DESIGN CONTROL DOCUMENT FOR THE US-APWR

Chapter 9
Auxiliary Systems

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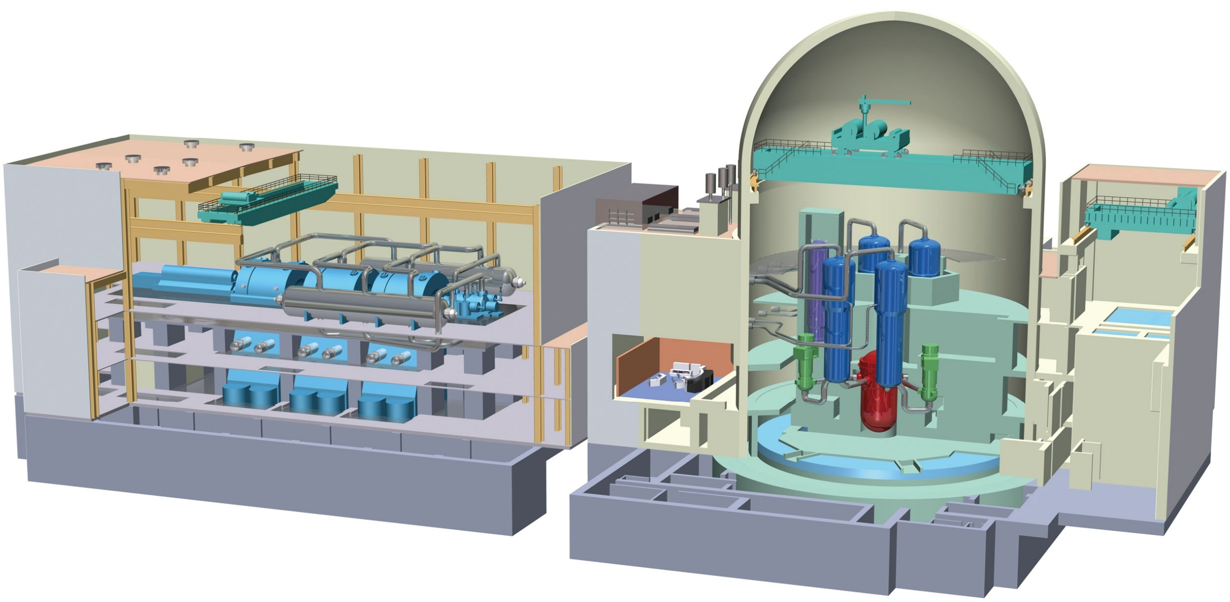

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ACRONYMS AND ABBREVIATIONS

A/B	auxiliary building
ac	alternating current
AC/B	access building
ALARA	as low as reasonably achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BTP	branch technical position
CCWS	component cooling water system
CFR	Code of Federal Regulations
CGS	compressed gas system
COL	Combined License
CRDM	control rod drive mechanism
CRE	control room envelope
CS/RHRS	containment spray/residual heat removal system
C/V	containment vessel
CVCS	chemical and volume control system
CWS	circulating water system
dc	direct current
DCD	Design Control Document
DWS	demineralized water system
ECCS	emergency core cooling system
EIA	Energy Information Administration
EPRI	Electric Power Research Institute
ESF	engineered safety features
ESW	essential service water
ESWS	Essential Service Water System
FCC	Federal Communications Commission
FMEA	failure mode and effects analysis
FOS	fuel oil storage and transfer system
FSAR	Final Safety Analysis Report
FTS	Fuel Transfer System
GDC	General Design Criteria
GTG	gas turbine generator
GWMS	gaseous waste management system

HEPA	high-efficiency particulate air
HID	high intensity discharge
I&C	instrumentation and control
IAS	instrument air system
ICIS	In-Core Instrumentation System
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
ITAAC	inspection, test, analysis, and acceptance criteria
LLHS	light load handling system
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LWMS	Liquid Waste Management System
MCR	Main Control Room
N/ELS	normal/emergency lighting system
NFPA	National Fire Protection Association
NRC	U.S. Nuclear Regulatory Commission
NUREG	NRC technical report designation (Nuclear Regulatory Commission)
OBE	operating-basis earthquake
OHLHS	Overhead Heavy Loading Handling System
PA/PL	public address system/page
PABX	private automatic branch telephone exchange
PASS	Post-accident Sampling System
PCCV	prestressed concrete containment vessel
PGSS	Primary Gaseous Sampling System
PLSS	Primary Liquid Sampling System
ppm	parts per million
PS/B	power source building
PSWS	Potable and Sanitary Water Storage System
R/B	Reactor Building
RCP	reactor coolant pit
RCPB	reactor coolant pressure boundary
RCS	Reactor Control System
RG	Regulatory Guide
RHR	residual heat removal
RHRS	Residual Heat Removal System
RMS	Plant Radiation Monitoring System
RWSAT	refueling water storage auxiliary tank
RWS	Refueling Water System
RWSP	refueling water storage pit

SBO	station blackout
SFP	spent fuel pit
SFPCS	Spent Fuel Pit Cooling and Purification System
SG	steam generator
SGBDS	Steam Generator Blowdown System
SGBDSS	Steam Generator Blowdown Sampling System
SSE	safe-shutdown earthquake
SSS	Secondary Sampling System
SPTS	sound powered telephone system
SRP	Standard Review Plan
SSAS	Station Service Air System
T/B	Turbine Building
TCS	Turbine Component Cooling Water System
TIA	Telecommunication Industry Association
TSC	technical support center
UHS	ultimate heat sink
UL	Underwriters Laboratories
UPS	uninterruptible power supply
US-APWR	United States – Advanced Pressure Water Reactor
VCT	volume control tank
WWS	waste water system

9.0 AUXILIARY SYSTEMS

9.1 Fuel Storage and Handling

9.1.1 Criticality Safety of New and Spent Fuel Storage

9.1.1.1 Design Bases

New and spent fuel storage facilities are located in the fuel handling area of the reactor building (R/B) which is designed to meet the seismic category I requirements of Regulatory Guide (RG) 1.29. New fuel is stored in low density racks installed in a dry new fuel storage pit. Spent fuel is stored in moderate density racks installed in a spent fuel pit (SFP) filled with borated water.

New fuel storage racks store 180 fuel assemblies, which corresponds to approximately one normal refueling batch plus an additional 50 locations. One normal refuel batch for the United States - Advanced Pressure Water Reactor (US-APWR) is one-half of a core. The center-to-center spacing between adjacent fuel assemblies is designed to be 16.9 in (as shown in Figure 9.1.1-1) to maintain subcriticality.

Spent fuel storage racks are capable to receive 900 fuel assemblies corresponding to the amount of spent fuel from ten years of operation at full power on a 24-month fuel cycle, plus one full-core discharge. The center-to-center spacing between adjacent fuel assemblies is designed to be 11.1 in (as shown in Figure 9.1.1-2) to maintain subcriticality.

The fuel storage and handling area is protected against natural phenomena. The robust concrete walls and ceiling surrounding the fuel storage and handling area is designed to withstand the loads and forces caused by earthquake, wind, tornados, floods and internal and external missiles.

New and spent fuel storage racks are designed to maintain the required degree of subcriticality, and are evaluated as seismic category I structures. Equipment potentially damaging the stored fuel is designed to be prevented from collapsing and falling down on the structures in the event of a safe-shutdown earthquake (SSE).

Criticality is precluded by adequate design of fuel handling and storage facilities and by administrative control procedures. The basic method of preventing criticality is the control of geometrically safe configurations. This is accomplished by providing geometrically safe spacing between assemblies to reduce neutron interaction. Credit for neutron absorber material is taken for the spent fuel storage rack and the spent fuel rack cells which contain neutron absorber materials as fixed neutron poison. The design maintains K-effective (K_{eff}) at less than 1.0 for all normal and credible abnormal conditions. To provide additional margin, partial credit for soluble boron is taken into account for the evaluation. The fuel maximum reactivity assumption, worst case moderator density, and tolerances and uncertainties of the fuel and racks, are considered in order to maximize this calculated K_{eff} for normal and credible abnormal conditions.

Criticality analyses are performed in accordance with the following acceptance criteria and relevant requirements: General Design Criterion (GDC) 62 (Ref. 9.1.7-1), 10 CFR 50.68 (Ref. 9.1.7-2), NRC guide (Ref. 9.1.7-3), ANSI/ANS-8.17-2004 (Ref. 9.1.7-4), and relevant Standard Review Plan.

The 10 CFR 50.68 (b) item (2) and (3) for new fuel storage rack and item (4) for spent fuel storage rack are applied as the criticality safety design criteria.

Criticality analysis codes are validated in accordance with ANSI/ANS-8.1-1998 (Ref. 9.1.7-5). The validation results are summarized in 4.3.3.2.

9.1.1.2 Facilities Description

The description of new and spent fuel facilities is presented in Subsections 9.1.2.2.

9.1.1.3 Safety Evaluation

Prevention of an inadvertent criticality is provided by adequate design of fuel handling and storage facilities and by administrative control procedures, considering the double contingency principle. The main methods for criticality control are (1) limiting the size of the array of fuel assemblies; and, (2) limiting the assembly neutron interaction by fixing the minimum separation and/or providing neutron poisons. In addition, rack cells are maintained in a safe geometry with no deformation in any design basis event. Flooding in the new fuel storage rack and boron dilution in the SFP water are prevented or minimized. Fuel mishandling is prevented by the fuel handling procedures.

For criticality safety design, the following analyses are performed to evaluate the degree of subcriticality and to verify compliance with the design criteria:

1. New fuel storage rack: The design is such that K_{eff} will not exceed 0.95 for flooded and 0.98 for optimum moderation conditions assuming single failure of sources of moderation and potential fire fighting activities.

2. Spent fuel storage rack: The minimum required soluble boron concentrations are evaluated for normal and accident conditions, pursuant to the criteria of 10 CFR 50.68 (b)(4). It is noted that there are no accident events that need to be taken into consideration. Boron dilution events, if any, can be concluded to have no effect on criticality safety.

Criticality analysis conditions are described below, including the design criteria, criticality analysis code with its validation for establishing code bias and bias uncertainty, and calculation model.

The guidance of RG 1.13 was considered in the design of the spent fuel storage facilities.

9.1.1.3.1 Design Criteria

The design criteria are pursuant to the 10 CFR 50.68 (b) item (2) and (3) for new fuel storage rack, and item (4) for spent fuel storage rack.

For new fuel storage racks, the maximum K_{eff} value including all biases and uncertainties must be less than or equal to 0.95 for the flooded condition with unborated water and less than or equal to 0.98 for optimum moderation, at a 95 percent probability, and 95 percent confidence level. Rack cells are assumed to be loaded with fuel of the maximum fuel assembly reactivity.

For spent fuel racks, the maximum K_{eff} value, including all biases and uncertainties, must be less than or equal to 0.95 with partial credit for soluble boron credit and less than 1.0 with full density unborated water, at a 95 percent probability, and 95 percent confidence level. Rack cells are assumed to be loaded with fuel of the maximum fuel assembly reactivity.

9.1.1.3.2 Analysis Code and Validation

Criticality safety analysis uses the three dimensional Monte Carlo code MCNP version 5.1 and the continuous-energy neutron library data ENDF/B-V, as summarized in Section 4.3.3.2.

A set of 120 critical benchmark experiments, from the "International Handbook of Evaluated Criticality Safety Benchmark Experiments" (Sep. 2006 Edition) (mentioned in Section 4.3.3.2), has been analyzed using the above code and library to demonstrate its applicability to criticality analysis and to establish the method bias and uncertainty.

The benchmark experiments cover a wide range of geometries, materials, and enrichments, and are considered adequate for qualifying methods for the analysis of storage facilities.

The analysis of the 120 critical experiments results in an average K_{eff} of 0.9971. Comparison with the measured values results in a method bias of 0.0029. The standard deviation for the set of experiments is 0.0030. For 120 samples and for a 95% probability at a 95% confidence level, the one-sided tolerance factor is 1.899.

9.1.1.3.3 Analysis Conditions

The following analysis conditions are assumed:

- Under the new fuel assumption, the fuel assembly is assumed to have a maximum enrichment of 5 weight percent which is pursuant to 10 CFR 50.68 (b) item (7).

- Fuel assembly fabrication tolerances are considered.

- Moderator is at the temperature (density) within the design limits that yields the largest reactivity. Full density of unborated water is assumed to be 62.43 lbm/ft^3. A moderator density range of 0 to 100 percent of full density is considered for the new fuel storage rack.

- Credit is taken for the neutron absorption in the rack structural material and neutron poison, such as boron. The new fuel storage rack cell consists of stainless steel and the spent fuel storage rack cell consists of stainless steel with boron. Borated stainless steel or proven boron absorbers such as Boral and Metamic are being considered. The steel plate thickness and boron content are conservatively set to a minimum. Performance effectiveness of the neutron absorbing materials in the racks is taken into consideration.

- The rack cell array is either assumed to be infinite in the lateral direction or is assumed to be surrounded by a conservatively chosen reflector, whichever is appropriate for the design:

  New fuel storage rack

- A finite rack cell array and the surrounding concrete reflectors are used in the calculations.

  Spent fuel storage rack

- Basically, an infinite rack array in the lateral direction is used in the calculations. However, in the sensitivity study for determining uncertainty, the analysis model depends on the type of tolerance.

- Uncertainties are appropriately determined either by using worst-case conditions or by performing sensitivity studies. The uncertainties considered are material composition, fabrication tolerances of the fuel and rack, and the fuel location within the rack cell, as follows:

  - Steel plate thickness and its boron content are directly set to minimum so as to maximize $K_{eff.}$
  - Other uncertainties are considered less effective and independent and are therefore statistically combined with the analysis code bias uncertainty.

The criticality evaluation is performed in accordance with Section 5.1 of ANSI/ANS-8.17-2004. Section 5 describes the following relationships.

$k_p \leq k_c - \Delta k_p - \Delta k_c - \Delta k_m$,

If the various uncertainties are independent,

$k_p \leq k_c - (\Delta k_p^2 + \Delta k_c^2)^{1/2} - \Delta k_m$.

where:

k_p	is the calculated K_{eff}
k_c	is the mean K_{eff} derived from the code validation
Δk_p	is an allowance; calculation, tolerances

Δk_c is a bias uncertainty derived from the code validation

Δk_m is an arbitrary margin to ensure the subcriticality of k_p.

9.1.1.3.4 Criticality analysis for new and spent fuel racks

Criticality analysis for new and spent fuel racks is provided in the technical report (Ref.9.1.7-6).

9.1.2 New and Spent Fuel Storage

9.1.2.1 Design Bases

Subsection 9.1.1.1 provides the design bases for the new and spent fuel storage facilities, including quantities of fuel to be stored and the configuration of the storage facilities.

Storage racks for new fuel are designed of austenitic stainless steel with consideration for corrosion resistance. New fuel pit criticality, including flooding with a low density worst case moderator, is discussed in detail in Subsection 9.1.1.

The new fuel is protected from a heavy load drop accident by the limitation of travel of the heavy load handling crane preventing it from traveling over the new fuel pit. The heavy load handling crane is described in detail in Subsection 9.1.5. Failure modes of the fuel handling machine are described in Subsection 9.1.4. Drain facilities are provided to prevent the new fuel pit from flooding. New fuel pit nuclear safety and criticality issues are discussed in Subsection 9.1.1.

The US-APWR equipment, seismic and ASME Code classifications are discussed in Section 3.2. The requirements of ASME Code Section III, Division I, Article NF3000 are used as the criteria for evaluation of stress analysis. The materials are procured in accordance with ASME Code Section III, Division I, Article NF2000.

The stress analysis of the new fuel rack satisfies all of the applicable provisions in NRC Regulatory Guide 1.124, Revision 1, for components design by the linear elastic method.

The SFP is designed to provide sufficient water levels to store the spent fuel and provide adequate shielding above the top of the fuel assembly being handled. For the SFP, a weir and gate are provided for transferring fuel between the SFP and the fuel transfer canal. No penetration or drain funnel is provided at the lower portion of the pit, and a siphon break system is provided in the pit water cooling suction pipe in order to prevent the loss of pit water. In addition, a SFP liner leak detection system and water level monitoring system are provided to detect leakage. Furthermore, radiation monitoring system is provided in the fuel storage and handling area. Cooling and water quality of the SFP is provided by the spent fuel pit cooling and purification system (SFPCS) which is described in Subsection 9.1.3.

The spent fuel is protected from a heavy load drop accident by the limitation of travel of the heavy load handling crane preventing it from traveling over the SFP. The heavy load handling crane is described in detail in Subsection 9.1.5. Failure modes of the fuel handling machine are described in Subsection 9.1.4.

The spent fuel rack is designed as a moderate density storage arrangement which provides adequate natural coolant circulation to remove the residual decay heat from spent fuel stored in the spent fuel rack, in combination with the SFPCS described in Subsection 9.1.3. SFP nuclear safety and criticality are discussed in Subsection 9.1.1.

Equipment classifications of the US-APWR are described in Section 3.2. Subsection 9.1.1 describes criticality analysis of new and spent fuel storage. The spent fuel area ventilation system is described in Subsection 9.4.3, and the radiation monitoring system and shielding is discussed in Section 12.3.

9.1.2.2 Facilities Description

9.1.2.2.1 New Fuel Storage

The approximately 18 feet deep dry, unlined reinforced concrete new fuel storage pit is designed to provide support for the new fuel storage rack. The new fuel storage pit is designed to maintain its structural integrity following a SSE and to perform its intended function following a postulated event such as fire, internal/external missiles, or pipe break. The walls surrounding the fuel handling area and new fuel storage pit protect the fuel from missiles generated inside the R/B. The fuel handling area does not contain a credible source of missiles. The R/B is a seismic category I structure and is described in Subsection 1.2.1.7.1. Subsection 3.8.4 describes the structural design of the new fuel storage area and Section 3.5 discusses missile sources and protection.

The structure of the new fuel storage pit supports the weight of the new fuel rack at the floor level. The new fuel storage rack, as shown in Figure 9.1.2-1, consists of individual vertical cells interconnected to each other at several elevations, and supported by the pit walls with a grid structure near the top and bottom elevations. The rack module is not anchored to the pit floor, but supported by lateral bracing attached to the pit wall. The new fuel storage pit is covered by solid lids and an access platform. For each cell, the lids are normally closed and prevent misloading of a new fuel assembly in the space between the cells. The access platform provides passage between racks for inspection of the new fuel. Both the lids and access platform are designed not to fall or collapse in the event of the SSE.

The new fuel storage pit is provided with a manually operated drain system, which is connected to the R/B sump to prevent the new fuel pit from being flooded by an unanticipated release of water. The design of the drain piping system prevents backflow into the new fuel pit storage area through the drain system.

Center-to-center spacing of the new fuel rack array is 16.9 inches as shown in Figure 9.1.2-1, which provides a minimum separation between adjacent fuel assemblies. This design is sufficient to maintain a subcritical array even in the event of the new fuel storage pit being flooded with unborated water, fire extinguishing aerosols or during any design basis event. Additionally the design of the rack is such that a fuel assembly cannot be inserted into a location other than a location designed to receive an assembly, and an assembly cannot be inserted into a full location. Surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel.

9.1.2.2.2 Spent fuel storage

The SFP is located within the seismic category I reactor building fuel handling area. The walls of the SFP are an integral part of the seismic category I reactor building structure. The facility is protected from the effects of natural phenomena such as earthquakes (Section 3.7.2), wind and tornados (Section 3.3), floods (Section 3.4), and external missiles (Section 3.5). The facility is designed to maintain its structural integrity following a SSE and to perform its intended function following a postulated event such as a fire. Refer to Subsection 1.2.4.1 for further discussions of the reactor building fuel handling area.

Penetrations for the drain and makeup lines are located to preclude the draining of the SFP due to a break in a line or failure of a pump to stop. The connection for the SFP pumps' suction is located below normal water level and above the level needed to provide sufficient water for shielding and for cooling of the fuel if the SFPCS is unavailable.

Pipes which discharge into the spent fuel pool include a siphon break between the normal water level and the level of the SFP pumps' suction connection.

The capability to makeup to the SFP is provided by a Quality Group C, seismic category I makeup system, as discussed in Subsection 9.1.3.

A liner leakage collection system is provided to collect possible leakage from liner plate welds on the pit walls and floor. The stainless steel liners are welded to the C-shape embedment in the pit walls and floors, and the embedment are interconnected and drain to a collection point which is monitored to determine whether leakage is occurring.

The refueling canal is connected on one side to the SFP. On its opposite side, the refueling canal connects to the spent fuel cask loading pit and to the fuel inspection pit. A weir and gate provide physical isolation of the refueling canal from each of the three pits. All the gates are normally closed and only opened as required.

The SFP is not connected to the equipment drain system (Subsection 9.3.3) to preclude unanticipated drainage.

SFP water level and temperature gauges, and an area radiation monitor in the fuel handling area are provided with alarms to the main control room (MCR).

Normal auxiliary building (A/B) HVAC system provides ventilation for the fuel handling area to maintain the atmospheric pressure in this area slightly negative with respect to outside the building.

The spent fuel racks are composed of individual vertical cells, and several tiers of grid structures which interconnect each cell to rigidly maintain the cell array configuration. The racks are supported laterally by the grid structure, and each rack module is vertically supported by 4 legs on the pit floor without anchoring. Additionally, each rack cell is vertically supported by 4 legs on the pit floor without anchoring. The grid structures are designed such that a fuel assembly cannot be inserted between the cells, or any other locations around the racks.

Moderate density racks containing neutron absorbing material are provided in the SFP. Center-to-center spacing of the rack array is 11.1 in to maintain the required degree of subcriticality as shown in Figure 9.1.2.2-1.

Materials used in rack construction are compatible with the SFP environment, and surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel. Structural materials are corrosion resistant and will not contaminate the fuel assemblies or pit environment. Borated stainless steel or proven boron absorbers such as Boral and Metamic are being considered for the neutron absorbing material. Venting of the neutron absorbing material, if necessary, will be considered in the detailed design of the spent fuel storage racks. A program for monitoring the effectiveness of neutron poison by incorporating basic tests assures that the subcriticality requirements of the stored fuel array are maintained. The surveillance program relies on representative coupon samples to monitor performance of the absorber material without disrupting the integrity of the storage system. The coupons are hung in the spent fuel pit so that they receive dosage comparable to the rack poison panels. The coupons are periodically removed from the pool and examined for their physical appearance. After establishing that the coupon is indeed intact, it may be returned to the pool.

The coupons used in the surveillance program are taken from the poison material production lot. The surveillance program uses a predetermined number of test coupons that simulate the actual in-service conditions of the poison material in the storage racks.

Each coupon is pre-characterized prior to insertion in the pool to provide reference initial values for comparison with measurements made after irradiation. Archive samples of the poison material will also be retained for later comparison with the irradiated coupons.

A “tree” of coupons is mounted in a designated storage cell, located such that the freshly discharged fuel will always be in the surrounding cells. Coupons would be “pulled” and analyzed at preset intervals, to be determined as part of the surveillance program development effort. Based on the results of the initial surveillance coupon measurements, the future schedule will be determined as necessary.

The COL applicant is to provide a program for monitoring the effectiveness of neutron present in the neutron absorbing panel. Design of the spent fuel storage facility is in accordance with Regulatory Guide 1.13.

The SFP is also provided with an array of 12 storage spaces for damaged fuel assembly containers. These racks do not contain the neutron absorber and the center-to-center spacing of this array is 24 inches.

No overhead crane, except the light load fuel handling machine, pass over the SFP. The fuel handling machine is designed to withstand seismic category I loads to preclude its fall or collapse due to an SSE.

9.1.2.2.3 New Fuel Storage Rack and Spent Fuel Storage Rack Design

The fuel storage facilities are designed to meet the guidelines of ANS 57.2 (Ref. 9.1.7-7) and ANS 57.3 (Ref. 9.1.7-9). Structural design and stress analysis of the new and spent fuel storage racks are evaluated in accordance with the seismic category I requirements of Regulatory Guide 1.29.

The dynamic and stress analyses are performed and described in the technical report (Ref. 9.1.7-8). Loads and load combinations considered in the structural design and stress analysis are shown in Table 9.1.2-1 based on SRP Section 3.8.4, Appendix D.

Uplift force analysis is also performed for new and spent fuel racks design, and described in the technical report (Ref. 9.1.7-8). Each rack is evaluated for withstanding a maximum uplift force of 4,400 pounds based on the lifting capacity of the suspension hoist and the fuel handling machine. Structural analysis is performed to verify that resultant stress in the critical part of the rack is within acceptable stress limits and deformation of the rack array is limited to maintain a subcritical array.

Fuel assembly drop analysis is performed for each fuel rack to maintain a subcritical array. Drop weight is determined from the maximum weight handled for each rack and drop height is determined from the higher value of 2 ft or the design height for handling fuel above each rack. The analysis is also provided in the technical report (Ref. 9.1.7-8)

9.1.2.3 Safety Evaluation

9.1.2.3.1 New Fuel Racks

The new fuel rack, being a seismic category I structure, is designed to withstand normal and postulated dead loads, live loads, loads resulting from thermal effects, and loads caused by the SSE event.

