areas		C.7. Guidelines for Specific Plant Areas Fire barriers designed to meet the requirements of this section are included in the plant fire protection surveillance program to ensure their continued operability.
C.7.a. Primary and Secondary Containment (1) Normal Operation -Fire protection requirements for the primary and secondary containment areas should be provided for hazards identified by the fire hazards analysis. Examples of such hazards include lubricating oil or hydraulic fluid system for the primary coolant pumps, cable tray arrangements and cable penetrations, and charcoal filters. Because of the general inaccessibility of primary containment during normal plant operation, protection should be provided by automatic fixed systems. The effects of postulated fires within the primary containment should be evaluated to ensure that the integrity of the primary coolant system and the containment is not jeopardized, assuming no action is taken to fight the fire.	Partial conformance	C.7.a. Containment (1) Normal Operation - Fire protection requirements for the containment areas are provided on the basis of specific identified hazards. Water spray systems are provided for the charcoal filters and a lube oil collection system is provided for the reactor coolant pumps. See the discussion regarding automatic fire suppression inside containment presented in Section C.5.e.(2).

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
(a) Operation of the fire protection systems should not compromise the integrity of the containment or other safety-related systems. Fire protection activities in the containment areas should function in conjunction with total containment requirements such as ventilation and control of contaminated liquid and gaseous release.	Conforms	(a) Operation of the fire protection system will not compromise containment integrity or safety-related systems and will function in conjunction with total containment requirements such as ventilation, control of contaminated liquid, and gaseous release. See Section 1.9 of the FSAR for Regulatory Guide 1.52 conformance regarding the charcoal filter water spray system design.
(b) Inside noninerted containment, one of the fire protection means stated in Positions C.5.b.1 and C.5.b.2 or the following fire protection means should be provided: separation of cables and equipment and associated nonsafety circuits of redundant trains by a non-combustible radiant energy shield having a minimum fire rating of 1/2 h.	Conforms	(b) Separation of safe shutdown trains is provided inside the containment building. The means of providing separation is presented in the fire hazards analysis.
(c) In primary containment, fire detection systems should be provided for each fire hazard. The type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazards analysis.	Partial conformance	(c) Appropriate type detectors have been provided for the hazards inside the containment area as follows: • Continuous line-type detectors for safety-related cable trays and the cable trays containing the pressurizer heater power feeder cables. • Thermal detectors for charcoal filters. • Infrared detectors for RCPs.
A general area fire detection capability should be provided in the primary containment as backup for the above described hazard detection. To accomplish this, suitable smoke or heat detectors compatible with the radiation environment should be installed.		General area fire detection capability has not been provided inside the primary containment area because appropriate fire detection has been provided for the major hazards. In addition, the large open spaces and the ventilation rates inside the containment would diffuse the products of combustion making any general area fire detection system ineffective.
(d) Standpipe and hose stations should be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high-quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR dry-wells, standpipe and hose stations should be placed outside the drywell with adequate lengths of hose, no longer than 100 ft,	Conforms	(d) Standpipes and hose stations from the normal fire main system are located within the containment building. Portable extinguishers are stored inside the hose cabinets in the containment building during refueling outages. Extinguishers may be removed or left in place during plant operation. The operator will open the normally closed containment isolation valve when hose station operation is required.

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to reach any location inside the dry-well with an effective hose stream. The containment penetration of the standpipe system should meet the isolation requirements of General Design Criterion 56 and should be Seismic Category 1 and Quality Group B.		The standpipe system meets the containment isolation requirements by having a check valve on the inside and gate valve on the outside.
(e) The reactor coolant pumps should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the SSE. Such collection systems should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage should be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flashpoint characteristics of the oil present the hazard of fire flashback. Leakage points to be protected should include lift pump and piping overflow lines, lube oil cooler, oil fill and drain lines, and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line should be large enough to accommodate the largest potential oil leak.	Conforms	(e) The reactor coolant pump oil collection system is designed, engineered, and installed so that failure will not lead to a fire during normal operation and design basis accident conditions, and there is reasonable assurance that the system will withstand a safe shutdown earthquake. There are four oil collection tanks, one for each reactor coolant pump. Each tank is sized to hold all of the lube oil in the corresponding pump. Each tank is a vented closed container with a flame arrestor on the vent.
(f) For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Position C.5.e(2). The type of detection system for other fire hazards identified by the fire hazards analysis should be the most suitable for the particular type of fire hazard.	Not applicable	(f) VEGP has no secondary containment areas. Therefore the guidelines of this section are not applicable.
(2) Refueling and Maintenance -Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding, and flame cutting (with portable compressed-gas fuel supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems. Management procedures and controls necessary to ensure adequate fire protection for transient fire loads are discussed in Position C.2.	Conforms	(2) The SNC fire protection program documents will address the management procedures and controls necessary to ensure adequate fire protection for transient fire loads.

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Adequate self-contained breathing apparatus should be provided near the containment entrances for fire-fighting and damage control personnel. These units should be independent of any breathing apparatus or air-supply systems provided for general plant activities and should be clearly marked as emergency equipment.		Self-contained breathing apparatus are also provided near the personnel access hatch in the fire brigade equipment locker.
C.7.b. Control Room Complex		C.7.b. Control Room Complex
The control room complex (including galleys, office spaces, etc.) should be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roof having minimum fire resistance ratings of 3 h. Peripheral rooms in the control room complex should have automatic water suppression and should be separated from the control room by noncombustible construction with a fire resistance rating of 1 h. Ventilation system openings between the control room and peripheral rooms should have automatic smoke dampers that close on operation of the fire detection or suppression system. If a halon flooding system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying halon discharge and seal tightly against infiltration of halon into the control room. Carbon dioxide flooding systems are not acceptable for these areas.	Partial conformance	The control room complex is separated from other areas of the plant by 3-h rated barriers. Peripheral rooms in the control room complex are separated from the control room by noncombustible construction and are protected by manual water hose systems and portable fire extinguishers. Ventilation system openings between the control room and the peripheral rooms have automatic fire dampers. These deviations are justified because alternate shutdown capability is available from the remote shutdown panels. The peripheral rooms of the control room, i.e., the shift manager, emergency storage, kitchen, and toilet rooms are not provided with automatic suppression capability for the following reasons: (1) Low combustible load in each room (2) The fire barriers separating the peripheral rooms from the control room are at least 2-h rated, except for the shift manager's office which is 1-h rated. The fire barriers separating the rooms from other plant fire areas are 3-h rated. (3) Each room is equipped with early warning detection features.
Manual firefighting capability should be provided for both: (1) Fire originating within a cabinet, console, or connecting cables. (2) Exposure fires involving combustibles in the general room area.	Conforms	Manual firefighting capability is provided for both conditions 1 and 2.
Portable Class A and Class C fire extinguishers should be located in the control room. A hose station should be installed immediately outside the control room.	Conforms	Portable Class A and Class C extinguishers are located within the control room complex. A hose station with approved electrical nozzles is located adjacent to the control room and can be brought into the control room, if necessary, using appropriate precaution.

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		The location of the equipment outside the control room eliminates a constant hazard condition from water.
Nozzles that are compatible with the hazards and equipment in the control room should be provided for the manual hose station. The nozzles chosen should satisfy actual firefighting needs and electrical safety and minimize physical damage to electrical equipment from hose stream impingement.	Conforms	Fire hose stations have manual shutoff valves and approved Class C nozzles.
Smoke detectors should be provided in the control room, cabinets, and consoles. If redundant safe shutdown equipment is located in the same control room cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the control room.	Partial conformance	Smoke detectors are provided for the control room but not for cabinets and consoles other than the main control board. This deviation is justified because remote shutdown panels, located outside of the main control room fire area, provide alternate shutdown capability in the event of a control room fire. Consequently, the addition of smoke detectors to the control room cabinets and consoles provides no additional safety margin. Additionally, because the control room cabinets are designed to provide separation for train oriented functions, a small fire in a single cabinet is not likely to disable both trains. Smoke detectors are not mounted on the control room dropped ceiling because the modular ceiling is the ventilation air supply for the area. The air movement patterns in the vicinity of the ceiling would prevent smoke movement to the detectors.
Breathing apparatus for control room operators should be readily available.	Conforms	In the control room, portable breathing apparatus will be available for all necessary personnel.
The outside air intake(s) for the control room ventilation system should be provided with smoke detection capability to alarm in the control room to enable manual isolation of the control room ventilation system and thus prevent smoke from entering the control room.	Conforms	The control room ventilation system, as well as the control room, is provided with smoke detection capability to alert the operators of the potential need to isolate the control room ventilation system to prevent smoke from entering the control room. Venting alignment for the control room HVAC system is available at the operator's discretion to provide increased visibility by removing smoke.
Venting of smoke produced by fire in the control room by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculation portion of the normal ventilation system. Manually operated venting of the control room should be available to the operators.	Conforms	

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
All cables that enter the control room should terminate in the control room. That is, no cabling should be routed through the control room from one area to another. Cables in underfloor and ceiling spaces should meet the separation criteria necessary for fire protection.	Partial conformance	There are cables that pass through the control room on their way to other fire areas. All of these cables are enclosed in rigid steel conduit. Cables which must remain functional in the event of a control room fire in order to ensure the ability to achieve and maintain safe shutdown are protected by a 3-h-rated fire barrier. Other than cables for low-voltage (low-amperage) power cables, lighting, and/or communication for the control room, cables not in conduit are not located in concealed floor and ceiling spaces.
Air-handling functions should be ducted separately from cable runs in such spaces; i.e., if cables are routed in underfloor or ceiling spaces, these spaces should not be used as air plenums for ventilation of the control room. Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 ft in cross-sectional area, should have automatic fire suppression inside. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4-in. or smaller steel conduit or the cables are in fully enclosed raceways internally protected by automatic fire suppression.	Conforms	The section of raised floor in the control room and the area above the dropped ceiling are not used for inducted air handling functions. There are two raised floor sections in the control room (shift supervisor and plan operator areas) which are not provided with an automatic suppression or fire detection or fire detection system. The only combustibles within these raised floor sections are a few electrical cables for low-voltage (low-amperage) power, lighting, and communications. A fire inside these raised floor sections is highly unlikely. Should a fire occur at these locations, the potential impact on the ability to operate the plant is negligible and it would be quickly noticed by the operators in this continuously-manned location. Electrical cable trays are located above the dropped ceiling area in the control room complex. These cable trays run vertically from the main control bench boards to the upper cable spreading room. The cross-sectional area of any covered cable tray is less than or equal to 1 ft^2, and conduit located above the dropped ceiling is 4 in. or less in diameter. Fire detectors are located in the concealed space (open on the sides), and access for fire fighting (if necessary) is available from the ceiling perimeter.
There should be no carpeting in the control room.	Partial conformance	A limited amount of carpeting is provided in the control room. Since the carpet has a critical radiant flux of 0.45 w/cm^2 or higher and a smoke density of 450 or less, and alternate shutdown is available from the remote shutdown panels, this deviation is justified.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
C.7.c. Cable Spreading Room		C.7.c. Cable Spreading Room
The primary fire suppression in the cable spreading room should be an automatic water system such as closed-head sprinklers, open-head deluge system, or open directional water spray system. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present exposure hazards to the cable system. Cables should be designed to allow wetting down with water supplied by the fire suppression system without electrical faulting.	Conforms	Automatic preaction sprinkler systems and smoke detection systems have been provided for the cable spreading rooms. Each cable spreading room contains only one safe shutdown train. Primary water protection is in two zones, one north and one south of the cable termination cabinets. Cables are designed to permit wetting down with fire suppression water without electrical faulting.
Open-head deluge and open directional spray systems should be zoned. The use of foam is acceptable.	Not applicable	VEGP does not use open-head deluge or open directional spray systems. VEGP does not use a foam system.
Cable spreading rooms should have:		Cable spreading rooms have:
(1) At least two remote and separate entrances for access by fire brigade personnel.	Conforms	(1) Two separate entrances are provided for each cable spreading room.
(2) An aisle separation between tray stacks at least 3 ft wide and 8 ft high.	Partial conformance	(2) The VEGP cable spreading rooms are designed to provide a clearance of 6 ft x 8 in. between the floor and the bottom of tray stacks in exit and ingress areas. Accessibility for manual fire fighting is available except along the south wall of the Unit 2 lower cable spreading room. Cable tray congestion at this location limits accessibility for manual fire fighting but automatic fire suppression is provided consisting of ceiling sprinklers supplemented by cable tray protection utilizing the guidance of NFPA-15. While some vertical trays and/or structural steel may form aisles, adequate clearance is available to provide fire brigade access.
(3) Hose stations and portable extinguishers installed immediately outside the room.	Conforms	(3) Hose stations and portable extinguishers are installed outside the rooms.
(4) Area smoke detection.	Conforms	(4) VEGP has area smoke detection.
(5) Continuous line-type heat detectors for cable trays inside the cable spreading room.	Partial conformance	(5) VEGP does not have continuous line-type heat detectors. This deviation is justified because area detection is provided.