The new fuel rack is located in the new fuel storage pit, which has a cover to protect the new fuel from debris. No loads are required to be carried over the new fuel storage pit while the cover is in place. The cover is designed such that it will not fall and damage the fuel or fuel rack during a seismic event. Administrative controls are utilized when the cover is removed for new fuel transfer operations to limit the potential for dropped object damage.

The rack is also designed with adequate energy absorption capabilities to withstand the impact of a dropped fuel assembly from the maximum lift height of the suspension hoist of the spent fuel cask handling crane as discussed in Subsection 9.1.2.3.3. Handling equipment (spent fuel cask handling crane) capable of carrying loads heavier than fuel components is prevented from carrying heavy loads over the fuel storage area. The fuel storage rack can withstand an uplift force greater than or equal to the uplift capability of the suspension hoist of the spent fuel cask handling crane (4,400 lbs).

Materials used in rack construction are compatible with the storage pit environment, and surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel. Structural materials are corrosion resistant and will not contaminate the fuel assemblies or pit environment.

The new fuel assemblies are stored dry. The rack structure is designed to maintain a safe geometric array for normal and postulated accident conditions. The rack structure maintains the required degree of subcriticality for normal and postulated accident conditions such as flooding with pure water and worst case moderator density.

A discussion of the methodology used in the criticality analysis is provided in Subsection 9.1.1.

9.1.2.3.2 Spent Fuel Racks

The racks, being seismic category I structures (described in Section 3.2), are designed to withstand normal and postulated dead loads, live loads, loads resulting from thermal effects, and loads caused by the SSE event.

The racks are 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 as discussed in Subsection 9.1.2.3.3. Handling equipment such as the cask handling crane which is capable of carrying loads heavier than fuel components is prevented by design from carrying loads over the spent 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 (4,400 lbs).

Materials used in rack construction are compatible with the storage pool environment, and surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel. Structural materials are corrosion resistant and will not contaminate the fuel assemblies or pool environment. Neutron absorbing material used in the rack design has been qualified for the storage environment.

Design of the spent fuel storage facility is in accordance with Regulatory Guide 1.13. A discussion of the methodology used in the criticality analysis is provided in Subsection 9.1.1.

9.1.2.3.3 Fuel Assembly Drop Analysis

Each new and spent fuel rack are evaluated for withstanding a postulated drop of a fuel assembly and its associated handling tool to maintain a subcritical array assuming the maximum weight handled on each rack and the maximum drop height as described in Table 9.1.2-2.

9.1.3 Spent Fuel Pit Cooling and Purification System

The spent fuel pit cooling and purification system (SFPCS) performs the following functions:

- Cools the SFP water by removing the decay heat generated by spent fuel assemblies in the SFP

- Purifies and clarifies the SFP water
- Purifies the boric acid water for the refueling water storage pit (RWSP), the refueling cavity, and the refueling water storage auxiliary tank (RWSAT) in conjunction with the refueling water system (RWS)
- Transfers boric acid water to the fuel transfer canal, fuel inspection pit, and cask pit in conjunction with the refueling water system.
- Supplies boric acid water to the chemical and volume control system (CVCS) charging pump as an alternate water source.

9.1.3.1 Design Bases

The SFPCS is designed to meet the overall US-APWR plant design criteria. Specific design bases for the SFPCS are as follows:

- The cooling portion of the SFPCS is classified as Equipment class 3, and is safety-related and is designed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code III, Class 3, seismic category I standard (Ref.9.1.7-10).
- The system, using two SFPCS trains, is designed to maintain a SFP temperature below 120°F during a 1/2 core offload with a SFP heat load equivalent to 10 years of stored spent fuel and a newly offloaded 1/2 core. In case of a SFPCS single active failure, the system is designed to maintain a SFP temperature below 140°F.
- The system, using two SFPCS trains in conjunction with two trains of residual heat removal (RHR), is designed to maintain a SFP temperature below 120 °F during a full core offload with a SFP heat load equivalent to 10 years of stored spent fuel and a newly offloaded full core. In case of any single active failure, the system is designed to maintain a SFP temperature below 140°F.
- The system is designed to perform purification of the SFP water, the refueling cavity, the RWSAT, and the RWSP without causing any interruption in the refueling operation. The SFP water cleanliness requirement for normal operation is shown in Table 9.1.3-1. Standard and limit values are consistent with EPRI Primary Water Chemistry Guidelines (Ref. 9.1.7-11).
- The SFPCS provides heat removal for the pit water by circulating the pit water with the SFP pump, and removing decay heat with the SFP heat exchanger through the component cooling water system (CCWS).
- Protection of the cooling portion of the SFPCS against natural phenomena and internal and external missiles is addressed in the following sections in Chapter 3:
  - Section 3.3 – Wind and Tornado Loadings

- Section 3.4 – Water Level (Flood) Protection
- Section 3.5 – Missile Protection
- Section 3.7 – Seismic Design
- Section 3.11 – Environmental Qualification of Mechanical and Electrical Equipment

- The system piping is arranged such that the failure of any line cannot drain the SFP water level below a point 11 ft 1 in above the top of the stored fuel assemblies, which is the minimum SFP water level that provides adequate shielding.
- The SFPCS is designed to collect system leakage. A liner collection system to the R/B sump is provided to collect possible leakage from the SFP liner plate welds on the pit walls and floor. Leakage from the system piping is collected to the R/B sump. Details are described in DCD Subsection 9.1.2.2.
- Instrumentation is provided to indicate SFP water level and temperature.
- The SFP cooling portion is designed to limit the radiation dose at the surface of the SFP through the shielding provided by the SFP water.
- To continuously indicate the radiation levels inside the fuel handling area, an alarm signal warns the occupants of the fuel handling area of a deteriorated radio-logical condition. A description is presented in DCD Subsection 12.3.4.1.

9.1.3.2 System Description

A schematic of the SFPCS, which consists of two 100% cooling capacity trains, is shown in Figure 9.1.3-1. Each train includes one SFP pump, one SFP heat exchanger, one SFP filter, and one SFP demineralizer. In addition, each train of equipment has its own suction and discharge headers and includes the piping, valves, and instrumentation necessary for system operation.

Each SFPCS train contains a cooling portion for cooling of the SFP and a purification portion for purification of the boric acid water in the SFP, RWSP, RWSAT, and the refueling cavity. The SFPCS is designed such that either train can be operated to perform all the functions required of the system independently of the other train. Normally, one train is continuously cooling and purifying the SFP while the other train is available for water transfers, refueling water purification, or aligned as a backup to the operating train.

The suction line, which is protected by a strainer, is connected to the SFP at an elevation approximately 4 ft below the normal SFP water level. The return line contains a siphon breaker located near the surface of the water. These features are provided so that the pit cannot be gravity drained below a point 11 ft 1 in above the top of the spent fuel assemblies.

Cooling is performed for the SFP water by circulating the SFP water with the SFP pump and removing decay heat through the SFP heat exchanger. The heat removal is accomplished by taking high temperature water from the SFP, pumping it through a heat exchanger, transferring heat from the SFP water to the CCWS (discussed in Subsection 9.2.2), and returning the cooled water to the SFP.

Purification is performed for the SFP water by bypassing approximately 265 gpm from the cooling portion into the purification portion's demineralizer and filter, and removing solid materials and dissolved impurities. An isolation valve is provided to permit isolation from the cooling portion and allow purification of the SFP water in the refueling cavity, the RWSAT, or the RWSP in parallel to the SFP cooling operation.

When the heat load of the SFP is high (for full core offload), two RHRS trains (A and D), each comprising of one CS/RHRS pump and one CS/RHRS heat exchanger, perform SFP cooling in conjunction with the two SFP cooling trains.

The SFP is initially filled with water that has a boron concentration of approximately 4000 ppm; refer to Table 9.1.3-2 for the SFP design parameters. The boric acid water is supplied from the RWSP to the SFP through the refueling water recirculation pump, or directly supplied by connecting a temporary pipe to the boric acid water supply end connection located at the outlet of the boric acid blender in the chemical and volume control system.

The SFP condition resulting from the unlikely failure of the spent fuel cooling portion would be a rise in the SFP water temperature followed by an increase in evaporative losses. Minor leakage from SFPCS piping, components, or SFP liner will also decrease the SFP water level. Makeup to the SFP is manually started upon receipt of a low-level alarm signal from the SFP to the MCR. These losses could be made up from the following water sources.

The safety-related boric acid water makeup line is provided from the RWSP to the SFP. This tank contains 4000 ppm boric acid, thereby maintaining the initial boric acid water concentration in the SFP. The same concentration will be maintained during normal operations. The RWSP, as a primary water source of water to the SFP, is seismic category I. The makeup line from the RWSP to the SFP is seismic category I, ASME Code section III Class 3.

As a backup of the safety-related makeup line, another makeup line is also provided from the emergency feedwater (EFW) pit to the SFP. The EFW pit, as a backup water source of the RWSP, is also seismic category I. The backup line from the EFW pit to the SFP is non-seismic.

A provision is also made to add makeup water to the SFP from the demineralized water system (DWS). The water source is a non-seismic demineralized water storage tank, and the makeup line from the water source to the SFP is also non-seismic.

The SFP is isolated from the fuel transfer canal (integrated structure with the fuel inspection pit) by a gate. This gate is provided to allow the fuel transfer canal to be drained during maintenance of the fuel transfer equipment. The fuel transfer canal is drained by transferring the water to the SFP with a fuel transfer canal pump. To maintain adequate water level in the SFP, excess pit water is discharged into the RWSP or the RWSAT with the SFP pump through the system purification loop.

A safety-related makeup source of boric acid water is provided from the RWSP supply line. Borated refueling water is pumped into the discharge line of the spent fuel cooling portion.

A portion of the SFP water discharged by the SFP pump is diverted through the demineralizers and filters in the purification portion of the system and returned to the SFP. The demineralizers and filters remove particulate and ionic impurities from the SFP water.

During normal decay heat removal operation, one train can be used to purify the refueling cavity, the RWSP, and the RWSAT. This is accomplished by isolating the cooling portion using an isolation valve provided in the purification portion piping.

The SFP serves as a safety-related alternate water source for reactor coolant pump seal injection.

The SFPCS cooling portions are safety-related, seismic category I. The SFPCS conforms to the guidelines of RG 1.13, “Spent Fuel Storage Facility Design Basis” (Ref. 9.1.7-12), which pertains to the cooling and purification of the spent fuel storage facility. The SFPCS cooling portion (i.e., piping, pumps, valves, and heat exchangers) is designed to remain functional during and following a safe shutdown earthquake. Each cooling portion is designed to service the SFP at the temperatures and heat loads described in Subsection 9.1.3.1.2. The system’s performance conforms to the requirements of GDC 2, 4, 61, and 63.

The cooling and purification flow paths are shown in Figure 9.1.3-1 and Figure 9.1.3-2, respectively.

The purification portion of the SFPCS, i.e., piping, demineralizers, and filters, are non-safety related.

The equipment classification for the SFPCS is provided in Chapter 3, Section 3.2.

9.1.3.2.1 Component Description

The SFPCS component design parameters are provided in Table 9.1.3-3.

9.1.3.2.1.1 Spent Fuel Pit

The SFP is described in Subsection 9.1.2.

9.1.3.2.1.2 Spent Fuel Pit Pumps

Two identical pumps are installed in parallel in the SFPCS. Each pump is sized to circulate the pit water through the SFP heat exchanger in conjunction with the demineralizer and the filter to perform purification and cooling of the SFP.

The SFP pumps are horizontal centrifugal type, and the wetted area in contact with the fuel pit water is of stainless steel material.

9.1.3.2.1.3 Spent Fuel Pit Heat Exchangers

Two SFP heat exchangers are provided to remove decay heat from the SFP, as specified in Subsection 9.1.3.2.2.2. These heat exchangers are plate-type heat exchangers constructed of austenitic stainless steel. The SFP water circulates through one side of the heat exchanger while the CCW circulates through the other side.

9.1.3.2.1.4 Spent Fuel Pit Filters

Two vertical, cylindrical cartridge-type SFP filters are provided in the purification portion of the SFPCS. Each cartridge filter is designed for a flow rate of approximately 265 gpm. The filter is used to improve the pit water clarity by removing solid particles. The filter assembly is constructed of austenitic stainless steel with disposable filter cartridges.

9.1.3.2.1.5 Spent Fuel Pit Demineralizers

Two vertical, cylindrical demineralizers are provided, and each demineralizer is designed for a flow rate of approximately 265 gpm. The demineralizer removes ionic impurities from the SFP water before being circulated back to the SFP. The vessels are constructed of austenitic stainless steel.

9.1.3.2.1.6 Spent Fuel Pit Strainers

Spent fuel pit strainers are provided at the intake of the SFP to remove relatively large size solid materials for SFP and CS/RHR pump protection. The strainer is made of stainless steel.

9.1.3.2.1.7 Valves

Manual valves are used to isolate the cooling portion of the SFPCS from the purification portion. Manual valves are used to isolate components that could develop leaks or failures. Manual throttle valves are provided for flow control. Valves in contact with SFP water are made of stainless steel.

9.1.3.2.1.8 Piping

All piping in contact with SFP water is made of stainless steel. The piping is welded, except for flanged connections for the pumps and heat exchangers.

9.1.3.2.2 System Operation

9.1.3.2.2.1 Plant Startup, Normal Operation, and Shutdown

During plant startup, normal plant operation, and shutdown, one SFPCS train is normally operating. The operating train is aligned to provide SFP cooling and purification. The other train is available to perform the other system functions, such as RWSP or RWSAT purification and water transfers. Upon loss of the operating SFPCS train, operation is to be restored on or before actuation of the pit water high temperature alarm. Prior to restoring the operation, an operator is required to verify that the CCWS is supplying water to the SFP heat exchanger.

The SFP water chemistry can be checked at local sample points. If purification is required, a portion of the system flow is diverted through the SFP demineralizer and filter and returned to the pit. A local sample connection is provided in the SFP demineralizer inlet and outlet lines to check the boron concentration, radioactive concentration, and the efficiency of the filter and the demineralizer.

9.1.3.2.2.2 Refueling

The SFPCS has its maximum duty during refueling operations when the decay heat from the spent fuel is highest. The SFPCS standby train is normally placed in service during refueling operations and continues in operation as long as required to maintain temperature and water purity within the prescribed limits.

Two purification trains are constantly operating in tandem with two cooling trains for purification and cooling of the SFP during normal operations. One purification train is isolated from the cooling portion to utilize it for purification of the refueling cavity at the early stage of the refueling operation. From reactor disassembly to fuel offload initiation, the two SFPCS cooling trains are in service, with one SFPCS purification train utilized for refueling cavity purification. After the completion of the refueling operation, the said purification train is switched to perform SFP water purification, if deemed necessary.

Prior to refueling, the SFP water is checked to verify that its boron concentration is equivalent to that of the RWSP.

Half Core Offload

The two SFPCS trains are designed with the capacity to remove spent fuel decay heat generated from the accumulation of previously offloaded cores (spent fuel of two and one-half cores for 10-year plant operation) with the most recently irradiated 1/2 core completely transferred into the SFP at 120 hours after shutdown. With a total of three cores stored in the pit, the SFPCS is designed to maintain the pit water temperature below 120°F with two trains operating. In case of a single active component failure (e.g., one SFP pump or CCWS pump failure), the SFPCS is designed to maintain pit water temperature below 140°F by utilizing one SFP pump and one SFP heat exchanger.

The decay heat, which is generated from the accumulation of 10 years of spent fuel with the most recently irradiated half-core having just been placed in the pool, beginning about 120 hours after reactor shutdown is 50.8 x 10^6 BTU/hr.

Full Core Offload

In case of full core offloads, the SFP is aligned to RHRS trains A and D; each train consisting of one CS/RHR pump and one CS/RHR heat exchanger. RHRS trains A and D and the two SFP cooling trains maintain the pit water temperature below 120°F with spent fuel decay heat generated from the accumulation of previously offloaded cores (spent fuel of two and one-half cores for 10-years plant operation) and the offloaded full core completely transferred to the SFP at 120 hours after shutdown. The SFPCS is designed to maintain the pit water temperature below 140°F assuming a single active component failure (e.g., of the SFP pump, CS/RHRS pump, or CCWS pump).

The decay heat, which is generated from the accumulation of 10 years of spent fuel with the newest irradiated full core having just been placed in the pool, beginning about 120 hours after reactor shutdown is 80.5 x 10^6 BTU/hr.

Prior to the refueling operation, the SFP water is checked to verify that if its boron concentration is equivalent to that of the RWSP.

9.1.3.2.2.3 Spent Fuel Pit Purification

Each purification portion capacity is designed to perform purification of the boric acid water in the SFP, the refueling cavity, the RWSAT, and the RWSP without causing any interruption to the refueling operation. The system's demineralizers and filters provide adequate purification to achieve the following:

- Minimize SFP surface dose rate during normal fuel handling operations and anticipated accident conditions in the spent fuel storage area so as to permit access to plant personnel.
- Maintain optical clarity of the SFP water

The SFPCS clarification capability is sufficient to permit the necessary operations that must be conducted in the SFP area. The SFPCS is designed to perform its purification function in accordance with the following additional criteria:

- Each purification portion contains a filter vessel with a disposable cartridge filter and a mixed bed demineralizer downstream of the filter. The purification subsystem is designed for a flow rate of 265 gpm. This design flow rate is sufficient to maintain the specified water chemistry.
- Local sample lines are provided in the SFP demineralizer inlet and filter outlet lines. Sampling and analysis of SFP water for gross activity and particulate concentration are conducted when the SFPCS is in continuous operation.
- When the SFP filter differential pressure exceeds the set value, a high differential pressure alarm indicates a clogged filter that should be replaced.

The SFP purification system capability is such that the occupational radiation exposure is minimized to support as-low-as-reasonably achievable (ALARA) goals.

9.1.3.3 Safety Evaluation

The SFPCS performs no emergency functions during an accident.

9.1.3.3.1 Spent Fuel Pit Cooling

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 SFP pump or loss of cooling capability of a SFP heat exchanger, the second cooling train provides a backup capability that ensures continued cooling of the SFP.

During a loss of offsite power (LOOP), the emergency power sources supply power to the SFP pumps so that the SFP cooling function is maintained.

In the case of a SFPCS single failure, one SFP pump and one heat exchanger in service will maintain a SFP temperature below 140°F for a 1/2 core offload.

For a full core offload with a single active failure, the pit temperature is maintained below 140°F with one train of SFP cooling and two RHRS trains in operation, or two trains of SFP cooling and one RHRS train in operation.

9.1.3.3.2 Spent Fuel Pit Water Supply

The safety-related boric acid water makeup line is provided from the RWSP to the SFP due to the evaporative loss of the SFP water or minor leakage from the SFPCS. The RWSP, as a primary water source of SFP, is seismic category I. The makeup line from the RWSP to the SFP is seismic category I, ASME Code section III Class 3.

As a backup of the safety-related makeup, a makeup line is also provided from the emergency feedwater (EFW) pit to the SFP. The EFW pit, as a back up water source of the RWSP, is also seismic category I. The backup line from EFW pit to SFP is non-seismic.

9.1.3.3.3 Spent Fuel Pit Dewatering

The most serious failure of the SFPCS would be a complete loss of cooling water in the storage pit. In accordance with RG 1.13 (Ref. 9.1.7-12), the design of the SFPCS limits the loss of cooling water that would result from a malfunction or failure of system components so that the spent fuel does not become uncovered.

The SFP cooling pump suction connections are located near the normal water level. The return line contains a siphon breaker. These features are provided so that the pit cannot be gravity drained below a point approximately 24 ft above the top of the spent fuel assemblies, thus maintaining the minimum SFP water level for radiation shielding of 11 ft 1 in.

9.1.3.3.4 Water Quality

The purification loop removes fission products and other contaminants from the water to maintain occupational radiation exposure ALARA.

9.1.3.3.5 Natural Phenomena and Missiles

The SFPCS provides protection of essential components against natural phenomena and internal and external missiles.

9.1.3.4 Inspection and Testing Requirements

The SFPCS is hydrostatically tested prior to initial startup. Preoperational testing is described in Chapter 14, Section 14.2. System performance during normal operation is verified by monitoring system pressures, temperatures, levels, and flows.

Inservice inspection of pumps, valves, and piping is performed in accordance with the requirements of ASME Section XI, as discussed in Chapter 6, Section 6.6.

Inservice testing of active pumps and valves is performed to assure operational readiness as described in Chapter 3, Subsection 3.9.6.

Sampling of the fuel pit water for gross activity and particulate matter concentration is conducted periodically.

9.1.3.5 Instrumentation Requirements

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

9.1.3.5.1 Temperature

Local instrumentation is provided to measure the temperature of the water in the SFP and to give an indication, as well as an alarm, in the MCR when normal temperatures are exceeded.

Local instrumentation is provided at the outlet of the SFP heat exchangers to give an indication of the temperature of the SFP water as it leaves the heat exchanger and to monitor the SFP heat exchanger performance.

9.1.3.5.2 Pressure

Instrumentation is provided to measure and give local indication of the pressure in the SFP pump suction and discharge lines. These instruments are utilized to assess pump performance.

A local differential pressure indicator is installed at each SFP filter to measure the pressure differential between filter outlet and inlet. If the filter differential pressure exceeds the set value, a high differential pressure is alarmed in the MCR.

A local differential pressure indicator is installed at each SFP demineralizer to measure the differential pressure between outlet and inlet of the demineralizer. If the demineralizer differential pressure exceeds the set value, a high differential pressure is alarmed in the MCR.

9.1.3.5.3 Flow

Instrumentation is provided to measure and give local indication of the SFP cooling portion flow upstream of the SFP heat exchangers. This instrument is utilized to check if the flow rate of the cooling water returning to the SFP through the SFP heat exchanger is maintained at the specified value.

A local flow indicator is installed at the outlet of each purification line to measure the purification flow.

9.1.3.5.4 Water Level

A liquid level transmitter is installed in the SFP to monitor water level. The water level indication, high water level alarm, and low water level alarm are relayed to the MCR.

9.1.4 Light Load Handling System (Related to Refueling)

The light load handling system (LLHS) consists of mechanical and electrical equipment and building structural features related to refueling operations. This encompasses the fuel handling cycle from receipt of new fuel through loading of spent fuel into the spent fuel cask.

9.1.4.1 Design Bases

The LLHS is designed to meet requirements of 10CFR50, Appendix A, specifically, General Design Criterion: GDC 2, 5, 61, and 62. The GDC are satisfied as follows:

- The LLHS is designed as seismic category I and meets the equipment class quality requirements of the US-APWR as specified in Section 3.2.

- The LLHS in the US-APWR is not shared between multiple units.

- This system is designed with the following features:

  - Ability to perform periodic inspections and testing of components important to safety through appropriate configuration of the LLHS and, where necessary, the ability to isolate the equipment from shield waters;

  - Radiation shielding is provided either by the structural features such as concrete walls, floors, and/or barriers of the refueling area of the R/B or by maintaining a minimum coverage of irradiated fuel with water which has an appropriate concentration of boric acid.

- In accordance with ANSI/ANS57.1-1992, Design Requirements For Light Water Reactor Fuel Handling Systems, (Ref. 9.1.7-13) specifically:

  - The functional geometric configuration of the fuel handling equipment and related components provides safe, efficient, and reliable fuel handling operations.

- Mechanical or electrical safety devices are designed into the system to limit operations which may damage fuel assemblies, conditions which could pose a radiation hazard, or conditions which could result in inadvertent radiation exposure risk to personnel.

- The LLHS has been designed to inhibit accidental criticality during fuel handling based on the maximum reactivity of the fuel to be cycled through an US-APWR.

- The LLHS components involved in grappling, latching, translating, rotating, supporting, or hoisting fuel assemblies are designed to assure there will not be a structural failure of any part of the handling equipment, which would result in dropping or damaging a fuel assembly. These components are designated as seismic category I and designed in accordance with Section 3.7 and 3.9.

- The LLHS is designed to operate efficiently and reliably. Efficiency is achieved through simple, direct operation of the LLHS.

- The LLHS is designed for a 60 year plant life, with components which are radiation damage resistant and/or with a defined life cycle and readily maintainable or replaceable, and designed to be decontaminated.

- The LLHS is designed and installed to permit testing and maintenance requirements detailed in Subsection 9.1.4.4.

- Personnel safety is addressed in accordance with Title 29, “Labor”, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards for General Industry (Ref.9.1.7-14).

- Radiation exposure is addressed in accordance with Title 10, “Energy”, CFR Part 20, Standards for Protection Against Radiation (Ref.9.1.7-15).

• The portion of the transfer tube, described below, that is part of the pre-stressed concrete containment vessel (PCCV), is designed to fulfill the requirements of Rules for Construction of Nuclear Facility Components, Division 2, Concrete Containments, Section III, American Society of Mechanical Engineers, 2001 Edition through the 2003 Addenda (hereafter referred to as ASME Code) (Ref.9.1.7-16) in accordance with Section 3.8

9.1.4.2 System Description

The LLHS encompasses the equipment and structures involved in the handling of fuel, new, irradiated, and spent, for the US-APWR.

The LLHS equipment involved includes the new fuel elevator, fuel handling machine, refueling machine, the suspension hoist of the spent fuel cask handling crane, fuel transfer system, and various fuel handling tools.

The building structures associated with the LLHS are the refueling cavity located in the containment vessel (C/V), the SFP, the new fuel storage pit, the fuel inspection pit, the spent fuel cask pit, the spent fuel cask wash-down pit, the refueling canal and the receiving area of the R/B fuel handling area. Also included is the fuel transfer tube which penetrates from the refueling canal in the fuel handling area to the refueling cavity in the C/V enabling the transfer of fuel assemblies between the two areas.

The R/B including the fuel handling area and the C/V are designed as seismic category I in accordance with the requirements of Section 3.8. Additionally, the buildings are designed to contain radioactive materials. The design requirements for the C/V are specified in Subsection 3.8.1. The fuel handling area design requirements are specified in Subsection 3.8.4.

Fuel handling is governed by this section of the DCD. Plan view and section view of the LLHS are presented in Figures 9.1.4-1 and 9.1.4-2.

9.1.4.2.1 Component Description

9.1.4.2.1.1 Refueling Machine

The refueling machine transport fuel assemblies between the fuel transfer system (FTS) and the reactor core within the confines of the refueling cavity. The refueling machine consists of a bridge with two motorized end trucks which traverse the length of the refueling cavity. Mounted atop the bridge, is a vertical mast tube assembly which traverses the bridge perpendicular to the direction of the motorized end trucks. This provides an arrangement wherein the mast can be precisely indexed over a fuel assembly in the reactor core. The mast tube assembly contains a gripper mechanism which is lowered to latch onto a fuel assembly. The fuel assembly is then raised into the mast tube to protect the fuel assembly during transport. The mast tube also contains a sipping system used to detect leaking fuel.

The refueling machine also has an auxiliary hoist which is used in the control rod drive shaft unlatching operation.

Electrical interlocks, limit switches, and mechanical stops are utilized to prevent damage to a fuel assembly to assure appropriate radiation shielding depth below the water level in the refueling cavity, and to monitor the fuel assembly load for imparted loads greater than the nominal weight of the fuel assembly. Imparted loads could result from unidentified movement restrictions such as binding of the fuel assembly in the core.

9.1.4.2.1.2 Fuel Handling Machine

The fuel handling machine transport fuel assemblies between the fuel elevator and the SFP within the confines of the refueling area pits and fuel transfer canal. The fuel handling machine consists of a bridge with two motorized end trucks which traverse the length of the refueling cavity. Mounted atop the bridge, is a vertical mast tube assembly which traverses the bridge perpendicular to the direction of the motorized end trucks. This provides an arrangement wherein the mast can be precisely indexed over a fuel assembly in the spent fuel rack. The mast tube assembly contains a gripper mechanism which is lowered to latch onto a fuel assembly which is then raised into the mast tube to protect the fuel assembly during transport.

The auxiliary hoist has a load limiting device to prevent the hoist from exerting excessive force. The auxiliary hoist has the load capacity to lift a fuel assembly, but is configured to preclude latching on to fuel assembly.

As for electrical interlock, limit switches, and mechanical stops, which is same function for refueling machine, are also provided for fuel handling machine.

9.1.4.2.1.3 Suspension Hoist on the Spent Fuel Cask Handling Crane

The suspension hoist on the spent fuel cask handling crane (Subsection 9.1.5) has a load limit interlock. This interlock precludes the suspension hoist from lifting a load greater than its rated capacity. In addition, administrative procedure defined in Subsection 13.5.1 is to be developed to preclude the suspension hoist from being utilized for activities other than for new fuel assembly handling.

9.1.4.2.1.4 New Fuel Elevator

The new fuel elevator, located in the fuel inspection pit, accepts new fuel assemblies which have been removed from the new fuel assembly container. The new fuel elevator is used to lower the new fuel assembly for access by the fuel handling machine. The elevator winch has a load sensing device which prevents a fuel assembly from being raised.

9.1.4.2.1.5 Fuel Transfer System

The fuel transfer system consists of a rail mounted transfer container car which transports the fuel assembly between the refueling area of the R/B and the refueling cavity in the C/V. The transfer car has an integral up ender mechanism which facilitates translating the fuel assembly from the vertical position in the refueling area or the C/V to a horizontal position for transport through the transfer tube. Once in the C/V, the transfer car is then translated into the vertical position again. The up ender on each side is manually actuated to raise and lower the transfer car. As back up to the normal drive mechanism, the transfer car is provided with a wire rope to facilitate movement should the drive mechanism fail.

9.1.4.2.1.6 Fuel Transfer Tube

Transfer of fuel assemblies between the R/B refueling area and the refueling cavity of the C/V is through a mechanical pipe penetration identified as the fuel transfer tube. The fuel transfer tube has a gate valve on the refueling area end of the transfer tube and a blind flange on the C/V end. The blind flange assures the containment pressure boundary integrity outside of refueling operations.

9.1.4.2.1.7 Spent Fuel Assembly Handling Tool

The spent fuel assembly handling tool handles new and irradiated fuel assemblies at the appropriate depth below the shielding water. The tool is suspended from the hoist of the fuel handling machine. It has four latching fingers to grip the fuel assembly top nozzle in an interlocking fashion. When the fingers are latched, a locking pin is inserted into the operating handle, thereby preventing the fingers from being unlatched inadvertently during fuel handling operations.

9.1.4.2.1.8 New Fuel Assembly Handling Tool

The new fuel assembly handling tool is used to transfer new fuel from the shipping container to the new fuel rack or new fuel elevator. The tool is used in conjunction with the suspension hoist on the spent fuel cask handling crane. It has four latching fingers to grip the fuel assembly top nozzle in an interlocking fashion. When the fingers are latched, a locking pin is inserted into the operating handle, thereby preventing the fingers from being unlatched inadvertently during fuel handling operations.

9.1.4.2.1.9 Rod Control Cluster (RCC) Handling Tool

The rod control cluster handling tool is used to remove a rod control cluster from one fuel assembly and insert it into another fuel assembly. This operation is performed within the SFP. Once the spent fuel machine is positioned over the fuel assembly of interest, the handling tool is lowered onto the fuel assembly. The latching mechanism is lowered to the rod control cluster, the rod control cluster is latched, and then the latching mechanism and rod control cluster are pulled up into the guide tube. The tool is then raised, the crane is repositioned over the target fuel assembly, and the tool is lowered onto the fuel assembly. The latching mechanism and the rod control cluster are then lowered through the guide tube until the rod control cluster is resting in the target fuel assembly. The rod control cluster is then unlatched and the tool is lifted from the target fuel assembly.

9.1.4.2.1.10 Thimble Plug Handling Tool

The thimble plug handling tool is utilized to remove and transfer a thimble plug from one fuel assembly to another. This operation is performed from the bridge of the fuel handling machine by hand.

9.1.4.2.1.11 Burnable Poison Rod Assembly Handling Tool

The burnable poison rod assembly handling tool is used to transfer a burnable poison rod assembly between fuel assemblies and/or burnable poison rod assembly storage fixture.

9.1.4.2.1.12 Control Rod Drive Shaft Handling Tool

The control rod drive shaft handling tool is used to latch and unlatch the control rod drive shaft from the rod control cluster. It is suspended from the auxiliary hoist of the refueling machine.

9.1.4.2.2 Fuel Handling Operations

9.1.4.2.2.1 New Fuel Receipt

New fuel is shipped to the site in a new fuel shipping container. The new fuel shipping container is received into the R/B by way of the refueling area truck access bay at elevation 3 ft - 7 in.

The new fuel shipping container is raised from the truck using the suspension hoist on the spent fuel cask handling crane through the access hatch in the refueling area floors at elevations 25 ft - 3 in and 76 ft - 5 in. Elevation 76 ft - 5 in is the operating level of the refueling area.

The new fuel container is set on the operating floor. Using the suspension hoist on the spent fuel cask handling crane, new fuel is removed from the shipping container and stored in the new fuel storage pit. During this operation, the new fuel assemblies are suspended using a short fuel handling tool to permit surface inspection prior to being placed into a new fuel storage rack.

General arrangement figures for the US-APWR are presented in Subsection 1.2.1.7.

9.1.4.2.2.2 Reactor Refueling Operations

Reactor refueling operations are divided into four phases: preparation, reactor disassembly, fuel handling, and reactor assembly. Refueling operations are outlined below and performed in accordance with operating procedures defined in Subsection 13.5.2.

- Phase I - Preparation

  The reactor is placed into cold shutdown mode as defined in the Technical Specifications, Chapter 16. The refueling water and reactor coolant are borated to assure the core remains approximately 5% below criticality during refueling operations based on the maximum reactivity of the fuel to be cycled through an US-APWR.

  The water level in the refueling cavity and the spent fuel handling pit and interconnected pits is maintained at an elevation sufficient to keep radiation levels within personnel access limits when the fuel assemblies are being removed and transported from the core to the spent fuel racks in accordance with RG 1.13. The radiation and environmental levels are monitored to assure levels do not exceed personnel access limits.

  Upon achieving safe radiation and environmental conditions, the LLHS system is tested and the refueling machine overload is verified to be within operable. This is accomplished by using the mockup fuel assembly nozzle attached to the floor of the refueling cavity.

- Phase II – Reactor Disassembly

  The reactor vessel head assembly is prepared for refueling by disconnecting electrical cabling, seismic support tie rods, in-core instrumentation, and cooling duct work. The refueling cavity is prepared by:

  - Closing the reactor cavity drain line
  - Removing the blind flange of the fuel transfer tube
  - Verifying functionality of the reactor cavity lighting
  - Verifying tools are in place and functional
  - Verifying the FTS is functional

After the reactor head bolting is de-tensioned, but prior to lifting the head and overflowing from the reactor vessel, the lower levels of the refueling cavity are flooded using a fill line which enters through the refueling cavity floor. This is done at flow rate which will minimize scattering of activated dust.

When the lower levels of the refueling cavity are flooded, the reactor vessel head assembly is unseated and raised 2.5 ft above the flange. At this point, disconnection of the control drive shafts is verified. Upon verification of disconnection, the reactor vessel head assembly is raised while maintaining a maximum of one foot clearance above the refueling cavity water to provide shielding.

When the water level reaches the normal refueling water level, the reactor vessel head assembly is transported to the lay down area. Concurrently, refueling cavity lighting and the refueling cavity water filtration system is placed in service.

The upper reactor internals with the in-core instrumentation system (ICIS) thimble assemblies is lifted using the lift rig with a load cell in the lift rigging. The load cell monitors the force applied when lifting the internals and provides indication of interference with other core structures and fuel assemblies. When the upper reactor internals is clear of the reactor vessel, it is transferred to its storage location in the lower refueling cavity. The core is then ready for refueling.

- Phase III – Fuel Handling

  All irradiated fuel assemblies are removed from the core and relocated to the SFP. The partially used fuel and new fuel assemblies are then transferred and installed into their designated positions in the reactor core.

  In general, the fuel handling procedure is as follows:

  - The refueling machine is indexed over a fuel assembly in the core.

- The refueling machine mast latches onto a fuel assembly. The fuel assembly is raised to the designated height clearing the vessel flange while maintaining the established satisfactory radiation shielding depth below the water surface.

- The fuel transfer car is moved into the containment from the fuel storage area where the fuel container is pivoted into the vertical position.

- The refueling machine loaded with an irradiated fuel assembly traverses the reactor cavity until it is indexed over the vertical FTS fuel container. The irradiated fuel assembly is lowered into the container and unlatched.

- The fuel container is pivoted to the horizontal position. The fuel transfer car is moved back through the transfer tube to the refueling area in R/B. The fuel container is pivoted to the vertical position again.

- The irradiated fuel is grasped by the fuel handling machine. The fuel is then transferred to the spent fuel rack. This process is continued until the core is off loaded. SFP level is maintained at normal throughout the refueling process to assure adequate radiation protection for personnel.

- The rod control clusters, the thimble plugs, and the burnable poison rod assemblies are shuffled in the SFP by using long handled tools on the fuel handling machine bridge.

- Irradiated and new fuel assemblies are individually lifted from a spent fuel rack by using the fuel handling machine, transferred to the up ender, and transferred to inside containment by reversing the core unloading process.

• Phase IV – Reactor Assembly

  The reactor assembly is accomplished by reversing the process described in Phase II – Reactor Disassembly.

9.1.4.2.2.3 Spent Fuel Storage

The spent fuel assemblies are stored in the SFP until fission product activity is low enough to permit shipment from the site or to be placed in dry storage. Spent fuel storage and cooling is discussed in Subsections 9.1.2 and 9.1.3, respectively.

9.1.4.2.2.4 Spent Fuel Shipment

The procedure for the spent fuel shipment is as follows:

• The spent fuel cask is received into the R/B by way of the refueling area truck access bay at elevation 3 ft - 7 in. The spent fuel cask is raised from the truck using the spent fuel cask handling crane through the access hatch in the floors at elevation 25 ft - 3 in and 76 ft - 5 in the R/B refueling area.

- The cask is moved to the cask washdown pit and washed to clean off dust and adhered material from the outside surface of the cask.

- The cask lid is removed and lay down on the operating floor. Then, O-ring of the lid is visually inspected.

- The cask is then placed into an encapsulating flexible barrier (baggy) to the top flange to prevent surface contamination. Additionally, the cask is filled with clean demineralized water.

- The water levels are raised in the refueling canal and the cask pit. The water is supplied from the refueling water auxiliary tank. Prior to opening the SFP and cask pit gates, the SFP water level is confirmed to be equalized with the refueling canal and cask pit water levels.

- The cask is transferred from the cask washdown pit to the cask pit using the cask handling tool to prevent crane wire rope oil from contaminating the cask pit water. When the cask is being lifting down in the filled cask pit, the baggy is filled by demineralized water to prevent the SFP water from entering in the baggy. The gate between cask pit and refueling canal is closed until the cask is completely settled on the pit floor.

- The fuel handling machine is indexed over the spent fuel asembly to be transported out of the spent fuel rack. The spent fuel is picked up to a designated height clearing the rack top and maintaining sufficient water depth for radiation shielding, transferred, and inserted into the cask whose flange level is the same as the rack top elevation.

- After the cask is fully loaded, the lid is installed for radiation shielding. The lid installation is verified for proper installation.

- The cask is lifted, the baggy is removed and properly stored and/or disposed in accordance with operating procedures defined in Subsection 13.5.2. It is then moved to the decontamination pit.

- Swipes of the outside surface of the cask are taken to verify the out side surface of the cask has not been contaminated. When the swipes are found to be below the specified limits of Title 49 “Transportation” CFR Chapter I, Subpart I Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Part 173 “Shippers--general requirements for shipments and packagings”, (Ref. 9.1.7-17) and Title 10 “Energy” CFR Chapter I Nuclear Regulatory Commission Part 71 “Packaging and Transportation of Radioactive Material” (Ref. 9.1.7-18) as specified in the operating procedures defined in Subsection 13.5.2.

- The cask is removed from the decontamination pit, and lower through the access hatch in the fuel handling area operating floor to a cask transporter at elevation 3 ft - 7 in.

9.1.4.3 Safety Evaluation

The LLHS is evaluated as to its ability to assure there are no unacceptable releases of radiation as a result of mechanical damage to fuel, to prevent damage that could compromise the ability to maintain an adequate degree of subcriticality, to maintain acceptable shielding during fuel handling, withstand earthquakes, and to assure fuel handling is performed within acceptable limits.

- Damage to fuel assemblies is prevented by designing and configuring the light load handling system to comply with ANS 57.1-1992 (Ref. 9.1.7-13). This is further assured through the operating procedures defined in Subsection 13.5.2.

- Maintenance of subcriticality is achieved by designing and configuring the light load handling system to comply with ANS 57.1-1992 (Ref. 9.1.7-13).

- Maintenance of acceptable shielding requirements is achieved by designing and configuring the light load handling system to comply with ANS 57.1-1992 (Ref. 9.1.7-13). This is further assured through the operating procedures defined in Subsection 13.5.2.

- The ability to withstand natural phenomena, specifically earthquakes, is achieved by designing and configuring the light load handling system to comply with ANS 57.1-1992 (Ref. 9.1.7-13) using the seismic design criteria presented in Chapter 3.

- Fuel handling performance is assured to be within acceptable limits by designing and configuring the light load handling system to comply with ANS 57.1-1992 (Ref. 9.1.7-13). This is further assured through the operating procedures defined in Subsection 13.5.2.

9.1.4.4 Inspection and Testing Requirements

The inspection and testing requirements for the light load handling system are as outlined below:

- For the fuel handling machine, the new fuel elevator, the FTS including upenders, and the refueling machine, the following shop tests are performed:

  - All hoists and cables are load tested to 125% of their rated load capacity

  - All equipment will be assembled and verified to conform to specified operational characteristics

- Prior to use, the following steps will be taken to assure the light load handling system is functional:

  - Visual inspection for loose or foreign parts with maintenance to keep free of dirt and grease

  - Lubrication of exposed gears with proper lubricant
  - Inspection of hoist cables for worn or broken strands
  - Visual inspection of all limit switches and limit switch actuators for any sign of damaged or broken parts
  - Inspection and/or testing of the equipment for proper functional and running operation

- For fuel handling tools, the following shop tests are performed:
  - The tools are load tested to 125% of the rated load
  - The tools are assembled and checked for proper functional operation

- Prior to use, the following steps will be taken to assure the light load handling system is functional:
  - Visual inspection of the tools for dirt and loose hardware and for any signs of damage such as nicks and burrs
  - Check of tools for proper functional operation

9.1.4.5 Instrumentation Requirements

The light load handling system has a system of instrumentation and controls (interlocks), alarms, and communication devices to assure the light load handling system meets the criterion discussed in Subsection 9.1.4.1. The interlocks provided are as defined in ANS 57.1, paragraph 6.3.1.1, and in Table 1 for the fuel handling machine, the new fuel elevator, the FTS including upenders, and the refueling machine.

The light load handling system has interlock actuation annunciation lamps on the control console to visually prompt the operator of interlock status. Additionally, movement of the fuel handling machine and the refueling machine bridge are audibly signaled.

The plant is designed with a public address system. The fuel handling machine, the new fuel elevator, the FTS including up enders, and the refueling machine is to have the capability to be interlinked with the public address system in the fuel handling area and the PCCV at a minimum. Additionally, administrative procedure defined in Subsection 13.5.1 provides communication devices not susceptible to a loss of power, offsite, or onsite, such as sound powered telephones or two-way radios. These are to be used to provide communication between operators at the fuel handling machine, the new fuel elevator, the FTS including upenders, and the refueling machine. These devices operate on channels or frequencies unique to the light load handling system within the plant, to minimize or preclude interference from operations other than fuel handling.

The light load handling system is designed such that should there be loss of control function or power function, the load remains in a safe condition.

9.1.5 Overhead Heavy Load Handling System

The overhead heavy load handling system (OHLHS) consists of devices used for critical load handling evolutions. A critical load handling evolution is defined as the handling of a heavy load where inadvertent operations or equipment malfunctions, separately or in combination, could:

- Cause a significant release of radioactivity
- Cause a loss of margin to criticality
- Uncover irradiated fuel in the reactor vessel or spent fuel pool
- Damage equipment essential to achieve or maintain safe shutdown

Heavy loads are defined as a load weighing more than one fuel assembly and its handling device. For the US-APWR, a fuel assembly weighs approximately 2,000 lbs with a handling tool weighing approximately 450 lbs. Therefore, for the US-APWR, a heavy load is defined as any load greater than the combined weight of approximately 2,450 lbs. This definition is established as a threshold for invoking the use of the OHLHS. The OHLHS is not used for the handling of new and spent fuel assemblies. New and spent fuel assemblies are handled using the light load handling system (light load handling system) defined in Section 9.1.4

9.1.5.1 Design Bases

The load that, if dropped, that would cause the greatest damage is a function of the area in which the OHLHS is operating. In the containment, this is defined as the integrated reactor head package/internals being lifted and transported to the lay down area. In the fuel handling area, this is defined as a full spent fuel cask being lifted and transported through the fuel handling area. In the area between the PCCV and the fuel handling area, this would be a reactor coolant pump motor.

The OHLHS is designed with single-failure-proof cranes in accordance with NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants, (Ref. 9.1.7-19) using ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder) (Ref. 9.1.7-20), to handle the maximum critical load based on the area in which it is operating.

The use of the single failure proof crane precludes the need to perform load drop evaluations with the one exception. Single-failure proof cranes are designed so that any credible failure of a single component will not result in the loss of capability to stop and hold a critical load. However, ASME NOG-1 allows a drop of 1 inch for axle failure. It further defines the acceptable stopping distance as not exceeding 5 inches while lowering the maximum critical load at its maximum speed unless specified otherwise by the purchaser. These distances, 1 inch to 5 inch, represent a case where a critical load be lowered to the floor could impose an impact load on the floor and associated structural features, should a failure event occur within this range.

On occasion, the OHLHS may be used to handle non-critical loads of greater weight than the maximum critical load. For those occasions, the maximum non-critical load is the design rated load. The design rated load does not have the safety factor limits of a single-failure-proof crane required by NUREG-0554. The design rated load utilizes standard commercial practice safety factor limits.

The areas of the plant in which the OHLHS is operated are shown in Figures 9.1.5-1 through 9.1.5-4. These figures represent the Fuel Handling Area and the interior of the PCCV. The OHLHS is designed to meet requirements of 10 CFR 50, Appendix A, specifically, GDC 1, 2, 4, and 5.

The operation, testing, maintenance, and inspection of OHLHS are controlled through the use of safe load paths as defined in Figures 9.1.5-1 through 9.1.5-4 and administrative procedures defined in Subsection 13.5.1.

The administrative control procedures govern the operation, testing, maintenance, and inspection of overhead heavy load handling system. These procedures incorporate the requirements of and follow the recommendations and/or guidelines of the following documents:

Scope	Reference	Reference Title
General requirements	Chapter 5, Section 5.1.1, NUREG-0612	Control of Heavy Loads at Nuclear Power Plants (Ref. 9.1.7-21)
Crane Operators (Training, qualifications, and conduct.)	Chapter 2-3, ANSI/ASME B30.2	Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist (Ref. 9.1.7-22)
Inspection, testing, and maintenance.	Chapter 2-2, ANSI/ASME B30.2	Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist (Ref. 9.1.7-22)

9.1.5.2 System Description

The primary pieces of equipment used in the OHLHS are the spent fuel cask handling crane in the fuel handling area and the polar crane in the PCCV. Other OHLHS equipment may include, but are not limited to, monorail type hoists, bridge cranes, and jib cranes. The OHLHS is seismic category II and Equipment Class 5, as described in Section 3.2.

The OHLHS exists in the R/B, specifically the fuel handling area and the PCCV of the R/B.

The OHLHS also includes equipment accessories (e.g., slings, and hooks, etc.) instrumentation, physical stops and/or electrical interlocks, and associated administrative controls.

The applicable Codes and Standards are identified in Section 9.1.5.1.

9.1.5.2.1 Physical Arrangement

The physical arrangement of the heavy load handling system for stored fuel and safe shutdown equipment is shown in Figures 9.1.5-1 through 9.1.5-4. The specifications for the spent fuel cask handling crane and the polar crane are given in Table 9.1.5-1 and 9.1.5-2. As shown, the spent fuel handling crane has three load handling hooks, the main, the auxiliary, and the suspension crane. The suspension crane is only used for new fuel assembly handling between a new fuel container to the new fuel storage area or between the new fuel storage rack and the basket on the new fuel elevator. Because of this limitation, the suspension crane is considered part of the light load handling system. Its operation and control is detailed in Section 9.1.4.

9.1.5.2.2 Spent Fuel Cask Handling Crane

A spent fuel cask filled with spent fuel assemblies is lifted and transferred using the main hoist of the spent fuel cask handling crane and the spent fuel cask lift rig. The cask's path is from the cask loading pit to the truck access area on the ground floor as shown on Figure 9.1.5-1.

Neutron source containers and Irradiation sample containers are transferred using the auxiliary hoist through the path shown on Figure 9.1.5-2.

A reactor coolant pump (RCP) motor is transferred from the PCCV into the fuel handling area. In the fuel handling area, once the RCP motor is in position, it is lifted by the main hook of the spent fuel handling crane and transferred to the truck access area using the path shown on Figure 9.1.5-3.

Miscellaneous equipment is transferred from the PCCV using the same path as the RCP motors. The spent fuel cask handling crane movement and storage is handled as follows:

- The spent fuel handling cask crane range of movement is limited; in general, to the fuel handling area defined by the hook coverage ranges shown in Figure 9.1.5-1. The limitation is controlled by the configuration of the spent fuel handling cask crane and by permanent rail stops installed on the crane rails.
- For the RCP motors and miscellaneous equipment, movement is design limited to exclude the new fuel storage, cask, and fuel inspection pits. The movement of the spent fuel handling crane is limited by removable rail stops.
- The crane is stored on the truck access hatch side of the fuel handling area when not in service.

9.1.5.2.3 Polar Crane

During refueling, the integrated reactor vessel head assembly and the reactor core upper and lower internals are transferred using the main hook and a lifting rig. These components are transferred from the reactor vessel to their respective lay down area as shown on Figure 9.1.5-4.