CMEB 9.5-1 Requirements		VEGP Position	Clarification of Conformance or Justification of Deviation	
	Drains to remove firefighting water should be provided. When gas systems are installed, drains should have adequate seals or the gas extinguishing systems should be sized to compensate for losses through the drains.	Conforms		VEGP provides adequate drainage for firefighting water. There is no room total flooding gas system.
	A separate cable spreading room should be provided for each redundant division. Cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from the others and from other areas of the plant by barriers with a minimum fire rating of 3 h. If this is not possible, a dedicated system should be provided.	Conforms		Cable spreading rooms are not shared between reactors. The walls, floors, ceilings, and penetrations of the cable spreading rooms have fire resistance ratings of 3 h. A separate cable spreading room is provided for each redundant train.
	The ventilation system to each cable spreading room should be designed to isolate the area upon actuation of any gas extinguishing system in the area. Separate manually actuated smoke venting that is operable from outside the room should be provided for the cable spreading room.	Conforms		Smoke venting of the cable spreading room is provided by the normal ventilation system ducts until the automatic fire dampers close or by portable fans and flexible ducting.
C.7.d.	Plant Computer Rooms		C.7.d.	Plant Computer Room
	Computer rooms for computers performing safety-related functions that are not part of the control room complex should be separated from other areas of the plant by barriers having a minimum fire resistance rating of 3 h and should be protected by automatic detection and fixed automatic suppression. Computers that are part of the control room complex but not in the control room should be separated and protected as described in Position C.7.b. Computer cabinets located in the control room should be protected as other control room equipment and cable runs therein. Nonsafety-related computers outside the control room complex should be separated from safety-related areas by fire barriers with a minimum rating of 3 h and should be protected as needed to prevent fire and smoke damage to safety-related equipment.	Conforms		Computers are nonsafety related, located outside of the control room complex, and isolated from safe shutdown areas by 3-h barriers.
C.7.e.	Switchgear Rooms		C.7.e.	Switchgear Rooms
	Switchgear rooms containing safety-related equipment should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 h. Redundant switchgear safety divisions should be separated from each other by barriers with a 3-h fire rating. Automatic fire detectors should alarm and annunciate in the control room and alarm locally. Cables entering the switchgear room that do not terminate or perform a function there should be kept at a minimum to minimize the combustible loading. These rooms should not be used for any other purpose. Fire hose stations and portable fire extinguishers should be readily available outside the area.	Conforms		Redundant safe shutdown switchgear rooms are separated from the redundant train switchgear room and the balance of the plant by 3-h barriers. The rooms contain fire detectors and are protected by fire hose stations and/or portable extinguishers which are located outside of the rooms. Cables routed through the switchgear rooms but not terminating there are minimized. The rooms are not used for any other purpose other than housing electrical equipment. Drains are provided in the rooms. Manual fire fighting

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Equipment should be located to facilitate access for manual firefighting. Drains should be provided to prevent water accumulation from damaging safety-related equipment. (See NFPA 92M, Waterproofing and Draining of Floors.) Remote manually actuated ventilation should be provided for venting smoke when manual fire suppression effort is needed. (See Position C.5.f.)		is considered in locating the switchgear. Smoke removal is accomplished with a remote manually operated system or portable equipment.
C.7.f. Remote Safety-Related Panels		C.7.f. Remote Safety-Related Panels
Redundant safety-related panels remote from the control room complex should be separated from each other by barriers having a minimum fire rating of 3 h. Panels providing remote shutdown capability should be electrically isolated from the control room complex so that a fire in either area will not affect shutdown capability from the other area. The general area housing remote safety-related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the control room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be readily available in the general area.	Conforms	The redundant safe shutdown panels remote from the control room complex are separated from each other by 3-h barriers. Control devices and instruments located on the remote shutdown panels that are required for safe shutdown are electrically isolated from the control room complex so that a fire in either area will not affect shutdown capability from either area. The general areas housing the remote shutdown panels are provided with local detection which alarms in the main control room with the C&T area being available as a backup at the local panels. Combustible materials are administratively controlled. Portable extinguishers and manual hose stations are readily available in the general area.
C.7.g. Safety-Related Battery Rooms		C.7.g. Safety-Related Battery Rooms
Safety-related battery rooms should be protected against fires and explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 h inclusive of all penetrations and openings. DC switchgear and inverters should not be located in these battery rooms. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 volume percent. Loss of ventilation should be alarmed in the control room. Standpipe and hose, and portable extinguishers should be readily available outside the room.	Conforms	Safe shutdown battery rooms are protected against explosions by providing sufficient ventilation to maintain the hydrogen concentration below 2 volume percent. Safe shutdown battery rooms are separated from each other and other plant areas by 3-h barriers. DC switchgear and inverters are not located in these battery rooms. Automatic smoke detection systems are provided to alarm in the control room with the C&T area being available as a backup and at the local panels. Loss of ventilation flow is alarmed in the control room. Manual water hose stations and portable extinguishers are available for fire fighting.
C.7.h. Turbine Building		C.7.h. Turbine Building
The turbine building should be separated from adjacent structures containing safety-related equipment by a fire barrier with a minimum rating of 3 h. The fire barriers should be designed so as to maintain structural integrity in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates	Partial conformance	The turbine building is physically separate from buildings containing safe shutdown equipment. Exterior walls are not rated. This deviation is justified because the physical separation between buildings makes fire propagation very unlikely.

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a direct fire exposure hazard to the barrier. Considering the severity of the fire hazards, defense-in-depth may dictate additional protection to ensure barrier integrity.		
C.7.i. Diesel Generator Areas		C.7.i. Diesel Generator Building
Diesel generators should be separated from each other and from other areas of the plant by fire barriers having a minimum fire resistance rating of 3 h. Automatic fire suppression should be installed to combat any diesel generator or lubricating oil fires; such systems should be designed for operation when the diesel is running without affecting the diesel. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily available outside the area. Drainage for firefighting water and means for local manual venting of smoke should be provided.	Partial conformance	The diesel generators are separated from each other by a 3-h barrier. The diesel generator building is physically separated from the rest of the plant. Since exterior walls are not rated, this is a deviation. This deviation is justified because the physical separation makes fire propagation very unlikely. The diesel generator rooms are each provided with an automatic preaction sprinkler system and a fire detection system which annunciates in the control room with the C&T area being available as a backup and alarms locally. Drainage for fire fighting water is not required since the diesel generator building is located at grade level and the water will run out of the doors and be handled by the plant storm drains. Manual venting is with portable equipment or the HVAC system.
Day tanks with total capacity up to 1100 gal are permitted in the diesel generator area under the following conditions:	Partial conformance	The day tank has a capacity of 1250 gal. This deviation is justified because the additional volume of fuel does not constitute a significant increase in the fire hazard.
(1) The day tank is located in a separate enclosure with a minimum fire resistance rating of 3 h, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks and should be protected by an automatic fire suppression system, or	Partial conformance	(1) Each day tank is located within an enclosure that is separated from the diesel generator by barriers having 3-h ratings except for the room ceiling hatch which is not rated. The enclosure is protected by a preaction sprinkler system.
(2) The day tank is located inside the diesel generator room in a diked enclosure that has sufficient capacity to hold 110 percent of the contents of the day tank or is drained to a safe location.	Conforms	(2) The enclosure is capable of containing the entire contents of the day tank plus an equal volume of fire suppression water. The enclosure is ventilated to avoid accumulation of oil fumes.
C.7.j. Diesel Fuel Oil Storage Areas		C.7.j. Diesel Fuel Oil Storage Areas
Diesel fuel oil tanks with a capacity greater than 1100 gal should not be located inside buildings containing safety-related equipment. If above-ground tanks are used, they should be located at least 50 ft from any building containing safety-related equipment or, if located within 50 ft, they should be housed in a separate building with construction having a minimum fire	Conforms	The diesel fuel oil storage tanks are buried outside of the diesel generator building. The diesel generator day tanks are located inside the diesel generator building as discussed in C.7.i above.

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resistance rating of 3 h. Potential oil spills should be confined or directed away from buildings containing safety-related equipment. Totally buried tanks are acceptable outside or under buildings. (See NFPA 30, Flammable and Combustible Liquids Code, for additional guidance.)		
Above-ground tanks should be protected by an automatic fire suppression system.		
C.7.k. Safety-Related Pumps		C.7.k. Safety-Related Pumps
Pumphouses and rooms housing redundant safety-related pump trains should be separated from each other and from other areas of the plant by fire barriers having at least 3-h ratings. These rooms should be protected by automatic fire detection and suppression unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Fire detection should alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily accessible.	Partial conformance	Pumps of redundant safe shutdown trains are separated from each other by fire barriers having at least 3-h ratings except where the walls are exterior walls. Exterior walls are not rated. This deviation is justified because the physical separation makes fire propagation unlikely. Rooms containing pumps required for safe shutdown (except the boric acid transfer pump, the NSCW pump, and the diesel generator fuel oil storage tank pump rooms) are provided with automatic suppression and detection with a manual backup system.
Floor drains should be provided to prevent water accumulation from damaging safety-related equipment. (See Position C.5.a.(14.))		Drainage of fire fighting water is provided to prevent water damage to redundant pumps.
Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual firefighting operation. (See Position 5.c.f.)		Smoke removal is accomplished by manual activation of the HVAC system or with portable equipment.
C.7.l. New Fuel Area		C.7.l New Fuel Area
Hand portable extinguishers should be located within this area. Also, hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water.	Conforms	The following are provided for the new fuel area: Manual water hose, portable extinguishers, automatic detection system, and adequate drainage system. As described in subsection 9.1.1 and 4.3.2.6, the criticality analysis for the new fuel storage racks assures that accidental criticality will not occur from the possible sources of moderation that could arise during fire fighting operations.
The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density that might occur during fire water application.		

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C.7.m. Spent Fuel Pool Area		C.7.m. Spent Fuel Pool Area
Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the control room and to alarm locally.	Partial conformance	Protection for the spent fuel pool area is provided by portable extinguishers and hose stations. Due to minimal combustible loading in this zone and excessive ceiling height, fire detectors are not provided in general areas. However, in confined areas where safety-related equipment is present, such as spent fuel pool cooling pumps and heat exchangers, ionization detectors are provided for the actuation of fire protection systems installed in the room. Manual fire alarm stations are provided in strategic locations throughout the fuel handling building, usually near a hose station. These will alarm and annunciate in the control room with the C&T area being available as a backup.
C.7.n. Radwaste and Decontamination Areas		C.7.n. Radwaste and Decontamination Areas
Fire barriers, automatic fire suppression and detection, and ventilation controls should be provided.	Conforms	Fire barriers, automatic fire suppression and detection, and ventilation controls are used to provide assurance that a fire will not significantly increase the risk of radioactive releases to the environment.
C.7.o. Safety-Related Water Tanks		C.7.o. Safety-Related Water Tanks
Storage tanks that supply water for safe shutdown should be protected from the effects of an exposure fire. Combustible materials should not be stored next to outdoor tanks.	Conforms	The safe shutdown water tanks are separated from other areas of the plant. These tanks are located outdoors and are easily accessible to fire hoses from the outside fire hydrants and other portable extinguishing equipment. There are no combustibles stored near the water tanks.
C.7.p. Records Storage Areas		C.7.p. Record Storage Areas
Records storage areas should be so located and protected that a fire in these areas does not expose safety-related systems or equipment. (See Regulatory Guide 1.88, Collection, Storage, and Maintenance of Nuclear Power Quality Assurance Records.)	Conforms	The main record storage area is located in the service building. This building contains no safe shutdown equipment. The records storage file area on the 220-ft elevation of the control building is provided with 3-h barriers, automatic smoke detection, automatic Halon 1301 system, manual water hose stations, and portable extinguishers to protect safe shutdown systems. It should be noted that ASME NQA-1-1994 subsequently replaced Regulatory Guide 1.88 as the applicable guidance for record storage as described in the SNC Quality Assurance Topical Report (QATR).

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C.7.q. Cooling Towers		C.7.q. Cooling Towers
Cooling towers should either be of non-combustible construction or be so located and protected that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply.	Conforms	All cooling towers are of noncombustible materials. Cooling towers basins are not used for primary fire protection water storage.
C.7.r. Miscellaneous Areas		C.7.r. Miscellaneous Areas
Miscellaneous areas such as shops, warehouses, auxiliary boiler rooms, fuel oil tanks, and flammable and combustible liquid storage tanks should be so located and protected that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.	Conforms	Miscellaneous areas and buildings such as the service building and warehouse are so located that a fire or effects of fire including smoke will not adversely affect safe shutdown equipment. The auxiliary fuel tank is provided with dikes to contain the entire tank contents.
C.8. Special Protection Guidelines		C.8. Special Protection Guidelines
C.8.a. Storage of Acetylene-Oxygen Fuel Gases		C.8.a. Storage of Acetylene-Oxygen Fuel Gases
Gas cylinder storage locations should not be in areas that contain or expose safety-related equipment or the fire protection systems that serve those safety-related areas. A permit system should be required to use this equipment in safety-related areas of the plant. (Also see Position C.2.)	Conforms	Acetylene and oxygen cylinders will not be permanently stored in areas that contain or expose safe shutdown equipment. The permanent storage area will not contain or expose fire protection systems for safe shutdown areas. A permit system will be employed to limit temporary storage of, and to control use of these cylinders in safe shutdown areas.
C.8.b. Storage Areas for Ion Exchange Resins		C.8.b Storage Areas or Ion Exchange Resins
Unused ion exchange resins should not be stored in areas that contain or expose safety-related equipment.	Partial Conformance	When necessary, storage of ion exchange resins in areas containing safety-related systems will be in accordance with requirements of paragraph C.2.b (Administrative Controls).
C.8.c. Hazardous Chemicals		C.8.c. Hazardous Chemicals
Hazardous chemicals should not be stored in areas that contain or expose safety-related equipment.	Conforms	Hazardous chemicals will not be stored in areas that contain or expose safety-related equipment.

CMEB 9.5-1 Requirements	VEGP Position	Clarification of Conformance or Justification of Deviation
C.8.d. Materials Containing Radioactivity		C.8.d Materials Containing Radioactivity
Materials that collect and contain radioactivity such as spent ion exchange resins, charcoal filters, and HEPA filters should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of decay heat from entrained radioactive materials.	Conforms	Spent ion exchange resins are stored in closed metal tanks which are located in areas free from ignition sources or combustibles. Decay heat from radioactive filter loadings is described in subsection 15.6.5 and conforms with Regulatory Guide 1.52.

10.0 STEAM AND POWER CONVERSION SYSTEM

10.1 SUMMARY DESCRIPTION

The steam and power conversion system is designed to remove heat energy from the reactor coolant system via the four steam generators and to convert it to electrical power in the turbine-generator. The main condenser deaerates the condensate and transfers the heat, which is unusable in the cycle, to the circulating water system. The regenerative turbine cycle heats the feedwater, and the main feedwater system returns it to the steam generators.

Drawing AX6DD403 is an overall flow diagram of the steam and power conversion system. Table 10.1-1 gives the significant design and performance data for the major system components based on 1X4DC103, As-Built Heat Balance Diagram (100% reactor power). Drawings 1X4DC101 and 1X4DC103 provide heat balances for valves wide open (VWO), and 100% reactor power conditions, respectively.

10.1.1 GENERAL DESCRIPTION

The steam generated in the four steam generators is supplied to the high-pressure turbine element by the main steam system. After expansion through the high-pressure turbine element, the steam passes through the moisture separator/reheaters (MSR) and then is admitted to the three low-pressure turbine elements. A portion of the steam is extracted from the turbine for six stages of feedwater heating. Above approximately 10% of full power, hot reheat steam is supplied to the turbine-driven main feedwater pumps; below 10% of full power, main steam is used for this purpose.

Exhaust steam from the low-pressure turbines is condensed and deaerated in the main condenser. The heat rejected in the main condenser is removed by a closed loop circulating water system utilizing a natural draft cooling tower. The condensate pumps take suction from the condenser hotwell and deliver the condensate through five stages of low-pressure feedwater heaters to the suction of the steam generator feedwater pumps. The steam generator feedwater pumps discharge the feedwater through one stage of high-pressure feedwater heaters to the four steam generators.

The moisture separator drains, reheater drains, and the drains from the high-pressure feedwater heaters are pumped forward into the condensate stream between the fourth and fifth stages of low pressure feedwater heaters by the heater drain pump. The drains from the low-pressure feedwater heaters are cascaded through successively lower pressure feedwater heaters to the main condenser.

The General Electric turbine-generator has a guaranteed rating of 1,249,721 kW (1,247,083-kW nameplate rating) for a nuclear steam supply system (NSSS) thermal output of 3430 MWt. The principal turbine-generator conditions for the turbine guarantee rating are listed in table 10.1-1. The Westinghouse NSSS has a rating of 3643 MWt consisting of 3626 MWt net reactor core power plus 17 MWt reactor coolant pump input heat. The warranty rating system conditions for the NSSS are listed in table 10.1-1. The systems of the turbine cycle have been designed to meet the turbine-generator VWO, maximum calculated, not guarantee condition.

Instrumentation systems for the normal operating conditions of the steam and condensate systems are designed in accordance with accepted secondary cycle design for safe and reliable control, requirements for performance calculations, and periodic heat balances. Instrumentation

for the secondary cycle is also provided to meet recommendations by the turbine supplier and American Society of Mechanical Engineers (ASME) Standard TWDPS-1, Part 2, 1973, Recommended Practices for the Prevention of Water Damage to Steam Turbines. Other recommendations by the nuclear steam system supplier for prevention of water hammer in the steam generator are also part of the design bases. Continuous sampling system instrumentation and grab sample points are provided for maintaining acceptable limits of water chemistry in the secondary cycle, as required by the nuclear steam system and turbine suppliers. Condenser conductivity sampling is provided for tube/tube sheet leakage detection to meet requirements to identify and promptly isolate leakage in the condenser.

Criteria and bases for safety-related instrumentation for the main steam isolation and auxiliary feedwater systems are discussed in section 7.3.

PROTECTIVE AND SAFETY-RELATED FEATURES

Note: All references to Unit 1 digital turbine controls are effective after the Unit 1 outage in 2017.

A. Loss of External Electrical Load and/or Turbine Trip

In the event of turbine trip (unless below approximately 50% power), the integrated control system provides for automatic reactor scram. Steam is relieved to the condenser via the turbine bypass valves and, if required, to the atmosphere via the atmospheric relief valves. Steam relief permits energy removal from the reactor coolant system. Load rejection capability is discussed in paragraph 10.3.2.3.1. Loss of external electrical load is discussed in section 15.2.2.

B. Overpressure Protection

Spring-loaded safety valves are provided on all four main steam lines, in accordance with the ASME Boiler and Pressure Vessel Code, Section III. The pressure relief capacity of all the safety valves is such that the energy generated at the high-flux reactor trip setting can be dissipated through this system. The design capacity of the main steam safety valves equals or exceeds 105% of the NSSS engineered safeguards design steamflow at an accumulation pressure not exceeding 110% of the main steam system design pressure.

In addition, the shell sides of the feedwater heaters and moisture separator/reheaters are provided with overpressure protection in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, or equivalent standards.

C. Loss of Main Feedwater Flow

The auxiliary feedwater system is designed to provide feedwater to the steam generators for the removal of sensible and decay heat whenever main feedwater flow is interrupted, including loss of normal electric power. This system is described in subsection 10.4.9.

D. Turbine Overspeed Protection

<u>Unit 1</u>

During normal operations, turbine overspeed is precluded by the governing action of the digital electrohydraulic control system. Two additional redundant protective systems are provided for overspeed trip: primary overspeed trip and emergency overspeed trip. These overspeed trip systems close the main and

intermediate turbine stop valves and the control and intercept valves by electrohydraulic means. The electric trip devices (ETDs) in the trip manifold assembly (TMA) are independently testable under load. During testing, overpseed protection remains fully functional. The primary overspeed trip actuates at approximately 110% of rated speed, while the emergency overspeed trip actuates at approximately 110.5%. Turbine overspeed protection is further discussed in subsection 10.2.2.

Unit 2

During normal operations, turbine overspeed is precluded by the governing action of the electrohydraulic control system. Two additional independent protective systems are provided for overspeed trip: mechanical overspeed trip and electrical trip. These overspeed trip systems close the main and intermediate turbine stop valves by mechanical hydraulic means and the control and intercept valves by electrohydraulic means. Each of the two means of overspeed tripping is independently testable under load. During testing, overspeed protection is provided by the device not being tested. The mechanical trip valve actuates at 110% of rated speed, while the backup electrical device actuates at 111.5%. Turbine overspeed protection is further discussed in subsection 10.2.2.

E. Turbine Missile Protection

Turbine disk integrity to minimize turbine missiles is discussed in subsection 10.2.3.

Turbine missile protection is discussed in paragraph 3.5.1.3.

F. Radioactivity

Under normal operating conditions, there are no significant radioactive contaminants present in the steam and power conversion system. However, it is possible for the system to become contaminated through steam generator tube leakage. In this event, radiological monitoring of the main condenser air removal system and the steam generator blowdown system will detect contamination and alarm high radioactivity concentrations. A full discussion of the radiological aspects of primary-to-secondary system leakage and limiting conditions for operation are contained in chapter 11. The steam generator blowdown system, described in subsection 10.4.8, and the condensate demineralizer system, described in subsection 10.4.6, serve to limit the radioactivity level in the secondary cycle.

TABLE 10.1-1 (SHEET 1 OF 3)

SIGNIFICANT DESIGN FEATURES AND
PERFORMANCE CHARACTERISTICS FOR MAJOR
STEAM AND POWER CONVERSION SYSTEM COMPONENTS

Nuclear Steam Supply System, Full Power Operation	
Rated NSSS power (MWt)	3643
Steam generator outlet pressure (psig)	972
Steam generator inlet feedwater temperature (°F)	449
Steam generator outlet steam moisture (%)	0.27
Steam generator outlet steam temperature (°F)	543
Quantity of steam generators per unit	4
Flowrate per steam generator (lb/h)	4.06×10^6
Turbine-Generator	
Guarantee output (kW)	1,249,721
Nameplate rating (kW)	1,247,083
Turbine type	Tandem-compound, 6-flow, 38-in. last-stage bucket
Turbine elements per unit	1 high pressure 3 low pressure
Operating speed (rpm)	1800
Moisture Separator/Reheater	
Stages of reheat	1
Stages of moisture separation	1
Quantity of MSR vessels per unit	4
Main Condenser	
Type	2-pass, single-pressure
Quantity, per unit	1 (3 shells)
Condensing capacity (Btu/h)	8.09×10^9
Circulating water flowrate (gal/min)	484,600
Circulating water temperature rise (°F)	33.1

TABLE 10.1-1 (SHEET 2 OF 3)

Condenser Vacuum Pumps

Type	Rotary motor-driven, water-sealed
Hogging capacity, each (sf^3/min)	800 @ 10.0 in. HgA
Holding capacity, each (sf^3/min)	36 @ 1.0 in. HgA
Motor (hp) each	150
Speed (rpm)	1800
Quantity per unit	2

Steam Jet Air Ejectors

Quantity per unit	2
Type	2-stage
Holding capacity, each (sf^3/min)	60 @ 1.0 in. HgA
Steam consumption, each (lb/h)	3500

Condensate Pumps

Type	Vertical centrifugal, motor-driven
Design conditions	
Flow (gal/min)	10,810
Total head (ft)	1280
Motor (hp)	4500
Quantity per unit	3

Low Pressure Feedwater Heaters

No. 1	
Quantity per unit	3
Operating pressure (psia)	9.17
Duty (Btu/h) per heater	233×10^6
No. 2	
Quantity per unit	3
Operating pressure (psia)	20.0
Duty (Btu/h) per heater	141×10^6
No. 3	
Quantity per unit	3
Operating pressure (psia)	60.5
Duty (Btu/h) per heater	241×10^6
No. 4	
Quantity per unit	2
Operating pressure (psia)	167.1
Duty (Btu/h) per heater	411×10^6

TABLE 10.1-1 (SHEET 3 OF 3)

No. 5	
Quantity per unit	2
Operating pressure (psia)	270.2
Duty (Btu/h) per heater	329×10^6
<u>High Pressure Feedwater Heater</u>	
No. 6	
Quantity per unit	2
Operating pressure (psia)	424.7
Duty (Btu/h) per heater	358×10^6
<u>Steam Generator Feedwater Pumps</u>	
Pump type	Horizontal, centrifugal, single-stage
Turbine type	Six-stage, noncondensing
Quantity per unit	2
Design conditions per pump	
Flow (gal/min)	18,650
Total head (ft)	2650
Turbine hp @ 5950 rpm	15,700
<u>Heater Drain Pumps</u>	
Type	Vertical centrifugal, motor-driven
Design conditions	
Flow (gal/min)	6700
Total head (ft)	940
Motor (hp)	1800
Quantity per unit	2
<u>Steam Generator Blowdown Heat Exchanger</u>	
Duty (Btu/h)	22.2×10^6
Quantity per unit	4
<u>Steam Generator Blowdown Trim Heat Exchanger</u>	
Duty (Btu/h)	5.4×10^6
Quantity per unit	1
<u>Heater Drain Tank</u>	
Quantity per unit	2
Operating pressure (psia)	168.1

10.2 TURBINE-GENERATOR

The function of the turbine-generator is to convert thermal energy into electric power.

10.2.1 DESIGN BASES

10.2.1.1 Safety Design Bases

The turbine-generator serves no safety function and has no safety design bases.

10.2.1.2 Power Generation Design Bases

The following is a list of the principal design bases:

A. The turbine-generator is intended for baseload operation and also has load following characteristics consistent with the requirements of the Westinghouse nuclear steam supply system (NSSS).

B. The turbine-generator system (TGS) is designed in accordance with all applicable interface requirements and system design requirements of the Westinghouse NSSS.

C. The turbine-generator is designed to trip automatically under abnormal conditions and to concurrently initiate a reactor trip.

D. The system is designed to ensure proper drainage of all related piping and components in order to eliminate water induction into the main turbine during all phases of operation.

E. The TGS satisfies the recommendations of Nuclear Regulatory Commission Branch Technical Position ASB 3-1 as related to breaks in high- and moderate energy piping systems outside containment. In this regard the TGS is considered a high-energy system.

F. The system is designed to supply hot reheat steam to the feedwater pump turbines during normal power operation (above about 40 percent load) and at pump runout conditions with one pump out of service.

G. The system provides extraction steam for six stages of regenerative feedwater heating.

10.2.2 DESCRIPTION

The General Electric turbine-generator (drawings 1X4DB160-1, 1X4DB160-2, 1X4DB160-3, 1X4DB166, 1X4DB167-1, 1X4DB167-2, 1X4DB191, 1X4DB193, and 1X4DB196) is designated as a TC6F 38-in. last-stage buckets unit. It consists of turbines, a generator, external moisture-separator reheaters, exciter, controls, and auxiliary subsystems. The major design parameters of the turbine-generator and auxiliaries are presented in table 10.2.2-1.