The RCP motors and other similar sized equipment are transferred using the auxiliary hook from their installed location to the PCCV equipment hatch area where they are loaded onto a transporter for transfer to the fuel handling area or other designated areas. The transporter is not covered in this section because it does not operate overhead and it is not a critical load handling component

The polar crane movement and storage is handled as follows:

- The polar crane range of movement is limited, in general, area defined by the hook coverage ranges shown in Figures 9.1.5-4. The limitation is controlled by the configuration of the polar crane and by the fact, travel is limited by the circumferential rail on which the polar crane travels.

- For the heavy loads, polar crane movement is limited to exclude the area bounded by the reactor cavity by way of the administrative procedures defined in Subsection 13.5.1.

- The polar crane has a seismic restraint system which precludes derailment of the either the hoist trolley or the main bridge box girders during a seismic event.

The polar crane is stored in the parked position during plant operation. The parked position for the polar crane is parallel to the centerline of the C/V running between azimuth 0° and azimuth 180° with the hoist trolley located over the roof of the pressurizer room.

The polar crane is designed to be used as a structural component during steam generator (SG) replacement. The driven components are not used during SG replacement.

9.1.5.3 Safety Evaluation

The OHLHS is evaluated as to its ability to, assure there is no unacceptable release of radiation through mechanical damage to fuel, prevent damage that could compromise ability to maintain adequate degree of sub criticality, uncovering of fuel in the reactor vessel or spent fuel pool, and to prevent damage that could result in loss of essential safe-shutdown functions. This is accomplished by the following:

- Limiting the travel of the spent fuel cask handling machine to the areas shown in Figure 9.1.5-4 through the use of physical stops on the travel rails of the machine and the hoist carriage. The machine is fabricated and erected in accordance with the requirements of NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants, and (Ref. 9.1.7-19). This is accomplished by procuring the machine in conformance with ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder), (Ref. 9.1.7-20). All lifting devices used for the spent fuel cask are designed and fabricated in accordance with ANSI N14.6, American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More for Nuclear Materials, (Ref. 9.1.7-23) with the exception of slings which are supplied in accordance with ANSI/ASME B30.9, Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings – Slings, (Ref. 9.1.7-24).

- Fabricating and erecting a polar crane that complies with the requirements of NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants, (Ref. 9.1.7-19). This is accomplished by designing the crane in conformance with ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder), (Ref. 9.1.7-20). All lifting devices are designed and fabricated in accordance with ANSI N14.6, American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More for Nuclear Materials, (Ref. 9.1.7-23) with the exception of slings which are supplied in accordance with ANSI/ASME B30.9, Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings – Slings, (Ref. 9.1.7-24).

- Administrative control procedures to govern operator training, load handling instructions, and equipment inspection. The administrative control procedures are developed in accordance with ANSI/ASME B30.2, Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist, (Ref. 9.1.7-22).

9.1.5.4 Inspection and Testing Requirements

The OHLHS components are subjected to various tests and inspections prior to being placed in service and are the subject of an inspection, tests, analyses, and acceptance criteria (ITAAC) program, which is detailed in Chapter 14, Section 14.3.

During fabrication, the quality assurance program of the Manufacturer satisfies the requirements of ASME NQA-1. The manufacturer's inspection and testing program conforms to Sections 7100 and 7200 of ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder, (Ref. 9.1.7-20).

Prior to operation, the OHLHS is received, stored, and installed in accordance with Sections 7100, 7300, and 7400 of ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder, (Ref. 9.1. 7-20). Qualification of the assembled OHLHS is performed in accordance with Section 7500 of ASME NOG-1.

Periodic tests and inspections of the OHLHS are performed in accordance with Chapter 2-2 of ANSI/ASME B30.2, Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist, (Ref. 9.1.7-22).

9.1.5.5 Instrumentation Requirements

The OHLHS is equipped with mechanical and electrical limit devices to disengage power to the motors as the load hook approaches its travel limits or to prevent damage to other components when continued operation would potentially damage the OHLHS as required by NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants, (Ref. 9.1.7-19).

In addition to the limit devices, the control system is designed to include safety devices, which will assure the OHLHS returns to and/or maintains a secure holding position of critical loads in the event of a system fault. These safety devices are in addition to and separate from the control devices used for normal operation of the OHLHS. Emergency stop buttons are strategically placed at various locations to de-energize the OHLHS independent of the system controls. The overload sensing system is designed to be reset when switching the OHLHS between maximum critical load operations and design rate load operations. This resetting is performed remotely from the system controls and is governed by the OHLHS administrative procedures defined in Subsection 13.5.1.

The OHLHS driver control systems are designed using a combination of electrical and mechanical components. The control systems take into account the hoisting (raising and lowering) of the complete range of loads from the load hook itself up to and including the rated load in conjunction with the inertia of moving components, such as the motor armature, shafting and coupling, gear reducer, drum, etc. In general, the OHLHS is not contemplated to be used to lift individual spent fuel elements. The control system has been designed to be adaptable to include manual interlocks, which will preclude trolley and/or bridge movement while a spent fuel assembly is being hoisted free of the reactor vessel or a storage rack. The manual interlocks are controlled by the administrative control procedures defined in Subsection 13.5.1.

Instrumentation is installed within the motor control circuits to detect and react to malfunctions such as excessive electric current, excessive motor temperature, overspeed, overload, and overtravel. Control devices are installed to absorb the kinetic energy of the rotating components and arrest the hoisting movement should the load line or one of the dual revving systems fail, or should an overload and/or overspeed condition occur.

The drives are designed to conform to ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder), (Ref. 9.1.7-20) with respect to hoist speed, specifically Section 5331 of ASME NOG-1.

The complete operating control system, along with emergency control features is located in the cab on the OHLHS. Additional wireless remote control stations are also provided for remote operations of the OHLHS. The wireless remote control stations have the same control, including emergency, features as the cab mounted controls. The configuration of the controls stations are in accordance with Section 2-1.13 of ANSI/ASME B30.2, Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist, (Ref. 9.1.7-22). The individual control stations are interlocked to permit only one station to be operable at a time.

9.1.6 Combined License Information

COL 9.1(1) *The COL Applicant is to provide a program for monitoring the effectiveness of neutron poison present in the neutron absorbing panel.*

COL 9.1(2) *Deleted*

COL 9.1(3) *Deleted*

COL 9.1(4) Deleted

COL 9.1(5) Deleted

COL 9.1(6) Deleted

COL 9.1(7) Deleted

COL 9.1(8) Deleted

9.1.7 References

9.1.7-1 Prevention of Criticality in Fuel Storage and Handling, 'General Design Criteria for Nuclear Power Plants,' "Domestic Licensing of Production and Utilization Facilities," . NRC Regulations Title 10, Code of Federal Regulations, 10 CFR Part 50, Appendix A, Criterion 62.

9.1.7-2 'Criticality Accident Requirements,' "Domestic Licensing of Production and Utilization Facilities," Energy. NRC Regulations Title 10, Code of Federal Regulations, 10 CFR Part 50.68.

9.1.7-3 Kopp, L. Guidance on the Regulatory Requirements for Criticality Analysis of Fuel Storage at Light-Water Reactor Power Plants. U.S. Nuclear Regulatory Commission, February 1998.

9.1.7-4 Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors. ANSI/ANS-8.17-2004, American National Standards Institute/American Nuclear Society.

9.1.7-5 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors. ANSI/ANS-8.1-1998 (2007), American National Standards Institute/American Nuclear Society.

9.1.7-6 Criticality Analysis for US-APWR new and spent fuel racks, MUAP-07032, February, 2008.

9.1.7-7 Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants. ANS 57.2-1983, American Nuclear Society.

9.1.7-8 Mechanical Analysis for US-APWR new and spent fuel racks, MUAP-07033, March, 2009.

9.1.7-9 Design Requirements for New Fuel Storage Facilities at Light Water Reactor Plants. ANS 57.3-1983, American Nuclear Society.

9.1.7-10 Rules for Construction of Nuclear Components, ASME Boiler and Pressure Vessel Code, Division 1, Section III, 2007.

9.1.7-11 EPRI Primary Water Chemistry Guidelines: Revision 4, 2003

9.1.7-12 Spent Fuel Storage Facility Design Basis. Regulatory Guide 1.13, Rev. 2, U.S. Nuclear Regulatory Commission.

9.1.7-13 Design Requirements For Light Water Reactor Fuel Handling Systems. ANSI/ANS57.1-1992, American National Standards Institute/American Nuclear Society.

9.1.7-14 "Occupational Safety and Health Standards," Labor. Title 29 Code of Federal Regulations, Part 1910, U.S. Nuclear Regulatory Commission,.

9.1.7-15 "Standards for Protection against Radiation," Energy. Title 10, Code of Federal Regulations, Part 20, U.S. Nuclear Regulatory Commission,

9.1.7-16 "Rules for Construction of Nuclear Facility Components," Boiler and Pressure Vessel Code Section III, American Society of Mechanical Engineers, 2001 Edition through the 2003 Addenda.

9.1.7-17 "Shippers – General Requirements for Shipments and Packagings," Transportation. Title 49, Code of Federal Regulations, Part 173, U.S. Nuclear Regulatory Commission, Washington, DC.

9.1.7-18 "Packaging and Transportation of Radioactive Material," Energy. Title 10, Code of Federal Regulations, Part 71, U.S. Nuclear Regulatory Commission, Washington, DC.

9.1.7-19 NRC Collection of Abbreviations. NUREG-0554, U.S. Nuclear Regulatory Commission, Washington, DC.

9.1.7-20 Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder). ASME NOG-1, 2004, American Society of Mechanical Engineers.

9.1.7-21 Control of Heavy Loads at Nuclear Power Plants. NUREG-0612, U.S. Nuclear Regulatory Commission, Washington, DC, July 1980.

9.1.7-22 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist). ANSI/ASME B30.2-2005, American Society of Mechanical Engineers.

9.1.7-23 American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials. American National Standards Institute, ANSI N14.6-1993, American Nuclear Society, IL.

9.1.7-24 Slings. ANSI/ASME B30.9-2003, American Society of Mechanical Engineers.

Table 9.1.2-1 Loads and Load Combinations for New and Spent Fuel Rack

Load Combination	Acceptance Limit (ASME Section III, Division 1, Article NF3000)
D + L	Level A service limits
D + L + To	
D + L + To +E	
D + L + Ta + E	Level B service limits
D + L + To + Pf	
D + L + Ta + E’	Level D service limits
D + L + Fd	The functional capability of the fuel racks should be demonstrated
Where:	
D :	Dead Loads
L :	Live loads – effect of lifting the empty rack to installation
To :	Thermal effects and loads during normal operating or shutdown conditions, based on the most critical transient or steady state condition.
E :	Loads generated by operating-basis earthquake (OBE)
E’ :	Loads generated by SSE
Pf :	Upward force on the racks caused by postulated stuck fuel assembly
Ta	Differential temperature induced loads based on the postulated abnormal design condition (spent fuel rack only)
Fd :	Force caused by the accidental drop of the heaviest load from the maximum possible height

Table 9.1.2-2 Light Load Drop Condition for New and Spent Fuel Rack

	Drop object	Drop weight	Drop Situation	Drop height above rack top
Case-1N	a fuel assembly plus new fuel handling tool	2,000 lbs	Straight Incline	4.2 feet above rack top
Case-2N			Straight	4.2 feet above rack bottom with empty cell
Case-1S	a fuel assembly plus spent fuel handling tool	2,450 lbs	Straight Incline	2 feet above rack top
Case-2S			Straight	2 feet above rack bottom with empty cell

Table 9.1.3-1 Recommended Spent Fuel Pit Water Chemistry Speciation

Analysis		Unit	Standard value	Limited value
1	Boron	ppm	—	≧4000
2	Chloride ion	ppm	≦0.05	≦0.15
3	Fluoride ion	ppm	≦0.05	≦0.15
4	Turbidity	ppm	≦0.5	—

Table 9.1.3-2 Spent Fuel Pit Design Parameters

SFP storage capacity	10 years spent fuel plus one core
SFP water volume (below normal water level)	400,000 gal
Boron concentration of water (ppm)	4000

Table 9.1.3-3 Spent FuelPit Cooling and Purification System Component Design Parameters (Sheet 1 of 2)

SFP Pumps		
Type	Horizontal centrifugal	
Quantity	2	
Maximum operating pressure	200 psig	
Maximum operating temperature	200 °F	
Normal operating temperature	120 °F	
Normal operating flow rate	3,865 gpm	
Design pump head	250 feet	
Fluid	Boric acid water (4000 ppmB)	
Material	Stainless steel	
SFP Heat Exchangers		
Quantity	2	
Type	Plate type	
Heat transfer rate	28×10^6 BTU/h (per unit)	
Design capacity (UA value)	6.3×10^6 BTU/h -°F	
Minimum capacity for normal cooling (UA value)	4.3×10^6 BTU/h -°F	
	SFP water side	CCWS side
Normal operating flow rate	3,600 gpm	3,600 gpm
Maximum operating pressure	200 psig	200 psig
Maximum operating temperature	200 °F	200 °F
Inlet temperature	120 °F	100 °F
Fluid	Borated water (4,000 ppmB)	Component Cooling Water
Material	Stainless steel	Stainless steel
SFP Demineralizers		
Quantity	2	
Type	Vertical cylindrical type	
Operating pressure	200 psig	
Operating temperature	200° F	
Fluid	Boric acid water (4000 ppmB)	
Normal operating flow rate	265 gpm	
Vessel material	Stainless steel	
SFP Filters		
Quantity	2	
Type	Vertical cylindrical cartridge type	
Normal operating flow rate	265 gpm	
Operating pressure	200 psig	
Operating temperature	200 °F	
Fluid	Boric acid water (4000 ppmB)	
Filter element material	Polypropylene	
Vessel material	Stainless steel	

Table 9.1.3-3 Spent Fuel Pit Cooling and Purification System Component Design Parameters (Sheet 2 of 2)

SFP Strainers (at SFP pump intake)	
Number	2
Type	Cylinder type
Operating flow rate	3,865 gpm
Normal operating temperature	120 °F
Design pressure	Atmosphere
Design temperature	200° F
Vessel material	Stainless steel
SFP Strainers (at RHR pump intake)	
Number	2
Type	Cylinder type
Operating flow rate	3000 gpm
Operating temperature	120 °F
Design pressure	Atmosphere
Design temperature	200 °F
Vessel material	Stainless steel

Table 9.1.5-1 Specification of the Spent Fuel Cask Handling Crane

1. Type		Overhead bridge crane		
2. Operating device		Radio remote control unit and cab on crane		
3. Component supplied electric power		Trolley		
4. Electric power supply		Power	: 460V ac, 60 Hz, 3 Phase	
		Space Heater	: 230V ac, 60 Hz, Single Phase	
5. Bridge Span		47'-3"		
6. Top level of the rail		Elevation 125'-8"		
		Main Hook	Auxiliary Hook	Suspension Hoist
7. Capacity	Metric ton	135	20	2
8. Lift	ft-in (m)	124'-9" (38.003 m)	124'-9" (38.003 m)	69'-3" (21.0886 m)
9. Hook Coverage	ft-in (m)	Refer to Figure 9.1.5-5		
10. Hoisting Speed	m/min	0.12, 0.6, 1.2	0.45, 1.8, 4.5	2.1, 6.3
11. Traveling Speed	m/min	Bridge: 0.6, 1.5, 6.0		Suspension Crane: 3.0, 9.0
		Trolley: 0.6, 1.5, 6.0		Hoist: 3.0, 9.0
12. Wire Material		Stainless Steel (ATSM A 492 Type 304)		

Table 9.1.5-2 Specification of the Polar Crane

1. Type		Overhead bridge crane	
2. Operating device		Portable wireless control box on operating floor, Cab on crane	
3. Component supplied electric power		Trolley	
4. Electric power supply		Power : 460V ac, 60 Hz, 3 Phase	
		Space Heater : 230V ac, 60 Hz, Single Phase	
5. Bridge Span		142'-1"	
6. Top level of the rail		Elevation 145'-6"	
		Main Hook	Auxiliary Hook
7. Capacity	Metric ton	250	50
8. Lift	ft-in (m)	67'-9" (20.650 m)	119'-1" (36.296 m)
9. Hook Coverage	ft-in (m)	Refer to Figure 9.1.5-5	
10. Hoisting Speed	m/min	0.12, 0.6, 1.2	1.2, 6.0, 12.0
11. Traveling Speed	m/min	Bridge: 0.9, 1.8, 18.0	
		Trolley: 0.6, 3.42, 12.0	
12. Wire Material		Carbon Steel	