The turbine-generator and associated piping, valves, and controls are located completely within the turbine building. The effects of turbine missiles are described in paragraph 3.5.1.3. Failure of turbine-generator equipment does not preclude safe shutdown of the reactor coolant system. There is unlimited access to turbine-generator components and instrumentation associated with turbine-generator overspeed protection, under all operating conditions.

10.2.2.1 Turbine-Generator Description

The turbine is an 1800-rpm, tandem-compound, 6-flow, reheat unit with 38-in. last-stage buckets (TC6F 38-in. LSB). The high-pressure turbine element includes one double-flow high-pressure turbine. The low-pressure turbine elements include three double-flow low-pressure turbines and four external moisture separator/reheaters (MSRs) with one stage of reheating. The single direct-driven generator is gas cooled and rated at 1350 MVA at 25 kV, 3-phase, 60 Hz. Other related system components include a complete turbine-generator bearing lubrication oil system, a digital electrohydraulic control system (Unit 1) or electrohydraulic control system (Unit 2) with supervisory instrumentation, a turbine steam sealing system (refer to subsection 10.4.3), overspeed protective devices, turning gear, a generator hydrogen and seal oil system, a stator cooling system, a rectifier section, and a voltage adjuster.

10.2.2.2 Turbine-Generator Cycle Description

Steam from each of four steam generators enters the high- pressure turbine through four 28-in. stop valves and governing control valves; one stop valve and one control valve form a single assembly. Crossties are provided upstream of the turbine stop valves to provide pressure equalization with one or more stop valves closed. After expanding through the high-pressure turbine, the high-pressure turbine exhaust steam flows through four external MSR vessels. The external moisture separators reduce the moisture content of the high-pressure exhaust steam from approximately 14 percent to dry saturated steam conditions. The reheater uses a portion of the main steam supply to the main turbine to reheat the steam to superheat conditions. Next, the reheated steam flows through a combined intermediate stop and intercept valve in each of six 42-in. reheat steam lines leading to the inlets of the three low-pressure turbines. A portion of the hot reheat steam leaving the MSR is used to power the two feedwater pump turbine drivers. Steam from each low-pressure turbine is then exhausted into the shell of the condenser serving each low-pressure turbine.

Turbine steam extraction connections are provided for six stages of feedwater heating. Steam from the turbine third stage extraction point of the high-pressure turbine is supplied to high-pressure feedwater heater No. 6. The turbine fifth stage extraction point supplies steam to the low-pressure feedwater heater No. 5. Steam is taken from the high-pressure turbine exhaust crossover piping to the low-pressure feedwater heater No. 4. The low-pressure turbine ninth, eleventh, and twelfth stage extraction points supply steam to the low-pressure feedwater heaters No. 3, 2, and 1, respectively.

The rotating low-pressure turbine blades located just upstream of the eleventh and twelfth stage turbine extraction points are provided with grooved moisture separator extraction buckets to partially remove moisture from the remainder of the steam passing through the turbine and to improve thermal efficiency of the cycle. The extraction steam lines from these turbine extraction points to the feedwater heaters thus serve the dual purpose of routing the required extraction steam for feedwater preheating and the moisture extracted from the steam flowing through the turbine.

The moisture removed by the external MSR is drained to moisture separator drain tanks, from there to the No. 4 feedwater heater drain tanks, and subsequently is pumped into the feedwater system. Similarly, the condensed steam in the reheaters is drained to the reheater drain tanks, drains into the shell side of the No. 6 feedwater heater, and is eventually pumped into the feedwater system.

10.2.2.3 Automatic Controls

Automatic controls regulate turbine speed and acceleration through the entire speed range, with several discrete speed and acceleration rate settings. The automatic control system includes control of load and loading rate from no load to full load, with continuous load adjustments and discrete loading rates. Should it become necessary to remove the generating unit from the primary automatic controls, the standby manual control (Unit 2 only) of speed and load takes over, thus allowing continued operation of the turbine-generator.

10.2.2.3.1 Electrohydraulic Control Systems

Unit 1

The turbine-generator is equipped with a digital electrohydraulic control (DEHC) system (GE MARK VIe) that combines the principles of triple channel redundancy and high-pressure hydraulics to regulate steam flow through the turbine. The control system has three major subsystems: speed control logic, load control logic, and valve flow control logic all contained within the main controller processing units. The control system contains the logic that controls the turbine speed, load, acceleration rates, loading rates, and valve position limits by providing the appropriate control signals to the turbine steam flow control valves.

The DEHC system employs six electric speed inputs. Signals are triple-redundantly processed in the DEHC system with three independent processors. Valve opening actuation is provided by a 1600-psig hydraulic system that is totally independent of the bearing lubrication system; valve closing actuation is provided by springs and steam forces upon the reduction or relief of fluid pressure. the system is designed so that loss of fluid pressure, for any reason, leads to valve closing and consequent shutdown.

All steam valves are provided in series pairs. A stop valve is actuated by either of two overspeed (primary and emergency) trip systems, followed by a control valve modulated by the speed governing logic, and tripped by either overspeed trip system.

Drawing 1X4DB194 is a schematic of the EHC hydraulic fluid system.

Unit 2

The turbine-generator is equipped with an electrohydraulic control (EHC) system that combines the principles of solid-state electronics and high-pressure hydraulics to regulate steamflow through the turbine. The control system has three major subsystems: a speed control unit, a load control unit, and valve flow control units.

The EHC system employs three electric inputs and one mechanical speed input. Signals are redundantly processed in both electronic and hydraulic logic channels. Valve opening actuation is provided by a 1600-psig hydraulic system that is totally independent of the bearing lubrication system; valve closing actuation is provided by springs and steam forces upon the reduction or relief of fluid pressure. The system is designed so that loss of fluid pressure, for any reason, leads to valve closing and consequent shutdown.

All steam valves are provided in series pairs. A stop valve is actuated by either of two overspeed trip systems, followed by a control valve modulated by the speed-governing system, and tripped by either overspeed trip system.

Drawing 2X4DB194 is a schematic of the EHC hydraulic fluid system.

10.2.2.3.1.1 Speed Control. The speed control logic provides speed control, acceleration, and overspeed protection functions. The speed control logic produces a speed error signal, which is fed to the load control logic. The speed error signal is derived by comparing the desired speed with the actual speed of the turbine at steady-state conditions or by comparing the desired acceleration rate with the actual acceleration rate during startup.

There are six passive magnetic-type probes, used in conjunction with a multi-toothed wheel on the steam turbine shaft to sense the turbine's rotational speed. A primary set of three probes, voted two out of three, is used for speed control, speed indication,zero speed detection, and primary overspeed protection. The other set of three, also voted two out of three but in separate and triple-redundant protection processors, is used exclusively for emergency overspeed protection. Probe channel failures are detected when any single channel signal differs from voted value by a preset amount. Failure of any channel will generate an alarm. Failure of any two probe channels out of the three in a set will trip the turbine.

Because of the importance in safeguarding against turbine overspeed, the speed control logic uses the median select speed value. If one speed input fails, the logic continues to provide control. If two speed inputs fail, the turbine will trip.

A close signal being sent to the control valves and intercept valves will be sent to a fast acting solenoid valve on each control valve and intercept valve. Energizing these solenoid valves will release the hydraulic fluid pressure in the valve actuators, allowing springs to close each valve.

Logic is incorporated in the speed control to slowly vary the rotor speed above and below critical frequencies. This will prevent the turbine from running at a constant speed near critical bucket resonances.

Unit 2 Speed Control Unit

The speed control unit provides speed control, acceleration, and overspeed protection functions. The speed control unit produces a speed error signal, which is fed to the load control unit. The speed error signal is derived by comparing the desired speed with the actual speed of the turbine at steady-state conditions or by comparing the desired acceleration rate with the actual acceleration rate during startup.

Three separate error signals are derived by the speed control circuits: two are the result of individual comparisons of a speed reference signal with each of the two analog speed signals (primary and backup) that are proportional to turbine speed; the other is the integral of the acceleration error, which is derived by comparing a signal proportional to rotor acceleration with an acceleration reference signal. A low value gate receives these three signals and transmits the signal demanding the smallest control valve opening.

Because of the importance in safeguarding against turbine overspeed, the speed control unit uses two redundant channels, a primary and a backup. If the primary channel fails, the backup channel takes over automatically. If the backup channel fails, the primary will maintain control. In the event that both channels are lost, the turbine will trip.

A trip signal being sent to the control valves and intercept valves will be sent to a fast acting solenoid valve on each control valve and intercept valve. Energizing these solenoid valves will release the hydraulic fluid pressure in the valve actuators, allowing springs to close each valve.

A circuit is incorporated in the speed control unit to slowly vary the rotor speed above and below critical frequencies. This will prevent the turbine from running at a constant speed near critical bucket resonances.

10.2.2.3.1.2 Load Control

Unit 1 Load Control Logic

The load control logic develops signals that are used to proportion the steam flow to the stop valves, control valves, and intercept valves. Signal outputs are based on a proper combination of the speed error signals and load reference signals.

Unit 2 Load Control Unit

The load control unit develops signals that are used to proportion the steam flow to the stop valves, control valves, and intercept valves. Signal outputs are based on a proper combination of the speed error signals and load reference signals.

10.2.2.3.1.3 Valve Flow Control

Unit 1 Valve Flow Control Logic

The valve flow control logic regulates the steam flows as directed by the load control logic. Compensation is used to ensure linear steam flow response with respect to steam flow signals. The main stop valve, the control valve, and the intercept valve position loop consists, in each case, of DEHC system servo output, an electrohydraulic servo valve, a hydraulic actuator, and linear position transducers. By use of valve position feedback, the valve control logic positions the main stop valves, the control valves, and the intercept valves according to the flow demand signal from the load control logic, or from the valve test logic.

The flow of the main steam entering the high-pressure turbine is controlled by four stop valves and four governing control valves. Each 28-in. stop valve is controlled by an electrohydraulic actuator, so that the stop valve is either fully open or fully closed. The function of the stop valves is to shut off the steam flow to the turbine, when required. The stop valves are closed within 0.3.s by actuation of the emergency trip system devices. These devices are independent of the electronic flow control logic (paragraph 10.2.2.3.1.5).

The turbine control valves are positioned by electrohydraulic servo actuators in response to signals from the flow control logic. The flow control signal positions the control valves for long-range speed control through the normal turbine operating range and for load control after the turbine-generator unit is synchronized.

The 34-in. combined intermediate stop valves, located in the hot reheat lines at the inlet to the low-pressure turbines, are stop and intercept valves in one casing and control steam flow to the low-pressure turbines. During normal operation of the turbine, the stop and intercept valves are wide open. The intercept valve flow control logic positions the valve during startup

and normal operations and closes the valve rapidly on loss of turbine load. The intermediate stop valves close completely on turbine overspeed and trip.

Unit 2 Valve Flow Control Units

The valve flow control unit regulates the steamflows as directed by the load control unit. Compensation circuits are introduced to ensure linear steamflow response with respect to steamflow signals. The main stop valve, the control valve, and the intercept valve position loop consists, in each case, of electronic circuitry, an electrohydraulic servo valve, a hydraulic actuator, and a linear position transducer. By use of valve position feedback control, the valve control units position the main stop valves, the control valves, and the intercept valves according to the flow demand signal from the load control unit, from the standby control unit, or directly from the control panel (valve test).

The flow of the main steam entering the high-pressure turbine is controlled by four stop valves and four governing control valves. Each 28-in. stop valve is controlled by an electrohydraulic actuator, so that the stop valve is either fully open or fully closed. The function of the stop valves is to shut off the steamflow to the turbine, when required. The stop valves are closed within 0.3 s by actuation of the emergency trip system devices. These devices are independent of the electronic flow control unit (paragraph 10.2.2.3.1.5).

The turbine control valves are positioned by electrohydraulic servo actuators in response to signals from their respective flow control unit. The flow control unit signal positions the control valves for long-range speed control through the normal turbine operating range and for load control after the turbine- generator unit is synchronized.

The 34-in. combined intermediate stop valves, located in the hot reheat lines at the inlet to the low-pressure turbines, are stop and intercept valves in one casing and control steamflow to the low-pressure turbines. During normal operation of the turbine, the stop and intercept valves are wide open. The intercept valve flow control unit positions the valve during startup and normal operations and closes the valve rapidly on loss of turbine load. The intermediate stop valves close completely on turbine overspeed and trip.

10 2.2.3.1.4 Power/Load Unbalance.

Unit 1 Power/Load Unbalance

Associated with the load control logic is a rate sensitive power/load unbalance circuit, the purpose of which is to initiate control valve fast closing action under load rejection conditions that might lead to rapid rotor acceleration and consequent overspeed.

Valve action will occur when the power exceeds the load by 40 percent or more, and generator current is lost in a time span of 35 ms or less. Cold reheat pressure is used as a measure of power. Generator current is used as a measure of load to provide discrimination between loss of load incidents and occurrences of electric system faults.

When DEHC detects a signal indicating a power/load unbalance condition, the load reference signal is set to zero, and the load setpoint begins to run back toward the no-load flow point. Should the condition disappear quickly, the power/load unbalance circuit will reset automatically, and the load reference signal will be re-established near its value prior to the loss of load. Should the condition persist and the load not return within approximately 45 s, the load setpoint runback will be completed. The power/load unbalance circuit will clear automatically when the cold reheat pressure drops below 40 percent.

Unit 2 Power/Load Unbalance

Associated with the load control unit is a rate sensitive power/load unbalance circuit, the purpose of which is to initiate control valve fast closing action under load rejection conditions that might lead to rapid rotor acceleration and consequent overspeed.

Valve action will occur when the power exceeds the load by 40 percent or more, and generator current is lost in a time span of 35 ms or less. Cold reheat pressure is used as a measure of power. Generator current is used as a measure of load to provide discrimination between loss of load incidents and occurrences of electric system faults.

When the detection circuitry provides a signal indicating a power/load unbalance condition, the load reference signal is grounded, and the load reference motor begins to run back toward the no-load flow point. Should the condition disappear quickly, the power/load unbalance circuit will reset automatically, and the load reference signal will be re-established near its value prior to the loss of load. Should the condition persist and the load not return within approximately 45 s, the load reference runback will be completed. The power/load unbalance circuit will clear automatically when the cold reheat pressure drops below 40 percent.

10.2.2.3.1.5 Overspeed Protection.

Unit 1 Overspeed Protection

Three separate systems have been provided to protect the turbine against overspeed. The first is the normal overspeed protection system, which is an integral part of the speed control as discussed in 10.2.2.3.1.1. The second is the primary overspeed trip protection, which will operate if the normal overspeed protection should fail. The third is the emergency overspeed trip protection, which will operate should the primary overspeed trip fail. Refer to table 10.2.2-2 for a description of the sequence of events following a full-load rejection. A schematic of the overspeed protection systems is shown in figure 10.2.2-1a.

The primary overspeed trip subsystem will trip the turbine at the primary overspeed trip point. The primary set of speed probe signals are voted two out of three and compared to the primary overspeed trip point. Values equal to or greater than the trip point will de-energize the primary trip relays (PTRs). The PTRs, in turn, will de-energize the electrical trip devices (ETDs). Actuation of the ETDs, which are located in the TMA, will release the hydraulic fluid pressure in the steam valve actuator, allowing springs to close the steam valves. The hydraulic piping system through which the pressure signal is propagated is called the emergency trip system (ETS).

The emergency overspeed trip subsystem set to operate at a slightly higher speed than the primary pvers[eed trip subsystem. The emergency set of speed probe signals are voted two out of three and compared to the emergency overspeed trip point. Values equal to or greater than the trip point will de-energize the emergency trip relays (ETRs). The ETRs, in turn, de-energize the ETDs which will release hydraulic fluid pressure in the steam valve actuators, allowing springs to close the steam valves. The emergency overspeed trip subsystem is a component of the protective system which is a completely independent set of triple-redundant processors.

Both the primary overspeed trip and the emergency overspeed trip subsystems may be independently tested online at any desired load. During a test, overspeed protection will remain fully functional.

The hydraulic piping of the primary overspeed trip and the emergency overspeed trip subsystems is also connected to an air relay dump valve. When the pressure in the hydraulic piping to the air relay dump valve is high, an air signal is supplied to the nonreturn valves

located in the extraction lines. Loss of pressure in the hydraulic piping causes a loss of the air signal, which allows the spring-assisted nonreturn valves to close.

Due to the redundancy that is built into the overspeed protection systems, the failure of a single valve will not disable the trip functions. The following component redundancies are used to guard against overspeed:

- Main stop valves/control valves.
- Intermediate stop valves/intercept valves.
- Redundant speed sensors (triple redundant).
- Fast acting solenoid valves/emergency trip system.
- Speed control/primary overspeed trip/emergency overspeed trip (triple redundant).

The overspeed protection systems are also designed for fail-safe operation. Loss of any two redundant speed signals will initiate a trip. Loss of the hydraulic pressure in the ETS will also cause a trip. Therefore, damage to the overspeed protection systems, whether at the front standard of the turbine, at the TMS, or at the steam valves, will result in the closure of the valves and the interruption of steam flow to the turbine.

Quick closure of the steam valves is an important part of preventing turbine overspeed. The following values account for valve closing time:

Valve	Closings/(s)
Main stop valves	0.3
Control valves	0.3
Intercept valves	0.3
Intermediate stop valves	0.3
Extraction nonreturn valves	2.0

Unit 2 Overspeed Protection

Two separate basic systems have been provided to protect the turbine against overspeed. The first is the normal overspeed protection system, which is an integral part of the speed control unit as discussed in 10.2.2.3.1.1. The second is the emergency overspeed protection system, which will operate if the normal overspeed protection (as a part of speed control) should fail. Refer to table 10.2.2-2 for a description of the sequence of events following a full-load rejection. A schematic of the overspeed protection systems is shown in figure 10.2.2-1b.

The emergency overspeed protection system is a mechanical hydraulic system, which uses an overspeed trip (OST) device. The OST is a mechanical ring mounted on the front end of the turbine shaft; this ring will remain concentric with the turbine shaft as long as the shaft is rotating below a certain speed. If the shaft rotates above this speed, the ring will move to an eccentric position and actuate a trip latch mechanism. This mechanism converts the mechanical trip signal to a hydraulic (low-pressure) signal in the mechanical trip valve, which passes this signal through a hydraulic piping system to the steam valve actuators. Actuation of the mechanical trip valve will release the hydraulic fluid pressure in the steam valve actuator, allowing springs to close the steam valves. The hydraulic piping system through which the pressure signal is propagated is called the emergency trip system (ETS).

Supplemental to the OST is the backup overspeed trip (BOST), an electrical trip normally set to operate at a slightly higher speed than the OST. Three independent speed signals are generated by magnetic pickups from a toothed wheel on the turbine shaft. The speed signals

are amplified through electronic circuitry and are compared to a trip speed reference signal. If a speed signal exceeds its reference setting, its master trip relay is energized. The master trip relays, through two-out-of-three logic, deenergize the electrical trip solenoid valve. This will actuate the electrical trip valve which will release hydraulic fluid pressure in the steam valve actuators, allowing springs to close the steam valves.

The BOST electric trip, through two-out-of-three logic, also sends a mechanical close-trip signal to the trip latch assembly through the mechanical trip solenoid valve and the mechanical trip piston.

Both the OST and BOST may be independently tested online at any desired load. During a test, overspeed protection will be provided by the device not being tested.

The hydraulic piping of the emergency overspeed protection system is also connected to an air relay dump valve. When the pressure in the hydraulic piping to the air relay dump valve is high, an air signal is supplied to the nonreturn valves located in the extraction lines. Loss of pressure in the hydraulic piping causes a loss of the air signal, which allows the spring-assisted nonreturn valves to close.

Due to the redundancy that is built into the overspeed protection systems, the failure of a single valve will not disable the trip functions. The following component redundancies are used to guard against overspeed:

- Main stop valves/control valves.
- Intermediate stop valves/intercept valves.
- Primary speed control/backup speed control.
- Fast acting solenoid valves/emergency trip system.
- Mechanical overspeed trip/electrical overspeed trip.
- Speed control/overspeed trip/backup overspeed trip.

The overspeed protection systems also are designed for fail-safe operation. Loss of speed signals will initiate a trip. Loss of the hydraulic pressure in the ETS will also cause a trip. Therefore, damage to the overspeed protection systems, whether at the front standard of the turbine or at the steam valves, will result in the closure of the valves and the interruption of steamflow to the turbine.

Quick closure of the steam valves is an important part of preventing turbine overspeed. The following values account for valve closing time:

Valve	Closings/(s)
Main stop valves	0.3
Control valves	0.3
Intercept valves	0.3
Intermediate stop valves	0.3
Extraction nonreturn valves	2.0

10.2.2.4 Turbine Protective Trips

Unit 1

Turbine protective trips operate through the DEHC but independently of the speed control logic and, when initiated, cause tripping of all turbine stop and control valves. The turbine trips are:

- Primary Overspeed (110 percent of normal).
- Emergency overspeed (110.5 percent of normal).
- Low vacuum.
- Excessive thrust bearing wear.
- Reactor trip.
- Generator trip.
- Manual trip push-buttons from the main control room.
- Manual trip push-buttons located at the turbine front standard.
- Excessive vibration.
- Moisture separator drain system high level.
- Prolonged loss of stator coolant.
- Low hydraulic fluid pressure.
- Loss of two redundant speed signals.
- Low bearing oil pressure.
- Loss of main shaft oil pump discharge pressure.

Drawing 1X5DN203-1 illustrates the turbine and generator trip logics.

Unit 2

Turbine protective trips are independent of the electronic control system and, when initiated, cause tripping of all turbine stop and control valves. The protective trips are:

- Overspeed (mechanical): 110 percent of normal.
- Backup overspeed (electrical): 112 percent of normal.
- Low vacuum.
- Excessive thrust bearing wear.
- Electric solenoid trip actuated by:
  - Reactor trip.
  - Generator trip.
  - Manual trip from control room.
- Excessive vibration.

- Manual trip handle located at the turbine front standard.
- Moisture separator drain system high level.
- Prolonged loss of stator coolant.
- Low hydraulic fluid pressure.
- Loss of both speed signals or backup overspeed trip.
- Low bearing oil pressure.
- Loss of main shaft oil pump discharge pressure.

Drawing 2X5DN203-1 illustrates the turbine and generator trip logics.

10.2.2.5 Protective System

The purpose of the protective system is to detect undesirable or dangerous operating conditions of the turbine-generator, take appropriate trip actions, and provide information to the operator about the detected conditions and the consequent actions. In addition, means are provided for testing all testable equipment and circuits.

The protective system consists of two major subsystems:

A. The mechanical-hydraulic trip system (Unit 2 only).

B. The electrical trip and monitoring system.

A signal flow diagram of the protective system is shown in figure 10.2.2-2a (Unit 1) and figure 10.2.2-2b (Unit 2).

The ETS is the high pressure fluid system that, when in the reset or pressurized state, permits all steam valves to open in the presence of opening signals from the DEHC (Unit 1) or EHC (Unit 2). When in the tripped or depressurized state, it overrides all opening signals; trips the main and reheat stop valves, the control valves, and the intercept valves directly by way of their disc-dump valves; and trips the extractor check valves through the air relay dump valve. The principal output function of the protective system is to control the state of the ETS.

10.2.2.5.1 Mechanical-Hydraulic Trip System (Unit 2 Only)

The ETS is pressurized from the high pressure hydraulic fluid supply, through the following chain of devices, all components of the mechanical-hydraulic trip system:

A. Mechanical shutoff valve (MSOV).

B. Mechanical trip valve (MTV).

C. Mechanical lockout solenoid valve (MLV).

D. Electrical trip valve (ETV).

E. Electrical lockout solenoid valve (ELV).

The MSOV and MTV are controlled hydraulically by the mechanical trip pilot valve (MTPV), and when their pilot lines are depressurized, these valves shut off their input line and drain their output line, tripping the ETS.

The MLV is controlled electrically by the electrical trip and monitoring system, and when energized, it bypasses the MSOV and MTV, permitting these two valves and two of the three signal paths that actuate them to be tested without tripping the ETS.

The ETV is controlled hydraulically by the electrical trip solenoid valve (ETSV), and when its pilot line is depressurized, this valve shuts off its input line and drains its output line, tripping the ETS.

The ELV is controlled electrically by the electrical trip and monitoring system and, when energized, bypasses the ETV, permitting this valve and the signal path that actuates it to be tested without tripping the ETS.

In order to trip the ETS, any tripping signal has to actuate one or both of the MTPV or the ETSV. Each of these two cases will be examined separately.

10.2.2.5.1.1 MTPV Actuation. This valve is operated mechanically by the trip latch rod, which is tripped (i.e., allowed to move under the influence of a charged spring to a position where the MTPV is tripped) by the trip finger.

The trip finger is operated by:

A. Mechanical OST

This is actuated during an overspeed of the turbine exceeding the OST setting or at rated speed during a mechanical OST test. During this test the electrical trip and monitoring system energizes the oil trip solenoid valve (OTSV) which admits lubrication oil to the OST, causing it to trip. A coordinated actuation of the MLV prevents the ETS from tripping.

B. Mechanical Trip Piston

This is held in the reset position by turbine lube oil pressure. The piston is allowed to trip by action of a spring when the oil pressure is lost or when the oil is shut off by the mechanical trip solenoid valve (MTSV). This valve is energized by the electrical trip and monitoring system during a 125-V trip, as it will be defined later, or during a mechanical trip piston test. In the latter case a coordinated actuation of the MLV prevents the ETS from tripping.

C. Manual Trip Handle

There is no provision for testing the manual trip handle under lockout conditions. A manual trip handle test will result in an actual trip.

The trip latch rod, once tripped, latches mechanically and remains in the tripped position even after the condition that caused it to trip (items A, B, or C) has been cleared. It is reset by the reset mechanism, consisting of:

The oil reset solenoid valve, which actuates the oil reset piston when energized by the electrical trip and monitoring system.

The oil reset piston, which resets the trip latch rod and the MTPV, which in turn resets the MSOV and MTV.