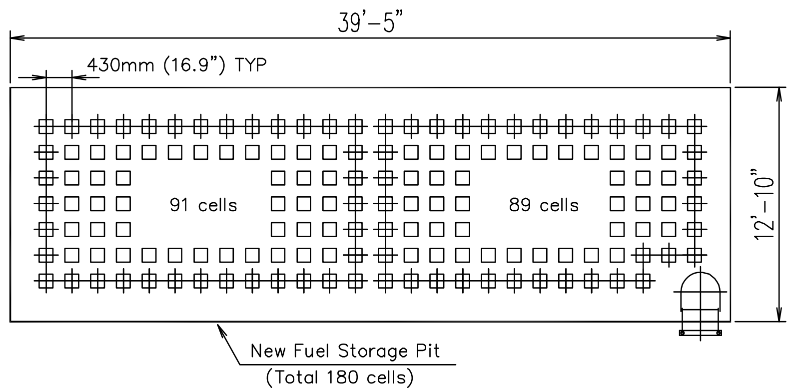


Figure 9.1.1-1 New Fuel Storage Pit

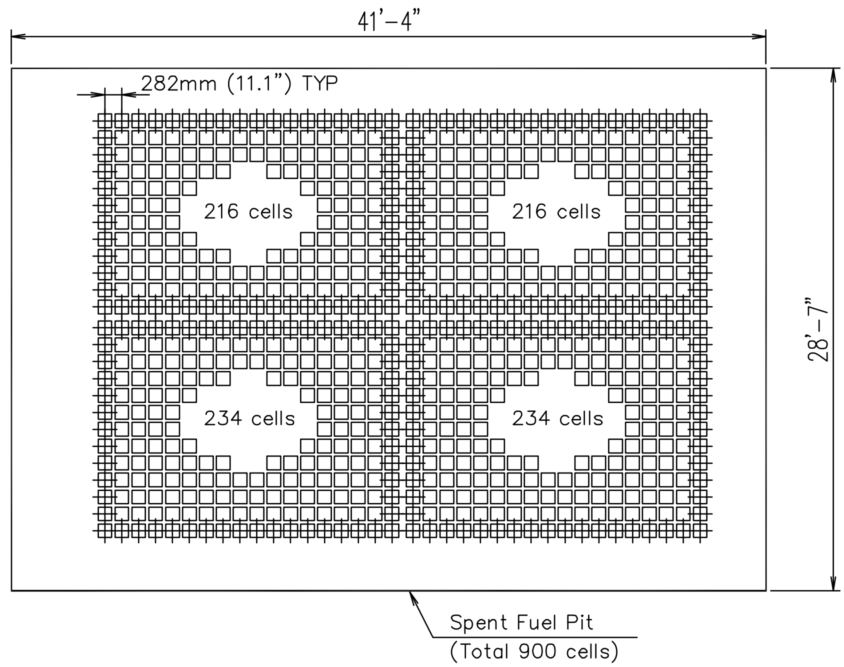


Figure 9.1.1-2 Spent Fuel Pit

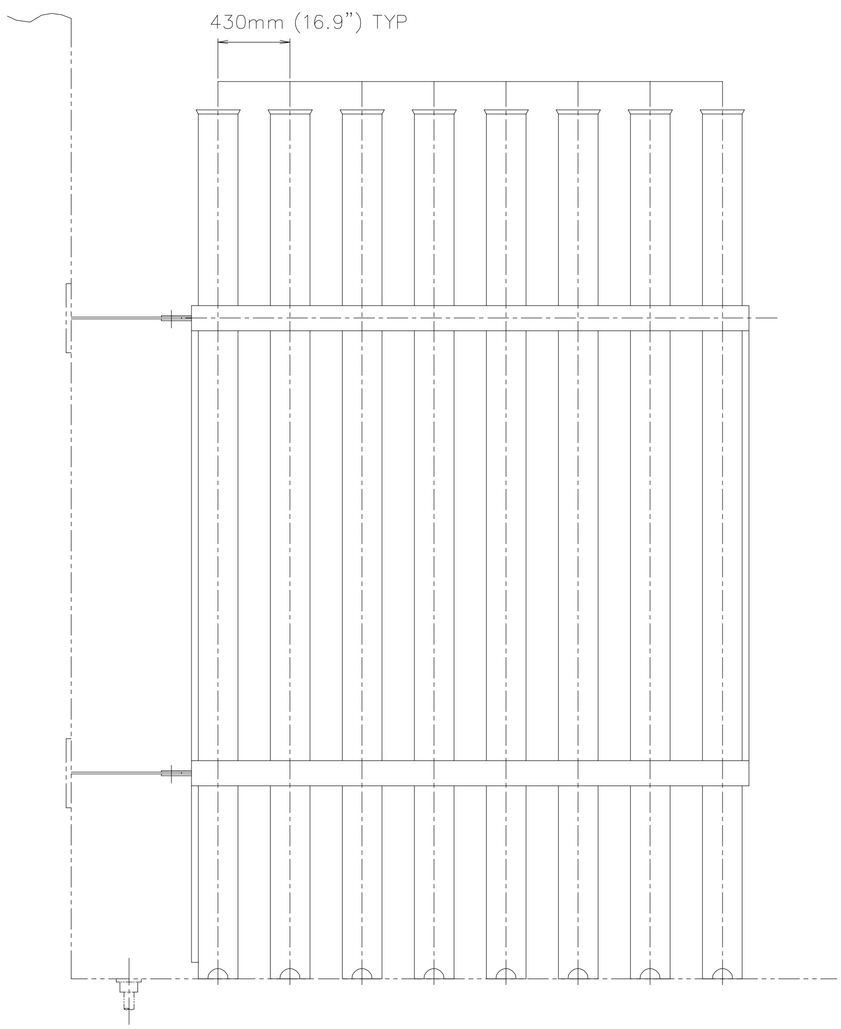


Figure 9.1.2-1 New Fuel Rack Array

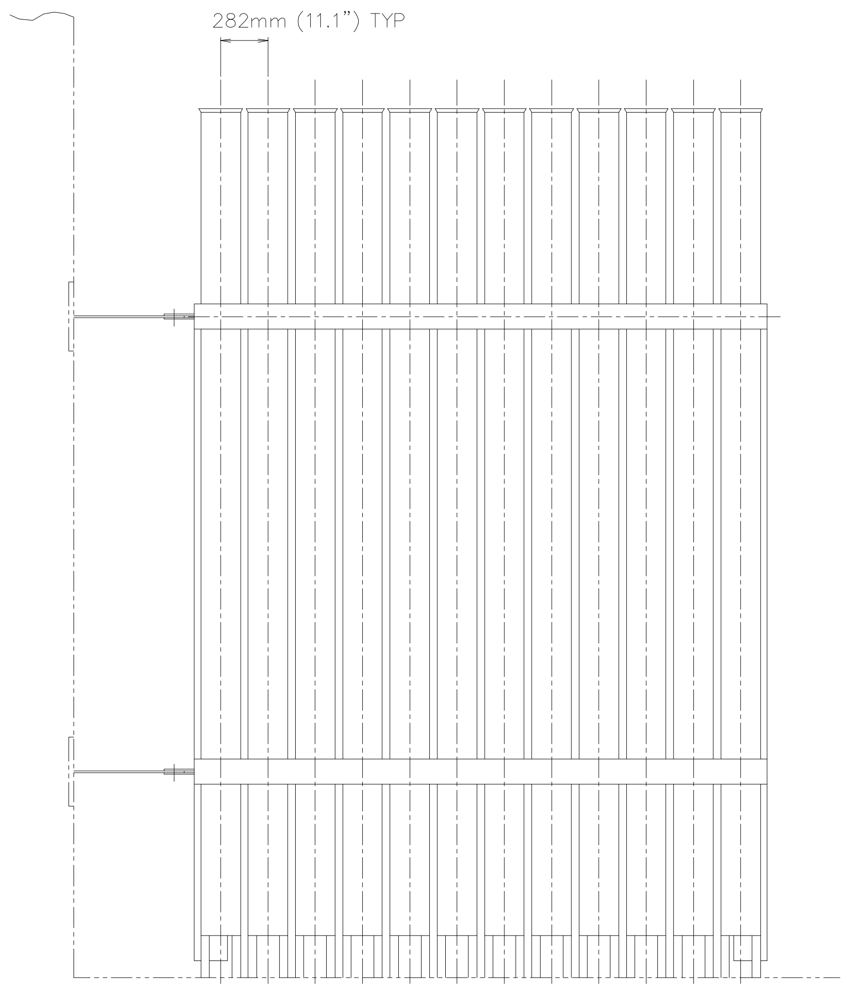


Figure 9.1.2-2 Spent Fuel Rack Array

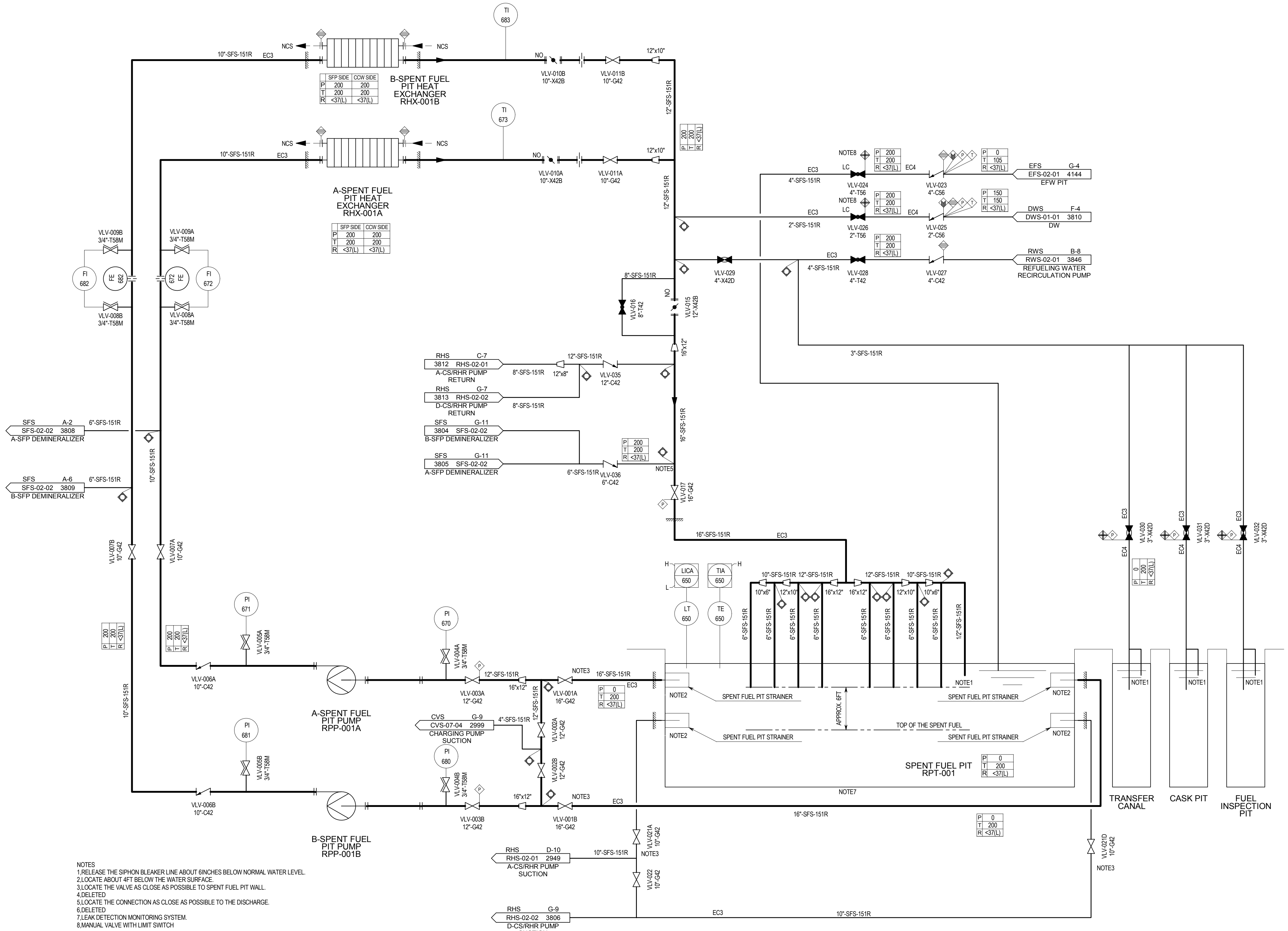


Figure 9.1.3-1 Schematic of Spent Fuel Pit Purification and Cooling System (Cooling Portion)

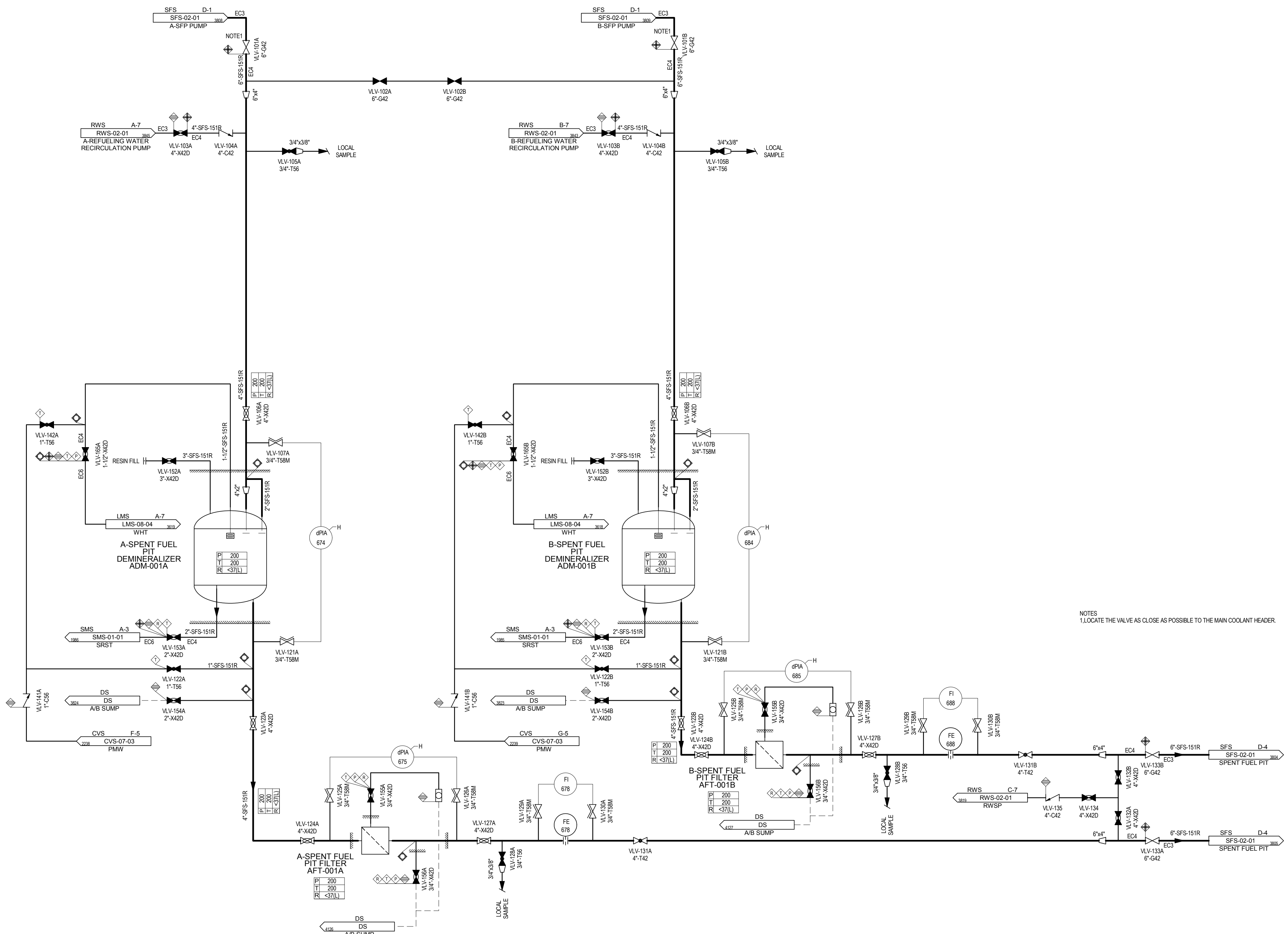


Figure 9.1.3-2 Schematic of Spent Fuel Pit Purification and Cooling System (Purification Portion)

(SRI)

Figure 9.1.4-1 Plan View of Light Load Handling System

(SRI)

Figure 9.1.4-2 Section View of Light Load Handling System

(SRI)

Figure 9.1.5-1 Traveling Route of Spent Fuel Cask

~~Security-Related Information - Withhold Under 10CFR2.390~~

(SRI)

Figure 9.1.5-2 Traveling Route of Irradiation Sample Container

(SRI)

Figure 9.1.5-3 Traveling Route of Equipment Maintenance

(SRI)

Figure 9.1.5-4 Traveling Route of Heavy Load inside Containment

9.2 Water systems

9.2.1 Essential Service Water System

The essential service water system (ESWS) provides cooling water to remove the heat from the component cooling water (CCW) heat exchangers (HXs) and the essential chiller units. The ESWS transfers the heat from these components to the ultimate heat sink (UHS). The UHS is described in Subsection 9.2.5.

9.2.1.1 Design Bases

The ESWS operates during all modes of plant operation and performs safety-related as well as non-safety related functions. The ESWS is designed to meet the relevant requirements of GDC 2, GDC 4, GDC 5, GDC 44, GDC 45, and GDC 46 (Ref. 9.2.11-1).

9.2.1.1.1 Safety Design Bases

The ESWS is designed to the requirements of the overall US-APWR plant design criteria. Specific safety design bases for the ESWS are as follows:

- The system, in conjunction with the plant UHS, is designed to remove heat from the plant auxiliaries required to mitigate the consequences of a design basis event and for safe shutdown, assuming a single failure and one train unavailable due to maintenance coincident with a loss of offsite power.

- ESWS is designed to equipment Class 3 and seismic category requirements, and as such it is designed to remain functional during and following an SSE.

- The system is designed considering the protection against adverse environmental, operating, and accident conditions that can occur, such as freezing, thermal overpressurization, and waterhammer.

- The system is designed to detect and preclude release of radioactive contaminants to the environment. Radioactive contaminants may enter the ESWS from the component cooling water system (CCWS).

- The safety-related portions are protected from wind and tornado effects, as described in Section 3.3; flood protection as described in Section 3.4; missile protection as described in Section 3.5; protection against dynamic effects associated with the postulated rupture of piping as described in Section 3.6. Environmental qualification of Class 1E equipment is described in Section 3.11; seismic design is described in Section 3.7, and fire protection is described in Section 9.5.

- The ESWS is constructed in accordance with ASME Section III, Class 3 requirements.

- The ESWS is designed for periodic inservice testing and inspection of components in accordance with ASME Code Section XI.
- The ESWS is designed with the capability to isolate non–safety related portion.
- The essential service water pumps (ESWPs) are designed to perform their safety function at the lowest probable water level of the UHS.

9.2.1.1.2 Power Generation Design Bases

The ESWS is designed to provide cooling water to the plant components and transfer heat to the UHS during all modes of normal operation.

9.2.1.2 System Description

9.2.1.2.1 General Description

Figure 9.2.1-1 shows the piping and instrumentation diagram of the ESWS. The ESWS draws water from the intake basin and returns water to the UHS after passing through the CCW HXs and the essential chiller units. The UHS is the source of water to the intake basin. The essential chiller units do not include the radioactive fluid, and CCWS is the intermediate loop between the reactor auxiliaries and the ESWS. This arrangement minimizes direct leakage of the radioactive fluid from the ESWS to the environment. In addition, radiation monitors are provided in each discharge line of CCW HX essential service water (ESW) side. The monitors alert the operator if the leaking CCW contains radioactivity so that the operator can isolate the leaking train.

The ESWS is arranged into four independent trains (A, B, C, and D). Each train consists of one ESWP, two 100% strainers in the pump discharge line, one 100% strainer upstream of the CCW HX, one CCW HX, one essential chiller unit, and associated piping, valves, instrumentation and controls.

Each supply line after the strainer is tapped to supply cooling water to each component. Each CCW HX is provided with piping and isolation valves around the heat exchanger, which facilitates back flushing of the CCW HX of the ESW side when required. Heat from the reactor auxiliaries is removed from the CCW HX and the heated service water flows to UHS via independent lines.

The ESWS layout ensures that the fluid pressure in the system is above saturation conditions at all locations. This, in combination with the control of the pump discharge valve, minimizes the potential for transient water hammer.

ESWS system design assures that the CCW HX operating pressure on the ESW side is not higher than the CCWS operating pressure. Thus, any leakage is from the CCW to the ESWS. Therefore, the raw service water doses not contaminate the demineralized CCW.

The COL Applicant is to specify the ESW chemistry requirements.

The COL Applicant is to provide the piping, valves and other design related to the site specific UHS.

9.2.1.2.2 Component Description

Table 9.2.1-1 shows the design parameters of the major components in the system.

9.2.1.2.2.1 ESWPs

Four 50% capacity ESWPs, one per train, supply cooling water to remove heat from the components, and then discharge to the UHS.

The pumps are powered from the Class 1E normal ac power system. On loss of offsite power, the pumps are automatically powered from their respective emergency power source.

Each pump is designed to provide 13,000 gpm flow at the required total dynamic head. The COL Applicant is to provide the site specific design data for the ESWPs.

9.2.1.2.2.2 Strainers

Two 100% capacity strainers are located in each ESW pump discharge line. When the differential pressure across the strainer reaches a pre-determined set pressure the strainer is isolated and the standby strainer is placed in service. The isolated strainer is manually backwashed.

One 100% capacity self-cleaning type strainer is located upstream of each CCW HX. The continuous backwash water is discharged downstream of the CCW heat exchanger.

9.2.1.2.2.3 CCW HX

Four 50% capacity plate type HXs, one per train, are provided. A detailed description of the HXs is discussed in Subsection 9.2.2.

9.2.1.2.2.4 Essential Chiller Units

Four 50% capacity chiller units, one per train, are provided. A detailed description of the essential chiller units is given in Subsection 9.2.7.

9.2.1.2.2.5 Piping

Carbon steel piping designed, fabricated, installed and tested in accordance with ASME Section III, class 3 requirements, is used for the safety-related portion of the ESWS. Piping is arranged to permit access for inspection. Underground piping is lined and placed in trenches. Manholes are provided for periodic piping inspection.

9.2.1.2.2.6 Valves

The water in this ESWS does not normally contain radioactivity and, therefore, special provisions against the leakage to the atmosphere are not necessary. Isolation valves are provided upstream and downstream of each component to facilitate its removal from service.

The motor operated valve is provided at the discharge of each pump. The starting logic of the ESWP interlocks the motor operated valve with the pump operation. The closed discharge valve opens after starting the ESWP. This feature minimizes transient effects that may occur as the water sweeps out air that may be present in the system.

Each CCW HX is provided with two separate locked close isolation valves and piping around the heat exchanger for back flushing. One valve is located in the piping running from the inlet of the heat exchanger inlet isolation valve to the inlet of the heat exchanger discharge isolation valve, and the second valve is located in the piping running from the outlet of the heat exchanger inlet isolation valve to the outlet of the heat exchanger discharge isolation valve. To initiate back flush operation, both bypass valves are opened and the heat exchanger isolation valves are closed. Cooling water flows from the discharge side into the heat exchanger and is discharged from the heat exchanger inlet side to the ESW discharge line.

9.2.1.2.2.7 Deleted

9.2.1.2.3 Deleted System Operation

9.2.1.2.3.1 Normal Operation

A low signal of ESW header pressure due to tripping of the operating ESWP is alarmed in the main control room (MCR). When the alarm is achieved, the stand by component cooling water pump (CCWP) of the same subsystem and the corresponding ESWP are placed in service to resume the cooling process. The previously activated CCWP is shut off after the switch in operating pump.

Voiding in any train may occur on loss of offsite power and subsequent pump trip. In order to preclude water hammer on pump restart, the motor operated valve at the discharge of each pump is interlocked to close when the pump is not running or is tripped. This interlock prevents the pump from starting if the valve is not closed. The valve starts to open after the respective pump starts.

The effect of long-term corrosion of the piping is mitigated by adding a corrosion inhibitor. The ESW is periodically sampled and chemicals are added, as required, during normal operation.

9.2.1.2.3.2 Emergency Operation

Loss of Coolant Accident (LOCA)

All ESWPs are automatically started by the ECCS actuation signal, and supply cooling water to their respective CCW HXs and essential chiller units. When offsite power is not available, ESWPs are automatically powered by onsite Class 1E power supplies.

During LOCA conditions, a minimum of two trains of the ESWS are required.

Loss of Offsite Power

When offsite power is lost, all ESWP powered by onsite Class 1E power supplies are automatically started by the under voltage signal.

During this condition, a minimum of two trains of ESWS are required.

9.2.1.3 Safety Evaluation

The UHS has sufficient water volume to perform required cooling to mitigate the consequences of an accident. Subsection 9.2.5 discusses conformance with Regulatory Guide 1.27 (Ref. 9.2.11-2).

The safety-related portion of the ESWS is designed and constructed to seismic category I requirements. The safety-related portions of the ESWS are protected against natural phenomena and missiles. The following sections address natural phenomena and missiles protection.

- Section 3.3, Wind and tornado loadings;
- Section 3.4, Water Level (Flood) Protection;
- Section 3.5, Missile Protection;
- Section 3.7, Seismic Design;

Pipe rupture protection is addressed in Section 3.6, Protection against Dynamic Effects Associated with Postulated Rupture of Piping.

The ESWS continues to perform its safety function in the event of a fire. Subsection 9.5.1 addresses fire protection.

The ESWS equipment and piping are located either underground or in the pump house and the R/B. These buildings 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, 3.8 and 9.5 describe the bases of the structural design and protection from natural events.

Radioactive contamination of the ESWS is unlikely but can occur if the CCWS system is contaminated and then leaks into ESWS via the CCW HX. Subsection 9.2.1.2.1 describes prevention of this leakage to the environment.

Four independent, redundant trains, each powered from an independent Class 1E power supplies, are provided. The system is designed to provide the required cooling to mitigate the consequences of an accident with a single failure and one train unavailable due to maintenance coincident with a loss of offsite power.

The ESWS and its components are initially tested in accordance with the program given in Section 14.2. Periodic in-service functional testing is performed as described in Subsection 9.2.1.4. Section 6.6 lists appropriate ASME Section XI requirements for the safety-related portion of the system.

Failure mode and effects analysis (FMEA) Table 9.2.1-2 concludes that no single failure, coincident with one train being unavailable due to maintenance and a loss of offsite power compromises the safety functions of ESWS.

The ESWS is not shared with multi-units.

The COL Applicant is to provide the evaluation of the ESWP at the lowest probable water level of the UHS.

The COL Applicant is to provide the protection against adverse environmental, operating, and accident conditions that can occur such as freezing, thermal overpressurization.

The COL Applicant is to provide the safety evaluation for the ESWS design related to the site specific conditions.

9.2.1.4 Inspection and Testing Requirements

The ESWS is hydrostatically tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance during normal operation is verified by monitoring system pressures, temperatures and flows.

Inservice inspection and testing of piping is performed in accordance with the requirements of ASME Section XI, as discussed in section 6.6.

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

The periodic performance verification of the ESWS components, including the heat exchanger which is cooled by the ESW, is performed to detect performance degradation due to the fouling.

9.2.1.5 Instrumentation Requirements

9.2.1.5.1 ESWS discharge pressure

The ESW pump discharge pressure is locally indicated, and pressure readings are used for ESW pump performance testing.

9.2.1.5.2 ESW header line pressure

ESW header pressure is indicated in the MCR. When the pressure decreases due to the failure or inadvertent shutdown of the operating pump or valve misalignment, a low pressure alarm is transmitted to the MCR.

9.2.1.5.3 CCW HX essential service water flow

The flow rate is indicated in the MCR. A low flow alarm is transmitted to the MCR.

9.2.1.5.4 ESWP motor essential service water flow

The flow rate is indicated in the MCR. A low flow alarm is transmitted to the MCR.

9.2.1.5.5 Differential pressure of strainer

Differential pressure of strainers located in each ESWP discharge line is indicated in the MCR. Hign difference pressure alarm is transmitted to the MCR. Differential pressure of CCW HX inlet strainer is locally indicated.

9.2.1.5.6 Radiation monitor

Radiation monitors are located downstream of the CCW HX and the signal is indicated in the MCR. When the radiation level exceeds the setpoint, an alarm is transmitted to the MCR.

9.2.1.5.7 Other instrumentation

As shown in the piping and instrumentation diagram of the ESWS, the other instrumentation and thermowells for temperature detection are provided where required to support testing and maintenance.

In addition, remote operated valves are provided with position indication instrumentation. The valve positions are monitored in the MCR.

9.2.2 Component Cooling Water System

9.2.2.1 Design Bases

The component cooling water system (CCWS) provides cooling water required for various components during all plant operating conditions, including normal plant operating, abnormal and accident conditions. It is an intermediate, closed loop cooling system that transfers heat from the various components to the ESWS. The CCWS is designed to meet the relevant requirements of GDC 2, GDC 4, GDC 44, GDC 45, and GDC 46 (Ref. 9.2.11-1). Its design bases are further described below.

9.2.2.1.1 Safety Design Basis

The CCWS design bases to meet the safety-related functional requirements are :

- The CCWS consists of two independent subsystems, with each subsystem providing 100% of the cooling capacity required for safe function. Each of the subsystems contains two fifty percent (2 x 50%) trains, for a total of four 50% trains.

- The CCWS is designed to have the capability to provide cooling water using either offsite power supply or onsite Class 1E power supply. Each train is powered by Class 1E power supplies respectively.

- The CCWS is designed to perform its safety function of accident mitigation assuming that one 50% train is out of service for maintenance coincident with the loss of offsite power and a single failure in another train.

- The CCWS is designed to seismic category I requirements so as to remain functional during and following a SSE.

- The CCWS is designed to have the capability to isolate the non-safety portions of the system during accident mitigation.

- The CCWS is designed against natural phenomena and internal missiles.

- The CCWS safety components are designed to withstand design loadings.

- The CCWS is protected against adverse environmental, operating, and accident conditions that can occur, such as flooding, high energy line break (HELB), thermal overpressurization, and water hammer.

- The CCWS is designed for periodic inservice testing and inspection of components in accordance with ASME Code Section XI.

- The CCWS is designed to withstand leakage in one train without loss of the system's safety function.

- Applicable codes and standards for the CCWS are listed in Section 3.2. The containment isolation valves and the piping between the isolation valves are designed and constructed to the requirements of ASME section III, Class 2. The remainder of the system is designed and constructed to the requirements of ASME Section III, Class 3, except for the portion that is not required to perform safety functions.

9.2.2.1.2 Power Generation Design Bases

The CCWS is designed to:

- Serve as an intermediate system between components containing radioactive fluids, which are cooled by the system, and the ESWS so as to prevent direct leakage of radioactive fluid into the environment through the ESWS.
- Provide sufficient cooling capacity for the components required during normal operating conditions such as normal power operation, normal shutdown and refueling.
- Detect leakage of radioactive material into the system and control leakage of radioactive material out of the system.
- Prevent long term corrosion that may degrade system performance.

9.2.2.2 System Description

The system flow diagram is shown in Figure 9.2.2-1.

The CCWS is the closed loop system that functions as an intermediate system between the various components cooled by CCWS and the ESWS, (Subsection 9.2.1). The CCWS transfers heat and prevents direct leakage of the radioactive fluid from the components to the ESWS.

The CCWS consists of two independent subsystems. One subsystem consists of trains A & B, and the other subsystem consists of trains C & D, for a total of four trains. Each train has one CCWP and one CCW HX and provides 50% of the cooling capacity required for safety function.

Electrical power to the CCWS is supplied from Class 1E buses that are backed up by Class 1E power supply so that the system is capable to operate during a loss of off site power.

There is the header tie line between trains A and B, and between trains C and D. The header tie line in each subsystem is branch off into two loops. See Table 9.2.2-1 for the components supplied by each loop.

Each subsystem is served by one CCW surge tank. The CCW surge tank is installed at the highest point of the system to facilitate system air venting to ensure a water solid closed loop and to provide the net positive suction head at the CCWP suction. In addition, the surge tank accommodates the thermal expansion and contraction of the cooling water and potential leakage into or out of the CCWS.

9.2.2.2.1 Component Descriptions

The CCWS components are described below. Design parameters for major components of CCWS are provided in Table 9.2.2-2.

9.2.2.2.1.1 CCW HX

The CCW HXs transfer heat from the CCWS to the ESWS. The CCW HXs are plate type. The CCW HXs are designated quality group C as defined in Regulatory Guide 1.26 (Ref. 9.2.11-3), seismic category I, and are designed in accordance with the requirements of the ASME Section III, class 3.

9.2.2.2.1.2 CCWP

The CCWP circulates cooling water through the CCW HX and the components cooled by CCWS.

The pumps are horizontal centrifugal pumps and driven by an ac powered induction motor.

The pumps are designated quality group C as defined in Regulatory Guide 1.26, seismic category I, and are designed in accordance with the requirements of the ASME Section III, class 3.

9.2.2.2.1.3 CCW Surge Tank

The CCW surge tanks are connected to the suction side of the CCWP. The surge tank accommodates the thermal expansion and contraction of the cooling water and potential leakage into or from the CCWS. Makeup water is supplied to the respective surge line.

The CCW surge tank is designated quality group C as defined in Regulatory Guide 1.26, seismic category I, and is designed to the requirements of the ASME Section III, class 3.