10.2.2.5.1.2 ETSV Actuation. This valve has a 24-V-dc solenoid which is normally energized when the ETSV is in the reset state. The valve trips when the solenoid is deenergized. Failure of this solenoid will cause a trip. The solenoid is connected to the electrical trip and monitoring system and is deenergized during a 24-V trip, as will be defined later, or during an electrical trip test. In the latter case, a coordinated actuation of the ELV prevents the ETS from tripping.

10.2.2.5.2 Electrical Trip and Monitoring System

Unit 1

The principal function of this part of the protective system is to connect all external trip signals (except the tripping signals from the emergency overspeed trip, which act directly on the ETRs to deenergize the ETDs) to the PTRs to deenergize the ETDs after suitable modifications by logic circuits. Deenergizing two-out-of-three ETDs in each TMA manifold is capable of tripping the ETS. To allow online maintainability, valves permit isolation of a TMA manifold. All protective trips remain functional with a manifold isolated.

The incoming trip signals are arranged into two groups, signals external or internal to the DEHC system.

Unit 2

The principal function of this part of the protective system is to connect all external trip signals (except the tripping signals from the OST and manual trip handle, which act directly on the mechanical-hydraulic trip system) to one or both of the MTSV and ETSV after suitable modifications by logic circuits. Each of these valves is independently capable of tripping the ETS.

The incoming trip signals are arranged into two groups, signals external or internal to the EHC cabinet.

10.2.2.5.2.1 External Signals.

Unit 1 Signals External to the EHC System

These cause the PTRs to deenergize, in turn, deenergizing the electrical trip devices (ETDs).

Unit 2 Signals External to the EHC Cabinet

These cause 125-V trips; i.e., they activate the 125-V trip bus and energize the MTSV directly. In addition, the 24-V trip circuit is indirectly operated through a set of relays (cross-trip), and the 125-V trip bus is locked up after a short time delay.
When the generator circuit breaker is open and the MTV and ETS are tripped, an additional lockup circuit is established through pressure switch contacts.

During a mechanical trip piston test, the MTSV is energized without activating the 125-V trip bus, the cross-trip circuit, and the lockup circuits.

10.2.2.5.2.2 Internal Signals.

Unit 1 Signals Internal to the DEHC System.

These cause the PTRs to deenergize, in turn, deenergizing the electrical trip devices (ETDs).

A loss of the Input/Output Network (IONet) will result in a turbine trip. The electrical trip and monitoring system receives feedback signals from each component in the IONet that allow it to determine network health.

Loss of power to two-out-of-three control processors will result in a turbine trip. The electrical trip and monitoring system receives feedback signals from each power source that allow it to determine system health.

The electrical trip and monitoring system also contains the logic for testing the ETDs. When one of these tests is initiated, the electrical trip and monitoring system logic deenergizes the selected PTR or ETR and receives feedback signals that allow it to sense the status of the PTRs, ETRs, and ETDs after each step and whether the test was successful.

Each of the three PTR or ETR circuits for each ETD can be separately tested without causing an actual trip. These circuits, as well as many other trip circuits of the electrical trip and monitoring system, are arranged in a two-out-of-three logic system.

Unit 2 Signals Internal to the EHC Cabinet

These cause a 24-V trip; i.e., they deenergize the ETSV solenoid through a set of relay contacts and lock up the 24-V trip circuit through another set of relays contacts.

The first set of relays is also operated during an electrical trip test; in this case, the lockup circuit is not activated and the situation is cleared once the cause producing it is removed, without necessitating any positive resetting action.

Of the signals internal to the EHC cabinet, the loss of both speed signal and the BOST signal energize, in addition to the tripping and the locking relays, a third set of relays which cross-trip the 125-V trip bus. The other three signals that cause a 24-V trip do not energize these cross-trip relays; however, of these, the master trip button causes a 125-V trip through a separate contact.

A loss of 24 V dc deenergizes the ETSV solenoid, causing a 24-V trip and cross-trips the 125-V trip bus.

The electrical trip and monitoring system also contains the logic for testing the trip devices (mechanical overspeed, mechanical trip piston, and electrical trip tests.) When one of these tests is initiated, the electrical trip and monitoring system logic provides a sequence of signals to the appropriate lockout, trip, and reset valve solenoids and receives feedback signals that allow it to sense the status of the mechanical-hydraulic trip system after each step and whether the test was successful.

Each of the three BOST circuits can be separately tested without causing an actual trip. These circuits, as well as many other trip circuits of the electrical trip and monitoring system, are arranged in a two-out-of-three logic system.

10.2.2.6 Other Protective Systems

Additional protective features of the turbine and steam system are:

A. Safety valves on the MSR to protect the high-pressure turbine cylinder from overpressure in the event of a turbine trip.

B. Extraction line nonreturn valves (with the exception of the last two low-pressure heaters) to protect the turbine from overspeed due to reverse flow in case of a turbine trip.

C. Exhaust casing rupture diaphragms to protect the low- pressure turbine cylinders from overpressure in case of a loss of condenser vacuum.

10.2.2.7 Plant Loading and Load Following

The turbine-generator is intended to be base loaded but is designed to match or exceed the transient load-following capabilities of the nuclear steam supply system. The reactor regulating system (RRS) automatically adjusts reactor power to follow turbine load transients. The RRS senses turbine first- stage pressure as a linear indication of load and generates signals that regulate control element assembly drive direction and speed. As a combined unit consisting of turbine-generator and reactor, the system accepts step-load changes of ±10 percent and ramp-load changes of ±5 percent/min over the range of 20- to 100-percent full power. It also accepts, with the aid of the turbine bypass system, a load rejection of 50 percent full-load power without reactor trip and without steam release to the atmosphere through the power-operated atmospheric steam relief or steam safety valves. For load rejections greater than 50 percent of full load, a portion of the steam generated during the reactor runback will be released to the atmosphere. The turbine bypass system is described in subsection 10.4.4.

The turbine control system is designed to provide protection to the turbine by tripping the turbine for certain predetermined conditions as discussed in paragraph 10.2.2.4. The turbine is tripped upon reactor trip. The reactor protective system provides two separate signals of reactor trip to the turbine control system.

10.2.2.8 Inspection and Testing Requirements

Major system components are readily accessible for inspection and are available for testing during normal plant operation. Controls and protective devices associated with each turbine-generator component will be tested on a regularly scheduled basis. Turbine trip circuitry will be tested prior to unit startup. The main steam and reheat valves are nonsafety related, and the testing requirements are detailed in the Technical Requirements Manual.

10.2.3 TURBINE INTEGRITY (UNIT 1)

10.2.3.1 Materials Selection

Vogtle Unit 1 low-pressure turbine rotors are made from individual single forgings (monoblock) which eliminate the shrunk-on disks. The rotors are made from vacuum-degassed, Ni-Cr-Mo-V alloy steel. The susceptibility to stress corrosion cracking (SCC) is most pronounced in materials with yield strength above 105 ksi. The threshold of SCC susceptibility is in material with yield strength in the range of 85 to 100 ksi. The material (similar to ASTM A470 Class 6) used for the monoblock rotor, which has a yield strength in the range of 80 ksi, was selected to optimize load-carrying capability and resistance to SCC. Hence, the material yield strength is less than the SCC threshold, and stresses are reduced to provide maximum resistance to SCC.

10.2.3.2 High-Temperature Properties

The operating temperatures of the high-pressure rotors are below the creep rupture range. Creep rupture is, therefore, not considered to be a significant factor in ensuring rotor integrity over the lifetime of the turbine. Basic data are obtained from laboratory creep rupture tests.

10.2.3.3 Turbine Disk Design

The turbine assembly is designed to withstand normal conditions and anticipated transients, including those resulting in turbine trip, without loss of structural integrity. The design of the turbine assembly meets the following criteria:

A. Turbine shaft bearings are designed to retain their structural integrity under normal operating loads and anticipated transients, including those leading to turbine trips.

B. The multitude of natural critical frequencies of the turbine shaft assemblies existing between zero speed and 20-percent overspeed are controlled in the design and operation so as to cause no distress to the unit during operation.

10.2.3.4 Preservice Tests and Inspections

Preservice inspections for turbine rotors include the following:

A. Rotor forgings are rough machined, with minimum stock allowance prior to heat treatment.

B. Each rotor forging is subjected to a 100-percent volumetric (ultrasonic) examination. Each finish-machined rotor is subjected to a surface magnetic particle and visual examination. Results of the above examination are evaluated by use of General Electric acceptance criteria. The criteria are more restrictive than those specified for Class 1 components in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Sections III and V. These criteria include the requirement that subsurface sonic indications are either removed or evaluated to ensure that they do not grow to a size which compromises the integrity of the unit during the service life of the unit.

C. Each fully bucketed turbine rotor assembly is spin tested at 20 percent overspeed, the maximum speed anticipated following a load rejection from full load.

Additional preservice tests include air leakage tests to determine whether the hydrogen cooling system is tight, hydrogen purity tests, generator windings and motor megger tests, vibration tests, hydrostatic testing of coolers, pressure testing of piping, and in-place testing of motor-operated valves.

10.2.3.5 Inservice Inspection

Inspections for the turbine assembly and valves include the following:

A. Disassembly of the turbine is conducted during plant shutdown. Inspection of all parts that are normally inaccessible when the turbine is assembled for operation (couplings, coupling bolts, turbine shafts, low-pressure turbine buckets, and high-pressure rotors) is conducted. The turbine is inspected in sections so that over a 10-year period, the entire turbine is inspected once.

   This inspection consists of visual, surface, and volumetric examinations, as indicated below:

   1. Ultrasonic inspection of the tangential entry dovetails and pins of the finger dovetails is conducted. This inspection should be conducted at intervals of about 10 years.

2. A thorough volumetric ultrasonic examination of the high-pressure rotor is conducted. In addition, all accessible rotor surfaces are inspected visually and by magnetic particle testing. This inspection should be conducted at intervals of about 10 years.
3. Visual and surface examination of all low pressure buckets is conducted.
4. A thorough visual inspection of couplings and coupling bolts is performed.

B. Each main steam stop valve, control valve, intermediate stop valve, and intercept valve is disassembled approximately every 120 months during scheduled refueling or maintenance shutdowns. A visual and surface examination of valve seats, wheels, and stems is conducted. Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance.

C. All main stop valves, control valves, and combined intercept valves will be tested with the turbine online through the DEHC (Unit 1). Pushbuttons on the electrohydraulic control test panel will be used to stroke main stop, control, and combined intercept valves from full-open to full-closed (Unit 2).

Turbine valve testing will be performed at intervals as specified in subsection 16.3.8.

D. All extraction nonreturn valves will be tested prior to each startup.

Extraction nonreturn valves are tested locally by stroking the valve full-open with air, then equalizing air pressure, allowing the spring closure mechanism to close the valve. Closure of each valve is verified by direct observation of the valve arm movement.

10.2.3.6 References

1. Begley, J. A., and Logsdon, W. A., Westinghouse Scientific Paper 71-1E7-MSLRF-P1.
2. Spencer, R. C., and Timo, D. P., Starting and Loading of Turbines, General Electric Company, Presented at the 36th Annual Meeting of the American Power Conference, Chicago, Illinois, April 29 – May 1, 1974.
3. General Electric letter dated March 28, 1979, from Richard V. Dufresna to H. L. Welch, Jr.

10.2.4 TURBINE INTEGRITY (UNIT 2)

10.2.4.1 Materials Selection

Turbine wheels and rotors are made from vacuum-melted, or vacuum-degassed, Ni-Cr-Mo-V alloy steel by processes which minimize flaw occurrence and provide adequate fracture toughness. Tramp elements are controlled to the lowest practical concentrations consistent with good scrap selection and melting practices and consistent with obtaining adequate initial and long-life fracture toughness for the environment in which the parts operate. The turbine wheel and rotor materials have the lowest fracture appearance transition temperatures (FATT) and the highest Charpy V-notch energies obtainable, on a consistent basis, from water-quenched Ni-Cr-Mo-V material at the sizes and strength levels used. Since actual levels of

FATT and Charpy V-notch energy vary, depending upon the size of the part, the location within the part, etc., these variations will be taken into account in accepting specific forgings for use in turbines for nuclear application. Charpy tests, essentially in accordance with American Society of Testing Materials (ASTM) Specification A370, are included.

10.2.4.2 Fracture Toughness

Suitable material toughness is obtained through the use of materials described in paragraph 10.2.4.1, to produce a balance of adequate material strength and toughness to ensure safety while simultaneously providing high reliability, availability, and efficiency during operation. Bore stress calculations include components due to centrifugal loads, interference fit, and thermal gradients where applicable. The ratio of material fracture toughness, KIC (as derived from material tests on each wheel or rotor) to the maximum tangential stress for wheels and rotors, at speeds from normal to 115 percent of rated speed[a], will be at least 2 in.$^{(1/2)}$ Adequate material fracture toughness needed to maintain this ratio is ensured by destructive tests on material taken from the wheel or rotor, using correlation methods which are more conservative than that presented in reference 1.

Operating procedures for the turbine are employed to preclude brittle fracture at startup by ensuring that the metal temperature of the wheels and rotors is adequately above the FATT and is sufficient to maintain the fracture toughness to tangential stress ratio at or above 2 in.$^{(1/2)}$ as defined above.

Details of these startup procedures are contained in reference 2.

10.2.4.3 High-Temperature Properties

The operating temperatures of the high-pressure rotors are below the creep rupture range. Creep rupture is, therefore, not considered to be a significant factor in ensuring rotor integrity over the lifetime of the turbine. Basic data are obtained from laboratory creep rupture tests.