In case of a small leak out of the system, makeup water is supplied as necessary until the leak is isolated.

The makeup water can be supplied from the following systems:

- Demineralized water system (DWS) which supplies the demineralized water
- Primary makeup water system (PMWS) which supplies the deaerated water and primary makeup water
- Refueling water storage system (RWS) which supplies the refueling water

Deaerated water is used for initial filling of this system and demineralized water is used for automatic makeup when the tank water level reaches a low level setpoint.

If necessary, primary makeup water and refueling water may be used during an emergency. Refueling water storage pit is water source of seismic category I.

Water chemistry control of CCWS is performed by adding chemicals to the CCW surge tank to prevent long term corrosion that may degrade system performance. The CCW in the surge tank is covered with nitrogen gas to maintain water chemistry.

In order to provide redundancy for a passive failure (a loss of system integrity resulting in abnormal leakage), an internal partition plate is provided in the tank so that two separate surge tank volumes are maintained.

9.2.2.2.1.4 Piping

Carbon steel is used for the piping of the CCWS. Piping joints and connections are welded, except where flanged connections are required.

9.2.2.2.1.5 Valves

・**Header tie line isolation valve**

The function of this motor operated valve is to separate each subsystem into two independent trains during abnormal and accident conditions. This ensures each safety train is isolated from any potential passive failure in the non-safety portion or another safety train of the CCWS. This valve automatically closes upon the following signals,:

- Low- low water level signal of a CCW surge tank
- ECCS actuation signal and under voltage signal
- Containment Spray signal

・**Containment Spray/Residual Heat Removal Heat Exchanger (CS/RHRS HX) CCW Outlet Valve**

This normal closed motor operated valve automatically opens upon ECCS actuation signal plus the respective train CCW pump start signal to establish cooling water flow to the CS/RHR heat exchanger.

・**RCP Thermal Barrier HX CCW Return Line Isolation valve**

Two motor operated valves are located at the CCW outlet of the RCP thermal barrier Hx and close automatically upon a high flow rate signal at the outlet of this line in the event of in-leakage from the RCS through the thermal barrier Hx, and prevents this in-leakage from further contaminating the CCWS.

・**CCW Surge Tank Vent Valve and Relief Valve**

The surge tank vent valve opens upon CCW surge tank high pressure and this valve closes when the radiation monitor level exceeds its set point. The surge tank relief valve provides surge tank overpressure protection.

・**Other Relief Valve**

Other relief valves are provided to relieve the pressure buildup caused by potential thermal expansion when equipment is isolated.

- **Containment Isolation Valve**

Containment isolation valves are installed on CCW lines penetrating containment as described in Subsection 6.2.4.

- **Isolation valve between seismic category I portion and non-seismic category I portion**

Isolation valves are provided on each CCW supply line to the components located in the non-seismic category I buildings (turbine building (T/B) and A/B). These valves close to protect against CCW seismic category I out-leakage through the non-seismic category I portions by automatic closure upon the demand signals (See Figure 9.2.2-1).

CCW out-leakage through the non-seismic CCW return lines is prevented by check valves in the return lines.

9.2.2.2.2 System Operations

9.2.2.2.2.1 Normal Power Operation

During normal operation, at least one train from each subsystem is placed in service. A total of two CCWP and two CCW HXs are in operation. A combination of trains in service is trains A or B and trains C or D.

During this operating condition, an operating CCWP in each subsystem supplies CCW to all loops in the particular subsystem with cooling water temperature not exceeding 100 ^{0}F maximum.

CCWPs which are not in service are placed in standby and automatically start upon a low pressure signal of CCW header pressure.

9.2.2.2.2.2 Normal Plant Shutdown

After approximately four hours of normal plant cool down, when the reactor coolant temperature and pressure are reduced to approximately 350 ^{o}F and 400 psig, the standby CCW HXs and pumps are placed in service resulting in four trains (i.e. four CCWPs and four CCW HXs) in operation. The CCWS isolation valve for each of the CS/RHR HXs is opened to supply cooling water to these HXs.

The failure of one cooling train (i.e. failure in one pump or one HX) increases the time for plant cool down, however, it does not affect the safe operation of the plant. The plant can be safely brought to the cold shutdown condition with a minimum of two trains.

During plant cool down by the residual heat removal system, the CCW supply temperature to the various components is permitted to increase to 110 ^{o}F.

9.2.2.2.2.3 Refueling

During refueling, the required number of CCW HXs and pumps is determined by the heat load. Normally, three trains operate in this mode. The remaining train may be taken out of service for maintenance. An operating CCWP in each subsystem supplies CCW to all loops in service in the particular subsystem with a maximum CCW supply water temperature not exceeding 100 ^{o}F.

9.2.2.2.2.4 Loss of Coolant Accident

All CCWP are automatically actuated by ECCS actuation signal. The isolation valves for the CS/RHR HXs are automatically opened by the ECCS actuation signal and the same train CCWP start signal. The header tie line isolation valves are closed by an ECCS actuation signal in coincidence with an undervoltage signal, and the CCWS is separated into four individual trains (A, B, C and D). The header tie line isolation valves can be manually reopened from the MCR to restore RCP seal and SFP HX cooling, if required.

As a minimum, two trains are required to operate during a LOCA.

9.2.2.2.2.5 Loss of Offsite Power (LOOP)

In the case of a LOOP, all CCWPs are automatically loaded onto their respective Class 1E power sources. The CCWS continues to provide cooling of the required components.

As a minimum, two trains are required to operate during a LOOP.

9.2.2.3 Safety Evaluation

The CCWS is designed to perform its safety function with only two out of four trains operating. As shown in Table 9.2.2-3, the CCWS is completely redundant and a single failure does not compromise the system’s safety function even if one train is out of service for maintenance.

The safety-related portions of the CCWS is protected against natural phenomena and internal missiles. The following sections addresses natural phenomena and missiles protection.

- Section 3.3, Wind and tornado loadings;
- Section 3.4, Water Level (Flood) Protection;
- Section 3.5, Missile Protection;
- Section 3.7, Seismic Design;

Pipe rupture protection is addressed in Section 3.6, Protection against Dynamic Effects Associated with Postulated Rupture of Piping.

The CCWS continues to perform its safety function in the event of a fire. Subsection 9.5.1 addresses fire protection.

The R/B which contains safety-related portions of the CCWS is designed and constructed as a safety-related and seismic category I structure. The safety-related portions of the CCWS are designed and constructed as seismic category I.

Relief valves are provided on the components as necessary to prevent potential thermal overpressurization against over pressure of equipment and piping.

The CCWS is a closed system that is maintained in a water solid condition with a surge tank located at the highest point in the system thus preventing the potential for water hammer.

9.2.2.3.1 Leakage from Higher Pressure Components into CCWS

If leakage from a higher pressure component to the CCWS should occur, the water level of CCW surge tank increases and an alarm is transmitted to the MCR. If the in-leakage is radioactive, the radiation monitors of the CCWS also indicate in the MCR the increased radiation level and transmit an alarm when the radiation level reaches its set point. After the leak source is identified, the leak is isolated from the CCWS.

In the event that the in-leakage is through the RCP thermal barrier HX, the isolation valves on the RCP thermal barrier HX CCW return line are automatically closed by the high flow rate signal, thereby preventing further CCWS contamination.

9.2.2.3.2 Leakage from the CCWS

A decrease to the setpoint in the CCW surge tank water level initiates automatic makeup water to the surge tank and an alarm is transmitted to the main control room indicating a system leak. After the leak source is identified by visual inspection or by a change in individual CCW flow rate, the leak is isolated.

If the water level of the surge tank further decreases, the surge tank low-low water level signal is transmitted to the MCR and the header tie line isolation valves automatically close. Since the subsystem consists of two individual trains, the train with the leak can be isolated and the other train can be operated.

9.2.2.3.3 Sharing of CCWS

The CCWS is not shared with multi-units.

9.2.2.3.4 Prevention of Corrosion

Water chemistry of CCWS is controlled and maintained by adding chemicals and covering the surge tank with nitrogen gas to prevent long term corrosion that may degrade system performance.

9.2.2.3.5 RCP seal protection

Even in the event that the CCW to RCP is isolated by a containment spray actuation signal and the seal water injection from the CVCS is also lost, the containment isolation valves on the CCW supply and return lines can be manually reopened from the MCR to restore RCP seal cooling. As shown in Table 9.2.2-3, the CCWS is designed to restore CCW supply to the RCP thermal barrier HX, assuming any single failure.

9.2.2.3.6 RCP seal protection during SBO conditions

RCP seal integrity during SBO conditions is discussed in Section 8.4.

9.2.2.4 Inspection and Testing Requirements

9.2.2.4.1 Preoperational Testing and Inspection

Preoperational testing of the CCWS is performed as described in Section 14.2 to verify that system is installed in accordance with plans and specifications. The system is hydrostatically tested and is functionally tested to verify that the proper sequence of valve positions and pump starting occur on the appropriate signals. The pumps are tested to verify performance. Proper orifice installation and/or valve position settings are verified and adjusted, as required, to maintain proper flow balance in the system.

9.2.2.4.2 In-Service Testing and Inspection

During normal operation, the standby pump and CCW HX are periodically tested for operability or, alternatively, placed in service in place of the train which has been operating.

Descriptions of the testing and inspection programs for pumps and valves are provided in the following subsections and sections:

- Subsection 3.9.6, Functional design, qualification & in-service testing programs for pumps, valves & dynamic restraints;
- Subsection 6.2.4, Containment Isolation System (applicable to CCWS containment isolation valves);
- Section 6.6, In-service inspection & testing of class 2 & 3 components.

9.2.2.5 Instrumentation Requirements

9.2.2.5.1 CCW supply header pressure

CCW header pressure is indicated in the MCR. When the pressure decreases due to the failure or inadvertent shutdown of the operating pump or valve misalignment, an alarm is transmitted to the MCR and the standby pump is started.

9.2.2.5.2 CCW radiation monitor

Radiation monitors are located downstream of the supply headers and the signal is indicated in the MCR. When the signal exceeds the setpoint, an alarm is transmitted and the CCW surge tank vent valve is closed.

9.2.2.5.3 CCW supply header flow rate

The CCW supply header flow rates are indicated in the MCR.

9.2.2.5.4 CCW surge tank water level

The CCW surge tank water level is indicated in the MCR. If CCWS in-leakage or out-leakage occurs, a high or low water level alarm is transmitted to the MCR.

A low-low water level signal isolates the components located in the non-seismic category I buildings. In addition, the isolation valves on the header tie line are closed by a low-low water level signal and the subsystem, where the low-low water level signal is actuated, is divided into two independent trains for each train to supply the respective loop.

9.2.2.5.5 RCP thermal barrier HX and RCP motor cooling water flow rate

Reactor coolant pump thermal barrier HX and motor cooling water flow rate is indicated in the MCR. If the flow rate drops to its low flow setpoint, a low flow alarm is transmitted to the MCR. A high flow alarm, resulting from the in-leakage of reactor coolant to CCWS due to the reactor coolant pump thermal barrier HX tube leak, is transmitted to the MCR and the isolation valves located at cooling water return line are closed.

9.2.2.5.6 CCW surge tank pressure

The CCW surge tank pressure is locally indicated. The surge tank nitrogen cover gas supply valve and tank vent valve are controlled with open-closed control so that the tank pressures are maintained within a pre-set range. High and low surge tank pressures are alarmed in the MCR.

9.2.2.5.7 CCWP discharge and suction pressure

The CCW pump discharge and suction pressures are locally indicated and are used for CCW pump performance testing.

9.2.2.5.8 CCW supply temperature

The CCW HX outlet temperature is indicated in the MCR. When the temperature exceeds the setpoint, an alarm is transmitted to the MCR.

9.2.2.5.9 Other instrumentation

As shown in Figure 9.2.2-1, the other flow and temperature indicators are provided where required. These indicators are used for initial flow balancing, and flow and temperature verification during plant operation.

9.2.3 [Reserved]

Not applicable to the US-APWR.

9.2.4 Potable and Sanitary Water Systems

The objective of the potable and sanitary water system (PSWS) is to provide clean and potable water for domestic use and human consumption and to collect site sanitary waste for treatment, dilution and discharge during normal operation. The system serves all the areas in the T/B, R/B, A/B, access building, firehouse and future facilities.

9.2.4.1 Design Bases

There are no safety design bases for the potable and sanitary water system. The power generation design bases are as follows:

- The potable water system layout is designed with no interconnection and/or sharing between systems or between the units to prevent contamination due to potential radioactivity or due to backflow making water unfit for human consumption. This conforms to the requirement of GDC 60 (Ref. 9.2.11-1).

- The potable water is designed to be treated to prevent harmful physiological effects. Its bacteriological and chemical quality conforms to the requirements of the Environmental Protection Agency “National Primary Drinking Water Standards,” 40 CFR 141 (Ref. 9.2.11-4). All state and local environmental protection standards will also be followed, as these may be more stringent than federal requirements.

- The distribution of the potable water by the PSWS is in compliance to the “Occupational Safety and Health Standard.” 29 CFR 1910, 141 (Ref. 9.2.11-5).

- The supply capacity of potable water is to provide a quantity of potable water based on 20 gal/person/day for the largest number of persons expected to be at the station during a 24-hour period of power generation or outages. The potable water system is designed to provide a storage capacity of 25,000 gallons.

- 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.

- The system maintains a minimum pressure of 20 psig at the furthermost points in the distribution system.
- The sanitary drainage system is designed to accommodate 20 gallons/person/day for up to 3500 people during 24-hour period. The above number of people onsite is conservatively based on the largest number of people during plant construction. However, during normal operation, as well as during plant refueling outages, the number of people will be considerably less and the sanitary drainage capacity requirements is reduced. This may result in storage tank modifications based on reduced usage.
- Sanitary drainage from all remote buildings onsite will be directed to individual sump-lift station, supplied with sewerage grinder transport pump for discharge to a treatment facility. COL Applicant is to confirm that the sanitary waste is sent to the onsite plant treatment area or they will use the city sewage system.

9.2.4.2 System Description

9.2.4.2.1 General Description

The potable and sanitary water system flow diagram is shown in Figure 9.2.4-1. Major component data are provided in Table 9.2.4-1.

The source of water for the potable water system is from two existing onsite wells. The onsite wells are capable of supplying water to the potable water storage tank. The potable water system consists of a potable water storage tank, two potable water pumps, a jockey pump, a distribution loop around the power block, hot water heaters, and necessary interconnecting piping and valves. Disinfection is provided by a chlorination system installed upstream of the potable water storage tank. The pumps receive electrical power from site AC power sources. The disinfection chlorination is provided via a sodium hypochlorite (NaOCl) injection system, as chlorine is no longer utilized on US nuclear sites due to control room habitability issues with toxic gases. Depending on the site well water chemical analysis, filtration or other water treatment alternatives may be required.

The sanitary drainage system collects sanitary waste from various plant areas such as restrooms, locker rooms etc., and carries the wastewater for processing to the treatment facility. The sanitary drainage system does not serve any facilities in the radiologically controlled areas.

9.2.4.2.2 Component Description

9.2.4.2.2.1 Potable Water Storage Tank

The potable water storage tank consists of a 25,000-gal, internally coated, carbon steel tank which stores water for distribution throughout the plant. A certified organic coating or non-leachable coating will be utilized to line the carbon steel tank. High water level and low water level signals from this tank control the operation of the well water pumps.

Upon receipt of low potable water tank level, the well water pumps start, and the inlet valve to the potable water tank opens.

A low-low tank level signal stops/trips the potable water feed pumps to prevent damage to the pumps. High and low-level alarms are provided. Manual override of the automatic level controls is available.

9.2.4.2.2.2 Potable Water Pumps

Each of the two potable water pumps is a full-capacity, motor-driven pump taking suction from the potable water storage tank and discharging to the domestic water distribution header. The pumps are operated as required to meet potable water demand in the plant.

9.2.4.2.2.3 Jockey Pump

A continuously operated motor driven jockey pump, taking suction from the potable water storage tank, is used to supply potable water to the distribution header and to maintain the pressure of the system during low-flow requirement periods. A recirculation line to the potable water system storage tank is provided to keep uniform mixture of hypochlorite within the tank, thus preventing stagnation and providing pump protection.

9.2.4.2.2.4 Hot Water Heaters

Local potable water hot water heaters are used to produce hot water to building specific areas based on their requirements. Water from the potable water tank is supplied to the hot water heater, and which is then routed to the shower and toilet areas and to other plumbing fixtures and equipment requiring domestic hot water service. Local electric water heaters are provided as required to serve restricted or possible contaminated areas such as the MCR. Points of use, inline electric water heating elements are used to generate hot water for the MCR and the T/B areas.

9.2.4.2.2.5 Valves

American Society of Mechanical Engineers (ASME) Section III code rated and approved relief valves are provided on all equipment and in all piping requiring pressure relief.

9.2.4.2.3 System Operation

Water from the deep wells onsite is pumped and stored in the potable water storage tank. Low water level instrumentation in the potable water storage tank generates a signal to start the well water pumps and supply makeup to the potable water system storage tank. High water levels in the potable water system storage tank produce a signal that stops the well water pumps.

Prior to supply well water entering the potable water system storage tank, supply water is disinfected. A minimum residual chlorine level of 0.5 ppm is maintained in the supply water prior to entering the potable water system storage tank. The chlorination system is activated and deactivated by a flow signal generated by the fill valve located upstream of the potable water system storage tank.

Two potable water pumps and a jockey pump are used to supply potable water throughout the plant. The potable water system pumps are activated sequentially to maintain adequate pressure throughout the distribution system. A pressure transmitter is provided downstream of the potable water system pumps to control their start/stop sequences. The jockey pump operates continuously to maintain system pressure during low-flow requirement periods.

Potable water is supplied to areas that have the potential for contamination with radioactivity. Where this potential for contamination exists, the potable water system is protected by installing backflow prevention device.

No interconnections exist between the potable water system and any system using water for purposes other than domestic water service, including any potentially radioactive system. The water supply from the other sources supplying water to potentially radioactive systems is designed to use an air gap to prevent contamination of the potable water system from other systems.

9.2.4.3 Safety Evaluation

The potable and sanitary water system has no safety-related function and therefore requires no nuclear safety evaluation. The PSWS has no interconnection to any system or equipment having the potential for containing radioactive material, thus eliminating the possibility of such contamination to the system. The wastes produced by the potable and sanitary water system contain no radioactive materials and can be safely treated in the sewage treatment plant.

9.2.4.4 Inspection and Testing Requirements

- The potable water system is tested hydrostatically for leak-tightness and system inspection is performed in accordance with applicable plumbing code requirements.

- The presence of residual chlorine is confirmed through independent laboratory tests of samples at the potable water storage tank, and at other sampling points (grab samples) if required.

- Periodic tests for microbiological and bacteria in the potable water, as well as the plant low volume and sanitary wastes, are conducted.

9.2.4.5 Instrumentation Requirements

- Thermostats, high-temperature limit switches, and temperature gauges as required are installed on the potable water system hot water supply. Pressure regulators are employed in those sections of the distribution system where pressure restrictions are imposed.

- Flow instrumentation associated with the potable water storage tank fill valve, provides input control signal for the chlorinator.
- A storage tank water level indicator with alarm signals, control signals for the fill valve and the potable water pumps is provided. The potable water pumps are tripped on low-low water level in the potable water system storage tank.
- A pressure transmitter located on the discharge of the potable water system pumps controls the stop/start sequence of the pumps.
- Instrumentation is provided for the continuous operation of the jockey pump to maintain system pressure during low-flow requirement periods.
- Instrumentation is provided for indication and for automatic potable water system pump start if the jockey pump fails to maintain system pressure.
- Instrumentation necessary for proper operation of all three pumps to satisfy the system distribution flow rates and to maintain an acceptable system pressure is provided.

9.2.5 Ultimate Heat Sink

The ultimate heat sink (UHS) consists of an assured source of water with associated safety-related structures designed to dissipate the heat rejected from the ESWS during normal and accident conditions. The UHS is designed to meet the requirements of Regulatory Guide 1.27 (Ref. 9.2.11-2).

9.2.5.1 Design Bases

The UHS is designed to dissipate the maximum possible total heat load, including that of a LOCA under the worst combination of adverse environmental conditions, even freezing, and cool the unit for a minimum of 30 days (or 36 days for cooling pond in accordance with Regulatory Guide 1.27) without makeup water. The UHS is designed for a single nuclear power unit and is not shared between units.

The UHS design bases to meet the safety-related functional requirements are provided below:

- The UHS is designed in accordance with the requirements of Regulatory Guide 1.27.
- The maximum ESW temperature is 95 ºF.
- The UHS along with ESWS is designed to remove the peak heat loads rejected from the ESWS under normal and accident conditions in order to mitigate the consequences of a design basis event and for a safe shutdown with or without offsite power.

- The UHS is designed so that a single failure coincident with a loss of offsite power (LOOP) does not result in inadequate core cooling or prevent a safe shutdown under extreme meteorological conditions.
- The safety-related structures and components of the UHS are designed to be protected against natural phenomena.
- The safety-related components of the UHS are designed to withstand design loadings.
- Provision is provided to protect the UHS essential structures and components against adverse environmental conditions such as freezing.
- The UHS is designed with inventory sufficient to provide cooling for at least 30 days (or 36 days for cooling pond in accordance with Regulatory Guide 1.27) following an accident, with no makeup water. The COL Applicant is to decide the cooling period in accordance with the site specific UHS. The most severe meteorological condition is based upon 30 years maximum historical conditions of dry and wet bulb temperatures.
- The safety-related structures and components of the UHS are designed to equipment Class 3 and seismic category I requirements to remain functional during and following an SSE.

9.2.5.2 System Description

The UHS is designed in accordance with the requirements of GDC 2, GDC 44, GDC 45 and GDC 46, and Regulatory Guide 1.27. The UHS is designed for a single nuclear power unit and is not shared between units.

The decay heat is estimated using ANSI/ANS 5.1, ‘Decay Heat Power for Light Water Reactors” (Ref. 9.2.10-6).

The UHS operates in conjunction with the ESWS. The ESWS is described in Section 9.2.1.

The COL Applicant is to determine the type of UHS (e.g. cooling pond, cooling towers) based on specific site conditions and meteorological data.

The COL Applicant is to provide a detailed description and drawings of the UHS, including water inventory, temperature limits, heat rejection capabilities under limiting conditions, instrumentation, and alarms.

The COL Applicant is to determine the source of makeup water to the UHS inventory and the blowdown discharge location. The blowdown discharge is provided as a check point for monitoring and neutralizing chemistry of ESW discharges to the environment.

The COL Applicant is to determine source and location of the UHS.

The COL Applicant is to determine location and design of the ESW intake structure.

The COL Applicant is to determine location and design of the ESW discharge structure.

9.2.5.3 Safety Evaluation

The COL Applicant will provide results of UHS capability and safety evaluation of the UHS based on specific site conditions and meteorological data.

The UHS is sufficiently sized to accept the heat rejected (Table 9.2.5-1) from the ESWS.

The heat loads for LOCA and safe shutdown conditions with LOOP for up to 36 days are provided in Table 9.2.5-2.

9.2.5.4 Inspection and Testing Requirements

The COL Applicant will provide test and inspection details based on type of UHS to be provided. These details will include inspection and testing requirements necessary to demonstrate that fouling and degradation mechanisms are adequately managed to maintain acceptable UHS performance and integrity.

9.2.5.5 Instrumentation Requirements

The COL Applicant will provide the required alarms, instrumentation and controls details based on the type of UHS to be provided.

9.2.6 Condensate Storage Facilities (Demineralized Water, Condensate Storage, and Primary Makeup Water)

The condensate storage facilities (CSF) system consists primarily of three systems:

- Demineralized water system
- Condensate storage and transfer system
- Primary makeup water system

The demineralized water treatment package is not within the scope of this DCD. The demineralized water treatment package supplies demineralized water to demineralized water storage tank (DWST), which in turn supplies demineralized water to the condensate storage tank (CST), primary makeup water tanks (PMWTs), and other users throughout the plant.

The CSF system is shown schematically in Figures 9.2.6-1, 9.2.6-2, and 9.2.6-3.

9.2.6.1 Design Bases

9.2.6.1.1 Safety-Related Design Basis

The CSF system has no safety-related function and therefore has no nuclear safety design basis.

9.2.6.1.2 Power Generation Design Basis

The demineralized water system is designed to provide:

- Sufficient demineralized water volume for makeup of the CST and to meet the demands and usages of the demineralized water in various other plant systems.
- Sufficient water capacity to provide deaerated water to various users.
- Sufficient water capacity to provide demineralized water to various users.
- Water for filling of the emergency feedwater pits of the emergency feedwater system.

The condensate storage and transfer system is designed to provide:

- Inventory for the condenser hotwell and secondary side water.
- Inventory to simultaneously fill all condenser shells for condenser leak testing.
- A reservoir to supply or receive condensate as required by the condenser hotwell level control system.
- Adequate capacity and head for the condensate transfer pumps for the distribution of condensate.

The primary makeup water system is designed to provide:

- Inventory to provide deaerated water to various users downstream of the primary makeup water tanks.
- Adequate capacity and head for the primary makeup water pumps for the distribution of deaerated water.

9.2.6.2 System Description

Main components of the CSF are located in the yard. The demineralized water system consists of one DWST, two 100% capacity demineralized water pumps, and associated valves, piping, and instrumentation.

The condensate storage and transfer system consists of one CST, two 100% capacity condensate transfer pumps, and associated valves, piping, and instrumentation.

The condensate transfer pump takes suction from the CST and discharges into the condenser hotwell. This operating mode is primarily used for the initial fill of the condensate system and subsequent makeup as required. During normal plant operation, condensate flows by vacuum drag/pressure differential from the CST to the condenser hotwell via a bypass line. The water level in the hotwell is automatically maintained by level control valves. A recirculation line from the condensate transfer pump to the CST is provided to ensure that the minimum flow through the pump is maintained during pump operation.

The primary makeup water system consists of two PMWTs, each of 140,000 gallon capacity, two 100% capacity primary makeup water pumps, and associated valves, piping, and instrumentation.

All system components meet design code requirements consistent with the component quality group and seismic design classification in provided in Section 3.2. Provision is made for mitigating the environmental effects of system leakage or storage tank failure.

The CSF system is shown schematically in Figures 9.2.6-1, 9.2.6-2 and 9.2.6-3.

9.2.6.2.1 Demineralized Water Storage Tank

The DWST is the normal source of demineralized water for supplying water to the CST and the emergency feedwater pits. It is also the normal source for supplying deaerated water to primary makeup water tanks, various primary system users, the secondary side chemical injection system and condensate polishing system, as shown in Figure 9.2.6-1. The DWST also supplies demineralized water to other users, as shown in Figure 9.2.6-2. Makeup to the CST is provided from the DWST.

Design parameters of the DWST are shown in Table 9.2.6-1.

9.2.6.2.2 Demineralized Water Transfer Pumps

Two 100% capacity demineralized water transfer pumps are provided. The demineralized water transfer pumps take suction from the DWST and discharge into a header that supplies demineralized water to various plant users, as shown in Figure 9.2.6-1. Design parameters of the demineralized water transfer pumps are shown in Table 9.2.6-1

9.2.6.2.3 Deaeration Package

The deaeration package reduces the oxygen concentration of the demineralized water.

9.2.6.2.4 Condensate Storage Tank

The CST is the normal source of water for make up to certain plant systems including the main condenser. The CST is a source of water for supply to various locations such as areas near equipment that need water for maintenance and drain tanks. Makeup to the CST is provided from the DWST.

Design parameters of the CST are shown in Table 9.2.6-1.

The water chemistry in the CST is maintained in accordance with Table 9.2.6-2.

9.2.6.2.5 Condensate Transfer Pumps

Two 100% capacity condensate transfer pumps are provided. The condensate transfer pumps take suction from the CST and supply condensate to the condenser hotwell and various other users throughout the plant as shown in Figure 9.2.6-1. Design parameters of the condensate transfer pumps are shown in Table 9.2.6-1.

9.2.6.2.6 Primary Makeup Water Tanks

Two 140,000 gallon capacity PMWTs are provided. Each tank is provided with a diaphragm that is in continuous contact with the tank water to prevent absorption of oxygen from air. The top of the diaphragm is blanketed with deaerated, demineralized water. The tanks receive deaerated, demineralized water from the DWST. They also receive distilled water discharged from the boric acid evaporator (subsection 9.3.4). Normally, one tank supplies water to the users, while the other tank is standby. Each tank has sufficient capacity to serve all users. Each tank is provided with level and other instrumentation as shown in Figure 9.2.6-2. Design parameters of the PMWT are shown in Table 9.2.6-1.

9.2.6.2.7 Primary Makeup Water Pumps

Two 100% capacity primary makeup water pumps are provided. The pumps take suction from the PMWT and supply deaerated, demineralized water to plant users as shown in Figure 9.2.6-2. Each pump is a centrifugal pump with 275 gpm capacity. Design parameters of the primary makeup water pumps are shown in Table 9.2.6-1.

9.2.6.3 Safety Evaluation

The CSF system has no safety-related function, and therefore requires no nuclear safety evaluation.

9.2.6.4 Inspection and Testing and Inspection Requirements

The initial preoperational acceptance testing demonstrates proper equipment functioning and system operation. The system's normal functionality is demonstrated by the continuous use during normal plant operation in accordance with the requirement of chapter 14.

9.2.6.5 Instrumentation Requirements

The condensate storage facilities are provided with instrumentation, as shown in Figures 9.2.6-1, 9.2.6-2 and 9.2.6-3 to monitor, control, and perform manual or automatic system functions and protect system components.

The CSF System contains a number of automatic on/off valves for its operation in an automatic, semi-automatic, or manual mode.

9.2.6.5.1 Pressure Indicators

Local pressure indication is provided for the pumps.

9.2.6.5.2 Level Transmitters and Level Switches

Level transmitter and associated signal processor units are provided to monitor and indicate water level in the storage tanks. The level in each storage tank is measured and indicated locally and in the MCR. High and low levels are alarmed in the MCR. On a high level alarm, the influent line valves on top of the tank are automatically closed. On a low level alarm, the transfer pumps trip.

9.2.6.5.3 Flow Indicators and Flow Transmitters

Flow indicators and flow transmitters are provided as shown in Figures 9.2.6-1, 9.2.6-2, and 9.2.6-3.

9.2.7 Chilled Water System

The plant HVAC systems require chilled water as a cooling medium to satisfy the indoor ambient temperatures. The chilled water system encompasses two independent closed loop systems, which are the essential chilled water system and the non-essential chilled water system.

Essential Chilled Water System

The function of the essential chilled water system is to provide, during normal and emergency operation, chilled water for the plant safety related air-cooling and ventilation systems, these include the following:

- MCR HVAC system
- Class 1E electrical room HVAC system
- Safeguard component area HVAC system
- Emergency feedwater pump area HVAC system
- Safety related component area HVAC system

Non-Essential Chilled Water System

The function of the non-essential chilled water system is to provide, during plant normal operation and LOOP, chilled water for the plant air cooling and ventilation systems serving the non-safety related areas.

9.2.7.1 Design Bases

9.2.7.1.1 Essential Chilled Water System

9.2.7.1.1.1 Safety Design bases

The essential chilled water system is designed to satisfy the following safety design bases.

- The essential chilled water system equipment and component pressure boundary are designed in compliance with ASME Section III.
- A single failure of any active component, or LOOP, cannot result in a loss of chilled water service to the plant safety-related cooling and ventilation systems.
- The essential chilled water system and its distribution piping loop are designed to equipment class 3 and seismic category I to remain functional during and following a SSE.
- Casings of the chiller refrigerant compressor and the chilled water pumps are designed to withstand penetration by internally generated missiles.
- The essential chilled water system withstands the effects of adverse environmental, operating and accidental conditions.
- The essential chilled water system withstands the effects of tornadoes and tornado missiles.
- The essential chilled water system withstands the design loadings.

9.2.7.1.1.2 Power Generation Design Bases

The essential chilled water system is designed to satisfy the following power generation design bases.

- The essential chilled water system supplies 40° F chilled water to the HVAC systems cooling coils during normal operation and design basis accidents.
- The essential chilled water system provides accessibility for adjustment, periodic inspection, and maintenance activities to assure continuous functional reliability.

9.2.7.1.2 Non-Essential Chilled Water System

9.2.7.1.2.1 Safety Design Bases

The non-essential chilled water system, with the exception of piping and valves between and including the safety-related and seismic category I containment isolation valves, is classified as non-safety related, non-seismic category I system. This system is designed to satisfy the following safety design basis.

- The non-essential chilled water system provides containment isolation of the chilled water lines penetrating the containment.

9.2.7.1.2.2 Power Generation Design Bases

The non-essential chilled water system is designed to satisfy the following power generation design bases.

- The non-essential chilled water system supplies 40°F chilled water to the HVAC systems cooling coils during plant normal operation and LOOP.
- The non-essential chilled water system pressure boundary and pressure boundary components are designed to meet ASME Section VIII, and ASME/ANSI B31.1.
- The non-essential chilled water system does not serve any safety function. Therefore, the single failure criterion does not apply.
- The non-essential chilled water system provides accessibility for adjustment, periodic inspection, and maintenance activities to assure continuous functional reliability.

9.2.7.2 System Description

9.2.7.2.1 Essential Chilled Water System

The essential chilled water system flow diagram is shown in Figure 9.2.7-1, equipment and component data is presented in Table 9.2.7-1.

The essential chilled water system consists of four independent trains and each train consists of one 50% capacity system. Each system includes, a water-cooled chiller, a chilled water pump, a compression tank with a make-up water line, a chilled water distribution loop, and instrumentation and control system. The condenser (heat rejection) section of each chiller is supplied with cooling water from the respective essential service water system during both normal and emergency operating conditions.

During LOOP, each of the essential chilled water system is powered from the respective safety emergency power source.

The chiller of each essential chilled water system is equipped with an integral chilled water temperature control system.

The essential chilled water system control maintains the chilled water supply temperature. The compression tank maintains the system pressure within the design operating range.

Upon receipt of an ECCS actuation signal, all essential chillers and chilled water pumps are energized.

9.2.7.2.2 Non-Essential Chilled Water System

The non-essential chilled water system consists of four water-cooled chillers, four chilled water pumps, a compression tank with a make-up water line, a chilled water distribution loop, and an instrumentation and control system. The condenser (heat rejection) section of each chiller is supplied with cooling water from a dedicated cooling tower. Each chiller is sized for one-third of the total non-essential chilled water load.

When the non-essential chilled water system is energized, the chilled water pump, the condenser water pump, and the cooling tower fans will start. When both the chilled and condenser water flows are established, the chillers will start to satisfy the plant non-safety cooling load. The non-essential chilled water system control maintains the chilled water supply temperature at the design setpoint. The compression tank maintains the system pressure within the design operating range.

During the LOOP condition, the non-essential chilled water system is powered from the alternate ac power source.

9.2.7.3 Safety Evaluation

9.2.7.3.1 Essential Chilled Water System

The physical separation of the redundant system and the associated components assures the continuous operation of the essential chilled water system.

The system is classified as equipment class 3, seismic category I. The system pressure boundary is designed in accordance with ASME Section III to assure the continuous integrity of the system pressure boundary under all modes of operation.

Redundant systems are powered by separate safety related buses and their heat rejection sections (condenser) are provided with cooling from separate safety related essential service water system.

Casings of the chiller refrigerant compressor and the chilled water pumps are designed to withstand penetration by internally generated missiles.

The essential chilled water system is protected from natural phenomenon by virtue of its location in a seismic category I structure.

9.2.7.3.2 Non-Essential Chilled Water System

With the exception of piping and valves between and including the containment isolation valves, the system does not perform any safety function.

9.2.7.4 Testing and Inspection Requirements

9.2.7.4.1 Essential Chilled Water System

Chillers and chilled water pumps are hydrostatically tested in accordance with ASME Section III.

The system is provided with adequate instrumentation, temperature and pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

Preoperational testing of the essential chilled water system is performed as described in Chapter 14, Verification Programs, to verify that system is installed in accordance with programs and specifications. The system is hydrostatically tested and is functionally tested to verify that pump is activated on the appropriate signals. The pumps are tested to verify performance.

During normal operation, the standby trains are periodically tested for operability or, alternatively, placed in service in place of the train that has been operating.

Descriptions of the testing and inspection programs for pumps and valves are provided in Chapter 3, Subsection 3.9.6, Functional Design, Qualification, and In-Service Testing Programs for Pumps, Valves and Dynamic Restraints.

9.2.7.4.2 Non-Essential Chilled Water System

The chillers, chilled water pumps, and condenser water pumps are hydrostatically tested in accordance with ASME Section VIII.

The system is provided with adequate instrumentation, temperature and pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

The description of the testing of containment isolation valves is provided in Chapter 6, Subsection 6.2.4, Containment Isolation System (applicable to non-essential chilled water system containment isolation valves).

The description of the inspection and testing of equipment class 2 containment isolation components is provided in Chapter 6, Section 6.6, Inservice Inspection of Class 2 and 3 Components.

9.2.7.5 Instrumentation Requirements

9.2.7.5.1 Essential Chilled Water System

Instrumentation for controlling and monitoring the essential chilled water system meets the requirements of IEEE Std. 603 and are qualified in accordance with IEEE Std. 323 and IEEE Std. 344.

The following instrumentation and controls servicing the essential chiller water system and provided in the MCR include:

- Temperature indication of entering and leaving chilled water with an alarm for leaving chilled water temperature exceeding the design limit
- High and low pressure alarms of the compression tanks
- Chilled water flow failure of the chilled water pumps
- Categorical alarms for chiller operation malfunction

The following local instrumentation is provided for surveillance and maintenance:

- Temperature indicator for chillers, chilled water and condenser water entering and leaving water flows
- Pressure indicator at chilled water and condenser water entering and leaving water flows
- Pressure indicator at the chilled water pumps suction and discharge nozzles
- Chiller oil pressure indicators, suction pressure indicator and discharge pressure indicators

9.2.7.5.2 Non-Essential Chilled Water System

The following instrumentation and controls serving the non-essential chilled system and provided in the MCR include:

- Temperature indication of entering and leaving chilled water and condenser water with an alarm for leaving chilled water temperature exceeding the design limit
- High and low pressure alarms of the compression tanks
- Chilled water flow failure of the chilled water pumps
- Categorical alarms for chiller operation malfunction

The following local instrumentation is provided for surveillance and maintenance:

- Temperature indicator for chillers, chilled water and condenser water entering and leaving water flows
- Pressure indicator at chilled water and condenser water entering and leaving water flows
- Pressure indicator at the chilled water pumps suction and discharge nozzles

- Chiller oil pressure indicators, suction pressure indicator and discharge pressure indicators

9.2.8 Turbine Component Cooling Water System

The turbine component cooling water system (TCS) provides chemically treated, demineralized cooling water for the removal of heat from various T/B heat loads and rejects the heat to the non-essential service water system.

9.2.8.1 Design Basis

9.2.8.1.1 Safety Design Basis

The TCS has no safety-related function and therefore has no nuclear safety design basis.

9.2.8.1.2 Power Generation Design Basis

- The TCS provides cooling water to equipment during normal plant operation.

- The cooling water is treated with a corrosion inhibitor and uses demineralized water for makeup. The system is equipped with a chemical addition tank to add chemicals to the system.

- The heat sink for the TCS is the non-essential service water system. The heat is transferred to the non-essential service water through plate type heat exchangers (HXs).

- The TCS can provide its system function with one of the TCS pumps or HXs out of service.

9.2.8.2 System Description

9.2.8.2.1 General Description

The TCS system is a closed loop system that functions as an intermediate system between the various components cooled by TCS system and the non-ESW system (See subsection 9.2.9). The system consists of three 50% capacity pumps, three 50% capacity HXs, one stand pipe, one chemical addition tank, associated piping, valves, controls, and instrumentation. Heat is removed from the TCS by the non-ESW system via the HXs. Figure 9.2.8-1 shows the TCS configuration.

The pumps take suction from a single return header. Any two of the three pumps operate in conjunction with any two of the three HXs. Discharge flows from the HXs combine into a single supply header. Branch lines then distribute the cooling water to the various components in the T/B. The flow rates to the individual components are controlled either by flow restricting orifices or by control valves, according to the requirements of the cooled systems. Valves are provided to isolate individual components, where required, to permit maintenance. A control valve is located on the TCS HXs outlet and bypass line to maintain the TCS outlet water temperature constant.

The system is kept full of demineralized water by a stand pipe which is located at the highest point in the system. The stand pipe connects to the system return header. A stand pipe is provided to maintain the net positive suction head for the TCS pumps. The condensate storage facilities provides makeup water to the stand pipe for initial system filling or to accommodate leakage. The stand pipe is vented to the atmosphere.

A chemical addition tank is provided in the line from the pump discharge header back to the pump suction header to facilitate mixing and addition of chemicals to the TCS to inhibit corrosion in piping and components. A TCS water sample is periodically taken and analyzed to verify that water quality is maintained.

9.2.8.2.2 Component Description

9.2.8.2.2.1 Pumps

Three pumps are provided. Any two pumps provide adequate pumping capacity for circulation of cooling water throughout the system. The pumps are horizontal, centrifugal pumps, and are constructed of carbon steel.

9.2.8.2.2.2 Heat Exchangers

Three HXs are arranged in a parallel configuration. Two of the HXs are in use during normal power operation and water flow splits between them.

The HXs are plate type HXs. TCS water circulates through one side of the heat exchanger while non-ESW flows through the other side. During system operation, the TCS water in the heat exchanger is maintained at a higher pressure than the non-ESW so that leakage of non-ESW into the TCS water system does not occur. The HXs are constructed of titanium plates.

9.2.8.2.2.3 Stand Pipe

The stand pipe accommodates changes in the cooling water volume due to changes in operating temperature and also accommodates minor leakage into or out of the system. The stand pipe is constructed of carbon steel.

9.2.8.2.2.4 Chemical Addition Tank

The chemical addition tank is constructed of carbon steel. The tank is normally isolated from the system and is provided with a hinged closure for addition of chemicals.

9.2.8.2.2.5 Valves

Manual isolation valves are provided upstream and downstream of each pump. The pump isolation valves are normally open but may be closed to isolate the non-operating pump and allow maintenance during system operation.

Manual isolation valves are provided upstream and downstream of each TCS heat exchanger. One heat exchanger is normally isolated from system flow during power operation.

An air operated outlet and bypass valve around the TCS HXs controls the outlet cooling water temperature at a constant value during startup and normal operation.

An air operated valve is provided to control makeup water to the stand pipe for system filling and for accommodating leakage from the system.

9.2.8.2.3 System Operation

9.2.8.2.3.1 Startup

The TCS is placed in operation during the plant startup sequence after the non-ESW system is in operation but prior to the operation of systems that require TCS. The system is initially filled by the condensate storage and transfer system through a fill line to the stand pipe. The system is placed in operation by starting one of the pumps.

9.2.8.2.3.2 Normal Operation

During normal operation, two TCS pumps and two HXs are adequate to perform the design function. The standby pump is aligned to automatically start upon low discharge header pressure.

During normal operation, leakage from the system will be replaced by makeup from the condensate storage and transfer system through the automatic makeup valve. Makeup can be controlled either manually or automatically upon reaching low level in the stand pipe.

9.2.8.2.3.3 Shutdown

The system is taken out of service during plant shutdown when no longer needed by the components being cooled. The standby pump is taken out of automatic control and the operating pumps are stopped.

9.2.8.3 Safety Evaluation

The TCS has no safety-related function and therefore requires no nuclear safety evaluation.

9.2.8.4 Inspection and Testing Requirements

The performance, structural, and leak-tight integrity of system components is demonstrated by operation of the system. Preoperational testing is described in Chapter 14.

9.2.8.5 Instrumentation Requirements

Indicating devices (e.g., pressure, temperature, level, and flow indicators) are provided as required for monitoring the system operation.

Flow indication is provided in the makeup line to stand pipe.

Temperature indication is provided for locations upstream and downstream of the TCS HXs.

Pressure indication is provided for each TCS pump suction and discharge.

Level instrumentation on the stand pipe provides level indication and both low and high level alarms in the MCR.

Stand pipe level control valve actuates to provide makeup flow by controlling normal water level of the stand pipe.

A pressure transmitter is provided in the TCS discharge header for automatic start of the standby TCS pump.

9.2.9 Non-Essential Service Water System

The non-essential service water (non-ESW) system provides cooling water to remove heat from the TCS. The heat is removed via the TCS heat exchanger and discharged to the heat sink via the circulating water system (CWS).

9.2.9.1 Design Bases

9.2.9.1.1 Safety Design Bases

The non-ESW system has no safety-related function and therefore has no nuclear safety design basis.

9.2.9.1.2 Power Generation Design Bases

The following is a list of the non-safety power generation design bases:

- The non-ESW system provides cooling water to the TCS HXs located in the T/B.
- The non-ESW system is designed to transfer heat to the CWS during all modes of plant operation.
- The non-ESW system is designed with redundant components available during all modes of normal power operation.

9.2.9.2 System Description

9.2.9.2.1 General Description

The non-ESW system is a once through system that draws water from the circulating water piping at the condenser inlet and returns water to the CWS piping at the condenser outlet after passing through the TCS HXs.

The system is composed of three 50% capacity non-ESW system pumps, three 50% capacity TCS HXs, two 100% capacity strainers, piping, valves, controls and instrumentation.

Figure 9.2.9-1 shows the non-ESW system configuration. Equipment and component classification and applicable codes and standards are provided in section 3.2

The non-ESW pumps located in the T/B, take suction from the circulating water piping and pumps water through the strainers and the TCS HXs to a common discharge header. The heat from TCS is removed in the HXs by non-ESW system and the heated water is returned to the cooling tower through the circulating water piping.

The non-ESW system is arranged such that any two of three pumps can operate in conjunction with any two of three TCS HXs to meet system flow requirements. One out of two 100% capacity strainers is used. The pumps take suction from a common header and the discharge flows from the HXs combine into a common discharge header.

The temperatures in the system are moderate and the fluid pressure in the system is kept higher than the above saturation conditions at all locations in the system. This along with the control of valves and other design features of the system arrangement minimizes the potential for transient water hammer.

The non-ESW system operates during all modes of normal power operation.

The design of this system is based on the design service water temperature of 88.5 ^{o}F and the design pressure of 100 psig. The TCS water in the heat exchanger is maintained at a higher pressure than the non-ESW system so leakage of non-ESW water into the TCS does not occur, thereby preventing TCS contamination.

9.2.9.2.2 Component Description

The non-ESW system component parameters are listed in Table 9.2.9-1.

9.2.9.2.2.1 Turbine Component Cooling Water Heat Exchanger

Three 50% capacity TCS HXs are provided for heat transfer between TCS system and non-ESW. The HXs are plate type. These HXs are part of TCS and are described in subsection 9.2.8.

9.2.9.2.2.2 Non-essential Service Water Pump

Three 50% capacity non-ESW pumps are provided to supply cooling water to remove heat from the TCS HXs.

The pumps are horizontal, centrifugal, electric motor driven located in the T/B.

Each pump is designed to provide approximately 13,500 gpm flow, developing 90 feet total dynamic head. This meets the maximum flow requirement for normal power operation (based on two pumps in operation) and therefore one pump can be out of service for maintenance during power operation.

9.2.9.2.2.3 Non-essential Service Water Strainer

Two 100% capacity, automatic self-cleaning strainers are located in the T/B. The strainer will backwash if the differential pressure across the strainer exceeds a pre-determined set pressure. The strainer can also be manually backwashed.

9.2.9.2.2.4 Piping

Carbon steel piping designed, fabricated, installed and tested in accordance with ANSI B31.1 Power Piping Code (Ref. 9.2.11-8) is used for the non-ESW system.

9.2.9.2.2.5 Valves

Since the water in this system does not normally contain radioactivity, any special provisions against the leakage to the atmosphere are not necessary. All valves in the process flow path are butterfly valves. Isolation valves upstream and downstream of each component are provided. The isolation valves for the TCS HXs are used during normal power operation to align the two HXs to be used and by isolating the third heat exchanger by closing its inlet and outlet valves. The isolation valve in the suction line to the non-operating pump is left open to facilitate quick start of the pump if required.

The service water strainers are provided with an air operated backwash valve, which opens during a backwash cycle.

9.2.9.2.3 System Operation

9.2.9.2.3.1 Startup

The system is placed in service during plant startup after the circulating water system is in operation but prior to the operation of the TCS. Non-ESW system operation is initiated by starting one of the non-ESW pumps.

9.2.9.2.3.2 Normal Operation

During normal operation, two non-ESW pumps, two TCS HXs, and one strainer are in service. The standby pump is aligned to automatically start upon low discharge header pressure.

The system layout, design features, and operation minimize the potential for water hammer transients. All system components are designed to withstand system transients during startup, shutdown, or accidental loss of an operating pump. All component materials are suitable for cooling water chemistry and chemicals are used to prevent organic fouling and corrosion.

9.2.9.2.3.3 Shutdown

The system is removed from service during plant shutdown when cooling of the TCS is no longer required and prior to shutdown of the circulating water system.

9.2.9.3 Safety Evaluation

The non-ESW system has no safety-related function and therefore requires no nuclear safety evaluation.

9.2.9.4 Inspection and Testing Requirements

The performance, structural, and leak-tight integrity of system components is demonstrated by operation of the system. Preoperational testing is described in Chapter 14.

9.2.9.5 Instrumentation Requirements

Parameters important to system operation are monitored in the MCR.

Pressure indication and pressure transmitters with low pressure alarms are provided for the non-ESW pump discharge header. A low pressure signal is alarmed and the standby non-ESW pump is automatically started. Flow indicators with low flow alarms are provided in each TCS heat exchanger outlet line.

Temperature indication is provided for the service water supply to and discharge from each TCS heat exchanger to determine the temperature differential across the heat exchanger. The temperature differential is used for monitoring heat exchanger performance.

Differential pressure measurement across the strainer is provided and a high differential pressure is alarmed. The operator places the standby strainer in service, isolates the clogged strainer, and initiates a manual backwash.