10.2.4.4 Turbine Disk Design

The turbine assembly is designed to withstand normal conditions and anticipated transients, including those resulting in turbine trip, without loss of structural integrity. The design of the turbine assembly meets the following criteria:

A. The maximum tangential stress in wheels and rotors, resulting from centrifugal forces, interference fit, and thermal gradients, does not exceed 0.75 of the yield strength of the materials at 115 percent of rated speed.[3]

B. Turbine shaft bearings are designed to retain their structural integrity under normal operating loads and anticipated transients, including those leading to turbine trips.

C. The multitude of natural critical frequencies of the turbine shaft assemblies existing between zero speed and 20-percent overspeed are controlled in the design and operation so as to cause no distress to the unit during operation.

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a. The highest anticipated speed resulting from a loss of load is 110 percent.

The turbine disk design facilitates inspection of all high stress regions including bores and keyways without the need for removing the disks from the shafts.

10.2.4.5 Preservice Tests and Inspections

Preservice inspections for turbine disk and rotor include the following:

A. Wheel and rotor forgings are rough machined, with minimum stock allowance prior to heat treatment.

B. Each rotor and wheel forging is subjected to a 100-percent volumetric (ultrasonic) examination. Each finish-machined rotor and wheel is subjected to a surface magnetic particle and visual examination. Results of the above examination are evaluated by use of General Electric acceptance criteria. The criteria are more restrictive than those specified for Class 1 components in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Sections III and V. These criteria include the requirement that subsurface sonic indications are either removed or evaluated to ensure that they do not grow to a size which compromises the integrity of the unit during the service life of the unit.

C. Finish-machined surfaces are subjected to a magnetic particle examination. No magnetic particle flaw indications are permissible in bores, holes, keyways, and other highly stressed regions.

D. Each fully bucketed turbine rotor assembly is spin tested at 20 percent overspeed, the maximum speed anticipated following a load rejection from full load.

Additional preservice tests include air leakage tests to determine whether the hydrogen cooling system is tight, hydrogen purity tests, generator windings and motor megger tests, vibration tests, hydrostatic testing of coolers, pressure testing of piping, and in-place testing of motor-operated valves.

10.2.4.6 Inservice Inspection

Inspections for the turbine assembly and valves include the following:

A. Disassembly of the turbine is conducted during plant shutdown. Inspection of all parts that are normally inaccessible when the turbine is assembled for operation (couplings, coupling bolts, turbine shafts, low-pressure turbine buckets, low-pressure wheels, and high-pressure rotors) is conducted. The turbine is inspected in sections so that over a 10-year period, the entire turbine is inspected once.

   This inspection consists of visual, surface, and volumetric examinations, as indicated below:

   1. The bore and keyway region of each wheel receives an ultrasonic examination. In addition, each wheel is inspected visually and by magnetic particle testing on all accessible surfaces. Also, ultrasonic inspection of the tangential entry dovetails and pins of the finger dovetails is conducted. This inspection should be conducted at intervals of about 6 years.

2. A thorough volumetric ultrasonic examination of the high-pressure rotor is conducted. In addition, all accessible rotor surfaces are inspected visually and by magnetic particle testing. This inspection should be conducted at intervals of about 10 years.

3. Visual and surface examination of all low pressure buckets is conducted.

4. A thorough visual inspection of couplings and coupling bolts is performed.

B. Each main steam stop valve, control valve, intermediate stop valve, and intercept valve is disassembled approximately every 120 months during scheduled refueling or maintenance shutdowns. A visual and surface examination of valve seats, wheels, and stems is conducted. Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance.

C. All main stop valves, control valves, and combined intercept valves will be tested with the turbine online through the DEHC (Unit 1). Pushbuttons on the electrohydraulic control test panel will be used to stroke main stop, control, and combined intercept valves from full-open to full-closed (Unit 2).

Turbine valve testing will be performed at intervals as specified in subsection 16.3.1.

D. All extraction nonreturn valves will be tested prior to each startup.

10.2.5 EVALUATION

Components of the turbine-generator are conventional and are types that have been extensively used in other nuclear power plants. Instruments, controls, and protective devices are provided to ensure reliable and safe operation. Redundant, fast actuating controls are installed to prevent any damage resulting from overspeed and/or full-load rejection. The control system ensures turbine trip upon reactor trip. Automatic low pressure exhaust hood water sprays prevent excessive hood temperatures. Exhaust casing rupture diaphragms prevent low-pressure cylinder overpressure in the event of loss of condenser vacuum.

Since the steam generated in the steam generators is not normally radioactive, no radiation shielding is provided for the turbine-generator and associated components. Thus radiological considerations do not affect access to system components during normal conditions. In the event of a primary-to-secondary system leak due to a steam generator tube leak, it is possible for the main steam to become radioactively contaminated. Discussions of the radiological aspects of primary-to-secondary leakage are presented in chapters 11 and 12.

10.2.6 INSTRUMENTATION APPLICATIONS

The turbine-generator is provided with a full complement of turbine supervisory instruments mounted in the control room or are part of the DEHC on Unit 1. It is complete with sensors and/or transmitters mounted on the associated equipment, which indicate and record the following:

- Speed.
- Stop valve position.

- Control valve position.
- Combined intermediate valve (CIV) position.
- Temperatures as required for controlled starting, including:
  - External valve chest inner surface.
  - External valve chest outer surface.
  - First-stage shell lower inner surface.
  - Crossaround pipe upstream of CIV No. 1.
  - Crossaround pipe upstream of CIV No. 2.
  - Crossaround pipe upstream of CIV No. 3.
  - Crossaround pipe upstream of CIV No. 4.
  - Crossaround pipe upstream of CIV No. 5.
  - Crossaround pipe upstream of CIV No. 6.
- Casing and shaft differential expansion.
- Vibration of each bearing.
- Shaft eccentricity turbine standard.
- Bearing metal temperatures.

Control room alarms are provided to warn the operators of the following abnormal conditions:

- High vibration trip (Unit 2 only).
- High-high exhaust hood temperature (Unit 2 only).
- Low emergency trip system pressure trip (Unit 2 only).
- Low vacuum trip (Unit 2 only).
- Thrust bearing wear trip (Unit 2 only).
- Low shaft pump discharge pressure trip (Unit 2 only).
- Low bearing oil pressure trip (Unit 2 only).
- Steam seal pressure trouble (low steam seal pressure, high steam seal bypass pressure).
- Steam packing exhauster water level, high or low vacuum.
- High-low level in moisture separator drain tank.
- Turbine condenser vacuum low.
- Turbine exhaust hood temperature high.
- Shaft driven oil pump low pressure (Unit 1 only).

- Main turbine oil temperature Hi/Lo.
- Main turbine tripped (Unit 1 only).
- Turbine control miscellaneous alarm (Unit 1 only).
- Turbine control major alarm (Unit 1 only).
- Turbine control minor alarm (Unit 1 only).
- Vibration monitor trouble.

Local and control room indication of the following miscellaneous parameters are provided. Many of the parameters are available on the DEHC displays on Unit 1.

- Main steam throttle pressure.
- Steam seal supply header pressure.
- Steam seal condenser vacuum.
- Bearing oil header pressure.
- Bearing oil coolers coolant temperature.
- Electrohydraulic control fluid header pressure.
- Electrohydraulic control fluid temperature.
- Crossover pressure.
- Moisture separator drain tank level.
- First-stage pressure.
- High-pressure turbine exhaust pressure.
- Extraction steam pressure, each extraction point (via computer).
- Low-pressure turbine exhaust hood pressure.
- Exhaust hood temperature for each exhaust.

Instrumentation and controls are provided in the control room for the generator equipment as follows:

A. Generator supervisory instruments with sensors and/or transmitters mounted on the associated equipment, indicating or recording the following:

    1. Multiple generator stator winding temperatures (via computer). The detectors are built into the generator, fully protected from the cooling medium, and suitably distributed around the circumference in positions having the highest temperature.

2. Multiple stator winding cooling coil outlet temperature detectors.
3. Stator coolant inlet and discharge temperatures.
4. Hydrogen cooler inlet gas temperature (two detectors at each point).
5. Field ampere and voltage.
6. Hydrogen gas pressure.
7. Hydrogen gas purity.
8. Generator winding overtemperature.
9. Generator ampere, voltage, and power.

B. Alarms are provided for high stator, hydrogen, stator coil coolant, and field temperature. An alarm is provided from a core monitoring system to indicate a local core overheating condition.

TABLE 10.2.2-1

TURBINE-GENERATOR AND AUXILIARIES DESIGN PARAMETERS

Manufacturer	General Electric
Turbine	
Type	TC6F 38-in. LSB
No. of elements	1 high pressure; 3 low pressure
Last-stage bucket length (in.)	38
Operating speed (rpm)	1800
Condensing pressure (in. HgA)	3.50
Guaranteed turbine cycle heat rate (Btu/kWh)	10,115
Generator	
Guaranteed generator rated output (Kw)	1,156,622
Nameplate rating (Kw)	1,160,000
Power factor	0.90
Generator rating (Kva)	1,350,000
Voltage (V)	25,000
Hydrogen pressure (psig)	75
Moisture separator/reheater	
Type	Shell and tube
Number	4
Stages of reheating	1

TABLE 10.2.2-2

EVENTS FOLLOWING LOSS OF TURBINE LOAD WITH POSTULATED EQUIPMENT FAILURES

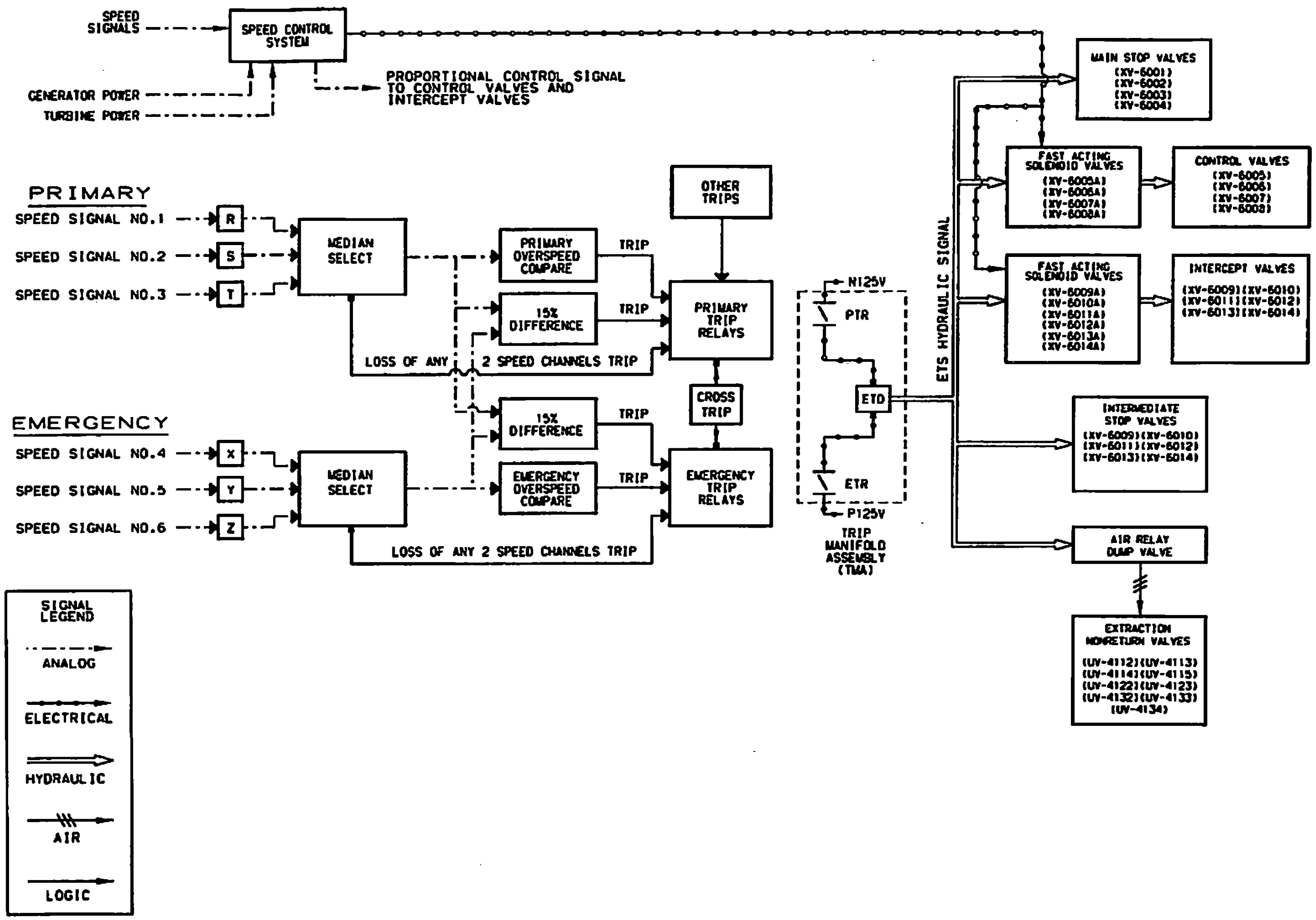
Unit 1 Only

Percent of Rated Speed (Approximate)	Event
100	Turbine is initially at valves wide open. Full load is lost. Speed begins to rise.
101	Control and intercept valves begin to close.
< 110	Peak transient speed with normally operating speed control system.
	Assume that power/load unbalance and speed control systems had failed prior to loss of load.
110	Primary (Electrical) overspeed trip signal is generated to depressurize the emergency trip header and cause all of the turbine valves to close.
110.5	Emergency (Electrical) overspeed trip signal is generated to depressurize the emergency trip header and cause all of the turbine valves to close.

Unit 2 Only

Percent of Rated Speed (Approximate)	Event
100	Turbine is initially at valves wide open. Full load is lost. Speed begins to rise.
101	Control and intercept valves begin to close.
108	Peak transient speed with normally operating speed control system.
	Assume that power/load unbalance and speed control systems had failed prior to loss of load.
110-111	Mechanical overspeed trip signals all valves to close. Operation of air relay dump valves releases spring closure mechanisms of extraction nonreturn valves.
111-112	Backup overspeed trip signals all valves to close.

Following the above sequence of events in either tube, the turbine will approach but not exceed 120 percent of rated speed.



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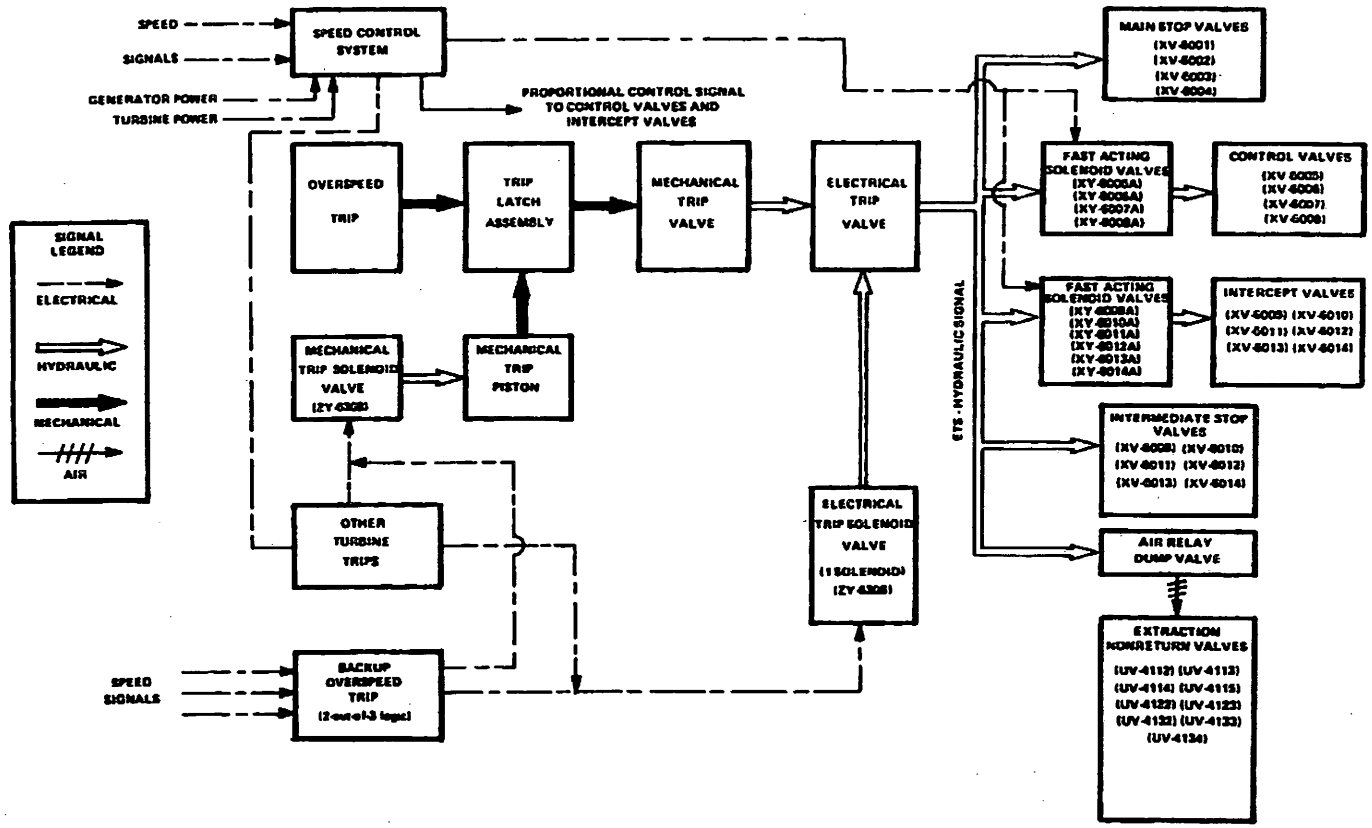
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

UNIT 1 TURBINE OVERSPEED PROTECTION SCHEMATIC

FIGURE 10.2.2–1a



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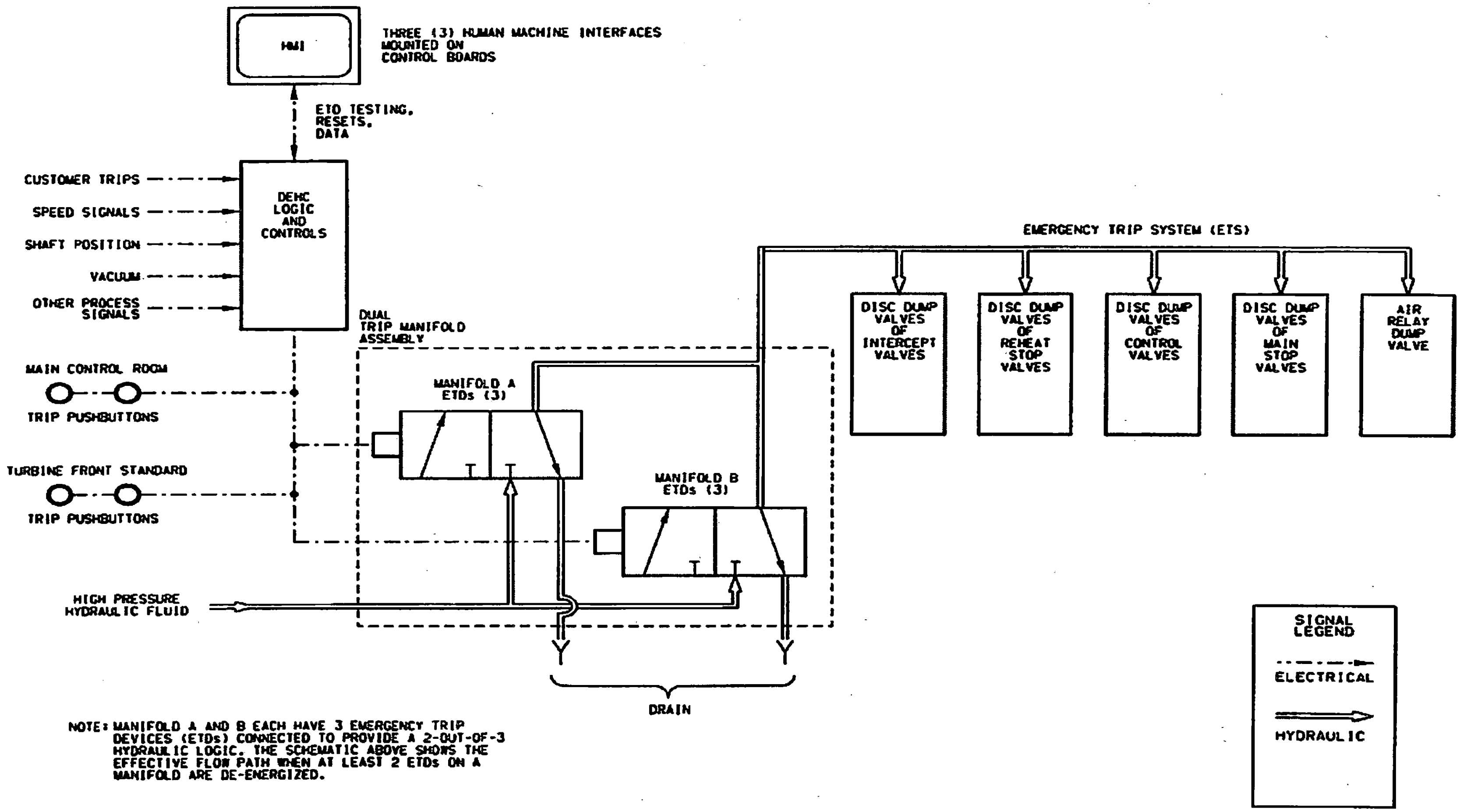
SOUTHERN COMPANY *Energy to Serve Your World®* — VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	UNIT 2 TURBINE OVERSPEED PROTECTION SCHEMATIC
	FIGURE 10.2.2–1b



NOTE: MANIFOLD A AND B EACH HAVE 3 EMERGENCY TRIP DEVICES (ETDs) CONNECTED TO PROVIDE A 2-OUT-OF-3 HYDRAULIC LOGIC. THE SCHEMATIC ABOVE SHOWS THE EFFECTIVE FLOW PATH WHEN AT LEAST 2 ETDs ON A MANIFOLD ARE DE-ENERGIZED.

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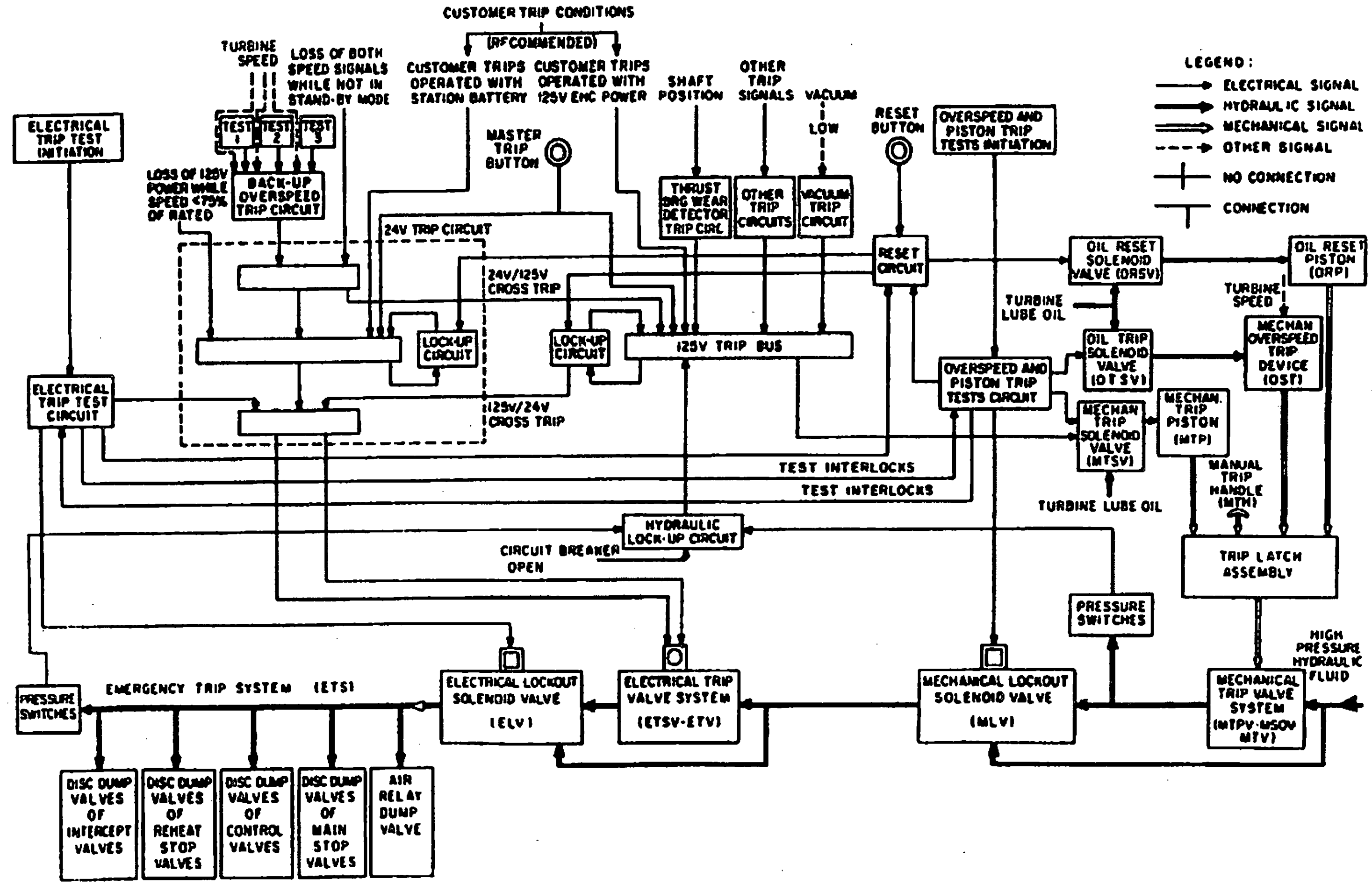
UNIT 1 AND UNIT 2

UNIT 1 PROTECTIVE SYSTEMS SIGNAL FLOW DIAGRAM

FIGURE 10.2.2–2a



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UNIT 1 AND UNIT 2

UNIT 2 PROTECTIVE SYSTEMS SIGNAL FLOW DIAGRAM

FIGURE 10.2.2–2b