9.2.10 Combined License Information

Information for following items is required to be provided in support of the Combined License Application:

COL 9.2(1) The COL Applicant is to provide the evaluation of the ESWP at the lowest probable water level of the UHS.

COL 9.2(2) The COL Applicant is to provide the protection against adverse environmental, operating, and accident conditions that can occur, such as freezing, thermal overpressurization.

COL 9.2(3) The COL Applicant is to determine source and location of the UHS.

COL 9.2(4) The COL Applicant is to determine location and design of the ESW intake structure.

COL 9.2(5) The COL Applicant is to determine location and design of the ESW discharge structure.

COL 9.2(6) The COL Applicant is to provide ESWP design details – required total dynamic head, NPSH available etc.

COL 9.2(7) The COL Applicant is to provide the piping, valves and other design of the ESWS related to the site specific conditions, including the safety evaluation.

COL 9.2(8) The COL Applicant is to specify ESW chemistry requirements.

COL 9.2(9) COL Applicant is to confirm the storage capacity and usage of the potable water.

COL 9.2(10) COL Applicant is to confirm that all State and Local Department of Health of Natural Resources Environmental Protection Standards are applied and followed.

COL 9.2(11) The COL Applicant is to confirm the source of potable water to the site and the necessary required treatment.

COL 9.2(12) COL Applicant is to confirm that the sanitary waste is sent to the onsite plant treatment area or they will use the city sewage system.

COL 9.2(13) COL Applicant is to identify the portable water supply and describe the system operation.

COL 9.2(14) COL Applicant is to confirm Table 9.2.4-1 for required components and their values.

COL 9.2(15) The COL Applicant is to determine the total number of people at the site and identify the usage capacity. Based on these numbers the COL Applicant is to size the potable water tank and associated pumps.

COL 9.2(16) The COL Applicant is to provide values to the component Table 9.2.4-1 based on the calculations performed for COL 9.2.4.2.1

COL 9.2(17) The COL Applicant is to determine the total number of sanitary lift stations and is to size the appropriate interfaces.

COL 9.2(18) The COL Applicant is to determine the type of the UHS based on specific site conditions and meteorological data.

COL 9.2(19) The COL Applicant is to design the UHS to receive its electrical power supply, if required by the UHS design, from safety busses so that the safety functions are maintained during LOOP. The UHS also receives its standby electrical power from the onsite emergency power supplies during a LOOP.

COL 9.2(20) The COL Applicant is to provide a detailed description and drawings of the UHS, including water inventory, temperature limits, heat rejection capabilities, instrumentation, and alarms.

COL 9.2(21) The COL Applicant is to determine the source of makeup water to the UHS inventory and the blowdown discharge location based on specific site conditions.

COL 9.2(22) The COL Applicant is to provide results of UHS capability and safety evaluation of the UHS based on specific site conditions and meteorological data. The COL Applicant is to use at least 30 years site specific meteorological data and heat loads data for UHS performance analysis.

COL 9.2(23) The COL Applicant is to provide test and inspection requirements of the UHS. These is to include inspection and testing requirements necessary to demonstrate that fouling and degradation mechanisms are adequately managed to maintain acceptable UHS performance and integrity.

COL 9.2(24) The COL Applicant is to provide the required alarms, instrumentation and controls details based on the type of UHS to be provided.

9.2.11 References

9.2.11-1 General Design Criteria for Nuclear Power Plants, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 50, Appendix A.

9.2.11-2 Ultimate Heat Sink for Nuclear Power Plants, Regulatory Guide 1.27 Revision 2, January 1976.

9.2.11-3 Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants, NRC Regulatory Guide 1.26 Revision 4, March 2007.

9.2.11-4 National Primary Drinking Water Standards, Environmental Protection Agency, Title 40, Code of Federal Regulations, 40CFRPart 141.

9.2.11-5 Occupational Safety and Health Standard, Occupational Safety and Health Administration, Department of Labor, Title 29, Code of Federal Regulations, 29CFRPart 1910.

9.2.11-6 American Nuclear Society Standards Committee Working Group, American National Standard for Decay Heat Power in Light Water Reactors, ANS 5.1, August 1979.

9.2.11-7 Electric Power Research Institute Palo Alto, California, Advanced Light Water Reactor Utility Requirements Document, Rev.8.

9.2.11-8 ANSI B31.1 Power Piping Code.

Table 9.2.1-1 Essential Service Water System Component Design Data

Essential Service Water Pump	
Quantity	4
Type	Vertical, centrifugal, mixed flow
Design flow rate	13,000 gpm
Design pressure	150 psig
Design temperature	140 °F
Materials	Stainless steel
Equipment Class	3
Essential Service Water Pump Outlet Strainer	
Quantity	8
Design flow rate	13,000 gpm
Design pressure	150 psig
Design temperature	140 °F
Equipment Class	3
Component Cooling Water Heat Exchanger Inlet Strainer	
Quantity	4
Design flow rate	11,500 gpm
Design pressure	150 psig
Design temperature	140 °F
Equipment Class	3
Essential Service Water Pump Discharge Valve	
Quantity	4
Design flow rate	13,000 gpm
Design pressure	150 psig
Design temperature	140 °F
Equipment Class	3

Table 9.2.1-2 Essential Service Water System Failure Modes and Effects Analysis (Sheet 1 of 2)

Item	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	ESWP (OPP-001A,B,C,D)	Supplies ESW to CCW HX and Essential Chiller Unit	A, Startup, normal shutdown, normal operation, refueling B, Accident, Safe shutdown, Cooldown – loss of offsite power	A1, Fails to start upon command A2, Trips for any reason B1, Fails to start upon command B2, Trips for any reason.	A1, Pump status light indication in MCR A2, Pump status light indication in MCR B1, Pump status light indication in MCR B2, Pump status light indication in MCR	A1, None Remaining three 50% capacity pumps are available. Minimum two pumps are required for safety function. A2, None Same as A1. B1, None Same as A1. B2, None Same as A1.	One train unavailable due to a maintenance do not effects on safety function, because Minimum two pumps are required.

Table 9.2.1-2 Essential Service Water System Failure Modes and Effects Analysis (Sheet 2 of 2)

Item	Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of failure Detection	Failure Effect on System Safety Function Capability	General Remarks
2	ESWP Discharge Valve (MOV-503A,B,C,D), fail as is, motor operated valve	Opens to provide flow path	A, Startup, normal shutdown, normal operation, refueling B, Accident, Safe shutdown, Cooldown – loss of offsite power	A. Fails in closed position B. Fails in closed position	A, Position indication in MCR B, Position indication in MCR	A, None Remaining three 50% capacity pumps are available. Minimum two pumps are required for safety function. B, None Same as A.	One train unavailable due to a maintenance do not effects on safety function, because Minimum two pumps are required.

Table 9.2.2-1 Components Cooled by CCWS (Sheet 1 of 3)

Loop	Component	System	Reference
A	A-Containment spray/residual heat exchanger	CS/RHRS	5.4.7
	A-Containment spray/residual heat removal pump	CS/RHRS	5.4.7
	A- Safety injection pump	SIS	6.3
	A- Component cooling water pump	CCWS	9.2.2
B	B-Containment spray/residual heat exchanger	CS/RHRS	5.4.7
	B-Containment spray/residual heat removal pump	CS/RHRS	5.4.7
	B- Safety injection pump	SIS	6.3
	B- Component cooling water pump	CCWS	9.2.2
C	C-Containment spray/residual heat exchanger	CS/RHRS	5.4.7
	C-Containment spray/residual heat removal pump	CS/RHRS	5.4.7
	C- Safety injection pump	SIS	6.3
	C- Component cooling water pump	CCWS	9.2.2
D	D-Containment spray/residual heat exchanger	CS/RHRS	5.4.7
	D-Containment spray/residual heat removal pump	CS/RHRS	5.4.7
	D- Safety injection pump	SIS	6.3
	D- Component cooling water pump	CCWS	9.2.2

Table 9.2.2-1 Components Cooled by CCWS (Sheet 2 of 3)

Loop	Component	System	Reference
A1	A- Spent fuel pit heat exchanger	SFPCS	9.1.3
	A- Charging pump	CVCS	9.3.4
	A- Sample heat exchanger	PSS	9.3.2
	A,B- Reactor coolant pump	RCS	5.4.1
C1	B- Spent fuel pit heat exchanger	SFPCS	9.1.3
	B- Charging pump	CVCS	9.3.4
	B- Sample heat exchanger	PSS	9.3.2
	C/V atmosphere gas sample cooler	PSS	9.3.2
	C,D- Reactor coolant pump	RCS	5.4.1

Table 9.2.2-1 Components Cooled by CCWS (Sheet 3 of 3)

Loop	Component	System	Reference
A2	A- Instrument air system	IAS	9.3.1
	Seal water heat exchanger	CVCS	9.3.4
	Excess letdown heat exchanger	CVCS	9.3.4
	A,B,C,D-Blowdown sample cooler	SGBDS	10.4.8
	Auxiliary steam drain monitor heat exchanger	ASSS	10.4.11
	B.A. evaporator	CVCS	9.3.4
	Chemical drain tank pump	LWMS	11.2
	A,B-Waste gas compressor	GWMS	11.3
	Waste gas dryer	GWMS	11.3
C2	B- Instrument air system	IAS	9.3.1
	Letdown heat exchanger	CVCS	9.3.4

Table 9.2.2-2 Component Cooling Water System Component Design Date

Component Cooling Water Pump		
Quantity	4	
Type	horizontal centrifugal	
Design flow rate	12,000 gpm	
Design head	180 ft	
Design pressure	200 psig	
Design temperature	200 ^{0}F	
Component Cooling Water Heat Exchanger		
Quantity	4	
Type	Plate type	
Plate Material	Ti	
Heat transfer rate	50.0x 10^{6} Btu/hr	
	CCW side	ESW side
Design flow rate	11,000 gpm	11,000 gpm
Design pressure	200 psig	150 psig
Design Temperature	200 ^{0}F	140 ^{0}F
Design Inlet temperature	-	95 ^{0}F
Design outlet temperature	100 ^{0}F	-
Component Cooling Water Surge Tank		
Quantity	2	
Type	Horizontal	
Capacity	283 ft^{3}	
Design pressure	50 psig	
Design temperature	200 ^{0}F	

Table 9.2.2-3 Component Cooling Water System Failure Modes and Effects Analysis（Sheet 1 of 4）

Item	Component	Safety Function	Failure Mode	Effect on System Safety Function	Failure Detection Method
1	CCW pumps	Pumps CCW to safety-related components	Fails to start upon the demand signal Trip for any reason	None Remaining three 50% capacity pumps are available. Minimum two pumps are required.	Pump status lights indication in MCR Low pressure alarm of header pressure
2	header tie line isolation valve (MOV-007A,B, MOV-020A,B)	Separates to independent two trains	Fails to close upon the demand signal	None Each train have own isolation valve. Either train could be isolated from the other train.	Valve position indication in MCR
		Opens to provide flow path to A1 loop after close of header tie line isolation valve	Fails to open upon the remote manual signal	None Each train have own isolation valve. Either train’s valve could be opened.	Valve position indication in MCR
3	header tie line isolation valve (MOV-007C,D, MOV-020C,D)	Separates to independent two trains	Fails to close upon the demand signal	None Each train have own isolation valve. Either train could be isolated from the other train.	Valve position indication in MCR
		Opens to provide flow path to C1 loop after close of header tie line isolation valve	Fails to open upon the remote manual signal	None Each train have own isolation valve. Either train’s valve could be opened.	Valve position indication in MCR
4	CS/RHR HX cooling water outlet valve (MOV-145A,B,C,D)	Opens to provide flow path to CS/RHR heat exchanger	Fails to open upon the demand signal	None Remaining three 50% capacity CS/RHR Heat Exchanger are available. Minimum two Heat Exchangers are required.	Valve position indication in MCR

Table 9.2.2-3 Component Cooling Water System Failure Modes and Effects Analysis（Sheet 2 of 4）

Item	Component	Safety Function	Failure Mode	Effect on System Safety Function	Failure Detection Method
5	Isolation valve for supply to non-seismic category I portion (AOV-601,602 AOV-661A,662A AOV-661B,662B)	Isolates the supply line connected to non-seismic category I portion	Fails to close on the demand signal	None Two isolation valves are provided in series. Close of one valve provides isolation. (Check valves are provided in return line.)	Valve position indication in MCR
6	RCP thermal barrier cooling water outlet valve (FCV-1319A,B,1320A,B, 1321A,B,1322A,B)	Isolates in-leak to CCWS	Fails to close on the demand signal	None Two isolation valves are provided in series. Close of one valve provides isolation.	Valve position indication in MCR
7	Containment isolation valve for supply to letdown heat exchanger (MOV-531)	Closes to provide containment pressure boundary	Fails to close on the demand signal	None System inside containment is used as one of the isolation barriers. And system is designed to satisfy the requirements for closed system.	Valve position indication in MCR
8	Containment isolation valve for return line from letdown heat exchanger (MOV-537)	Closes to provide containment pressure boundary	Fails to close on the demand signal	None System inside containment is used as one of the isolation barriers. And system is designed to satisfy the requirements for closed system.	Valve position indication in MCR

Table 9.2.2-3 Component Cooling Water System Failure Modes and Effects Analysis（Sheet 3 of 4）

Item	Component	Safety Function	Failure Mode	Effect on System Safety Function	Failure Detection Method
9	Containment isolation valve for supply to excess letdown heat exchanger (MOV-511)	Closes to provide containment pressure boundary	Fail to close on the demand signal	None System inside containment is used as one of the isolation barriers. And system is designed to satisfy the requirements for closed system.	Valve position indication in MCR
10	Containment isolation valve for return line from excess letdown heat exchanger (MOV-517)	Closes to provide containment pressure boundary	Fail to close on the demand signal	None System inside containment is used as one of the isolation barriers. And system is designed to satisfy the requirements for closed system.	Valve position indication in MCR
11	Containment isolation valve for supply to RCP (MOV-402A,B)	Closes to provide containment pressure boundary	Fail to close on the demand signal	None A check valve (VLV-403A,B) is provided in series to provide containment pressure boundary.	Valve (motor operated valve) position indication in MCR
		Opens to provide flow path to RCP	Fail to open up on the remote manual signal	None A motor operated valve (MOV-445A,B) is provided in parallel to provide flow path to RCP.	Valve (motor operated valve) position indication in MCR

Table 9.2.2-3 Component Cooling Water System Failure Modes and Effects Analysis（Sheet 4 of 4）

Item	Component	Safety Function	Failure Mode	Effect on System Safety Function	Failure Detection Method
12	Containment isolation valve (inside CV) for return line from RCP (MOV-436A,B)	Closes to provide containment pressure boundary	Fail to close on the demand signal	None A motor operated valve (MOV-438A,B) is provided in series to provide containment pressure boundary.	Valve position indication in MCR
		Opens to provide flow path to RCP	Fail to open up on the remote manual signal	None A motor operated valve (MOV-447A,B) is provided in parallel to provide flow path to RCP.	Valve position indication in MCR
13	Containment isolation valve (outside CV) for return line from RCP (MOV-438A,B)	Closes to provide containment pressure boundary	Fail to close on the demand signal	None A motor operated valve (MOV-436A,B) is provided in series to provide containment pressure boundary.	Valve position indication in MCR
		Opens to provide flow path to RCP	Fail to open up on the remote manual signal	None A motor operated valve (MOV-448A,B) is provided in parallel to provide flow path to RCP.	Valve position indication in MCR

Table 9.2.4-1 Potable and Sanitary Water System Component Data

Potable water storage tank	
Quantity	1
Capacity (gal)	25,000
Potable water pumps	
Quantity	2
Design Flow rate (gal/min)	50
Design head (ft)	220
Jockey pump	
Quantity	1
Design Flow rate (gal/min)	50
Design head (ft)	220
Potable water well pumps	
Quantity	2
Design Flow rate (gal/min)	50
Design head (ft)	220
Chlorine metering pump	
Quantity	1
Design Flow rate (gal/h)	2.9

Table 9.2.5-1 UHS Peak Heat Loads

Plant Operating Mode	Peak Heat Load
LOCA (2 trains operation)	170×10^6 Btu/h/train
LOCA (4 trains operation)	545×10^6 Btu/h/4 trains

Note: Peak heat load at safe shutdown operation is provided in Table 9.2.5-2.

Table 9.2.5-2 UHS Heat Load for LOCA and Safe Shutdown with LOOP (Sheet 1 of 2)

Time after incident	LOCA (4 trains operation)	LOCA (2 trains operation)	Safe shutdown (4 trains operation)	Safe shutdown (2 trains operation)
	(x 10^6 Btu/h/4 trains)	(x 10^6 Btu/h/2 trains)	(x 10^6 Btu/h/4 trains)	(x 10^6 Btu/h/2 trains)
1 h	543	319	76	59
2 h	460	332	76	59
3 h	371	314	76	59
4 h	311	294	409	392
5 h	275	274	399	382
6 h	251	257	391	319
7 h	237	243	384	271
8 h	227	232	278	241
9 h	220	222	229	221
10 h	214	213	214	208
11 h	208	205	207	199
12 h	203	198	203	193
13 h	200	193	199	188
14 h	197	188	196	184
15 h	194	184	194	180
16 h	192	180	191	177
17 h	190	177	189	175
18 h	187	174	187	172
19 h	185	172	185	170
20 h	183	170	184	168
21 h	181	168	182	166
22 h	180	166	180	165
23 h	179	164	179	163
24 h	177	163	178	162
2 days	161	146	160	144
3 days	152	137	150	133
4 days	145	129	143	126
5 days	139	123	138	121
6 days	135	119	134	117
7 days	131	115	131	114
8 days	129	113	128	111
9 days	127	111	126	109
10 days	125	109	124	107

Table 9.2.5-2 UHS Heat Load for LOCA and Safe Shutdown with LOOP (Sheet 2 of 2)

Time after incident	LOCA (4 trains operation)	LOCA (2 trains operation)	Safe shutdown (4 trains operation)	Safe shutdown (2 trains operation)
	(x 10^6 Btu/h/4 trains)	(x 10^6 Btu/h/2 trains)	(x 10^6 Btu/h/4 trains)	(x 10^6 Btu/h/2 trains)
11 days	123	107	123	106
12 days	122	105	122	105
13 days	121	104	121	104
14 days	120	103	120	102
15 days	119	102	118	101
16 days	118	101	117	100
17 days	117	100	116	99
18 days	116	99	116	98
19 days	115	99	115	98
20 days	114	98	114	97
21 days	114	97	114	96
22 days	113	96	113	96
23 days	112	95	112	95
24 days	111	95	112	95
25 days	111	94	111	94
26 days	111	94	111	94
27 days	110	94	110	93
28 days	110	93	110	93
29 days	110	93	110	93
30 days	109	93	109	92
31 days	109	92	109	92
32 days	109	92	108	91
33 days	108	92	108	91
34 days	108	91	108	91
35 days	108	91	108	91
36 days	107	91	107	90

Table 9.2.6-1 Tank and Pump Data

Demineralized Water Storage Tank	
Quantity	1
Capacity	500,000 gal.
Material	Stainless Steel
Condensate Storage Tank	
Quantity	1
Capacity	750,000 gal.
Material	Stainless Steel
Primary Makeup Water Tank	
Quantity	2
Capacity	140,000 gal.
Material	Stainless Steel
Demineralized Water Pump	
Quantity	2
Material	Stainless steel
Condensate Transfer Pump	
Quantity	2
Material	Stainless steel
Primary Makeup Water Pump	
Quantity	2
Capacity	275 gpm
Material	Stainless steel

Table 9.2.6-2 Condensate Storage Water Chemistry Guidelines

Water quality parameters	Water Chemistry Guidelines (note 1)
Chloride (ppm) max.	0.15
Fluoride (ppm) max.	0.15
Suspended solids (ppm) max.	1.0 (note 2)

Note 1: Guidelines are based on URD – ALWR Chapter 1 Table 1.5.4

Note 2: Solids concentration is determined by filtration through filter having 0.45 micron pore sizes

Table 9.2.7 Essential Chilled Water System Component Design Data

Essential Chiller Unit	
Type	Centrifugal Type, Electric-drive
Quantity	4
Refrigeration Capacity	3,600,000 Btu/hr-unit
Chilled Water Inlet temperature	40^{o} F
Chilled Water Outlet temperature	56^{o} F
Chilled Water Flow Rate	440 gpm
Cooling water inlet temperature	100^{o} F
Cooling water outlet temperature	116^{o} F ;delta T= 16^{o} F
Essential chilled water pump	
Type	Centrifugal type
Quantity	4
Flow rate	440 gpm
Head	165 feet

Table 9.2.8-1 TCS Component Parameters

TCS Pump	
Quantity	3
Type	Horizontal, centrifugal
Rated flow, gal/min	13,500
Head at rated flow, feet	160
TCS Heat Exchanger	
Quantity	3
Type	Plate
Rated flow, gal/min	13,500
Heat Duty, Btu/hr	65×10^6
Material	Titanium

Table 9.2.9-1 Non-ESW System Component Parameters

Non-ESW Pump	
Quantity	3
Type	Horizontal, centrifugal, single stage
Rated flow, gal/min	13,500
Head at rated flow, feet	90
Non-ESW Strainer	
Quantity	2
Type	Vertical, Cylinder, self cleaning
Rated flow, gal/min	27,000

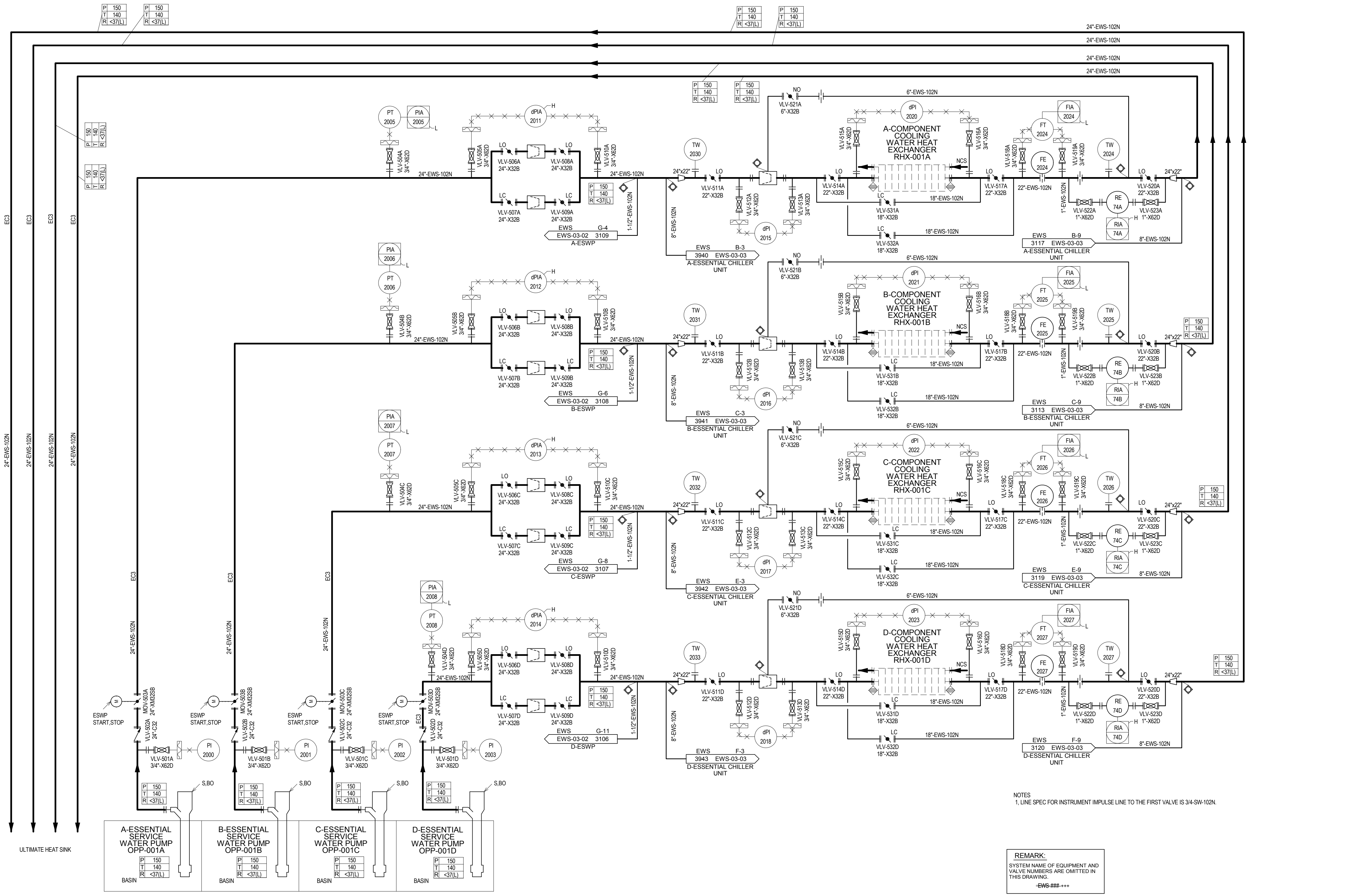


Figure 9.2.1-1 Essential Service Water System Piping and Instrumentation Diagram (Sheet 1 of 3)

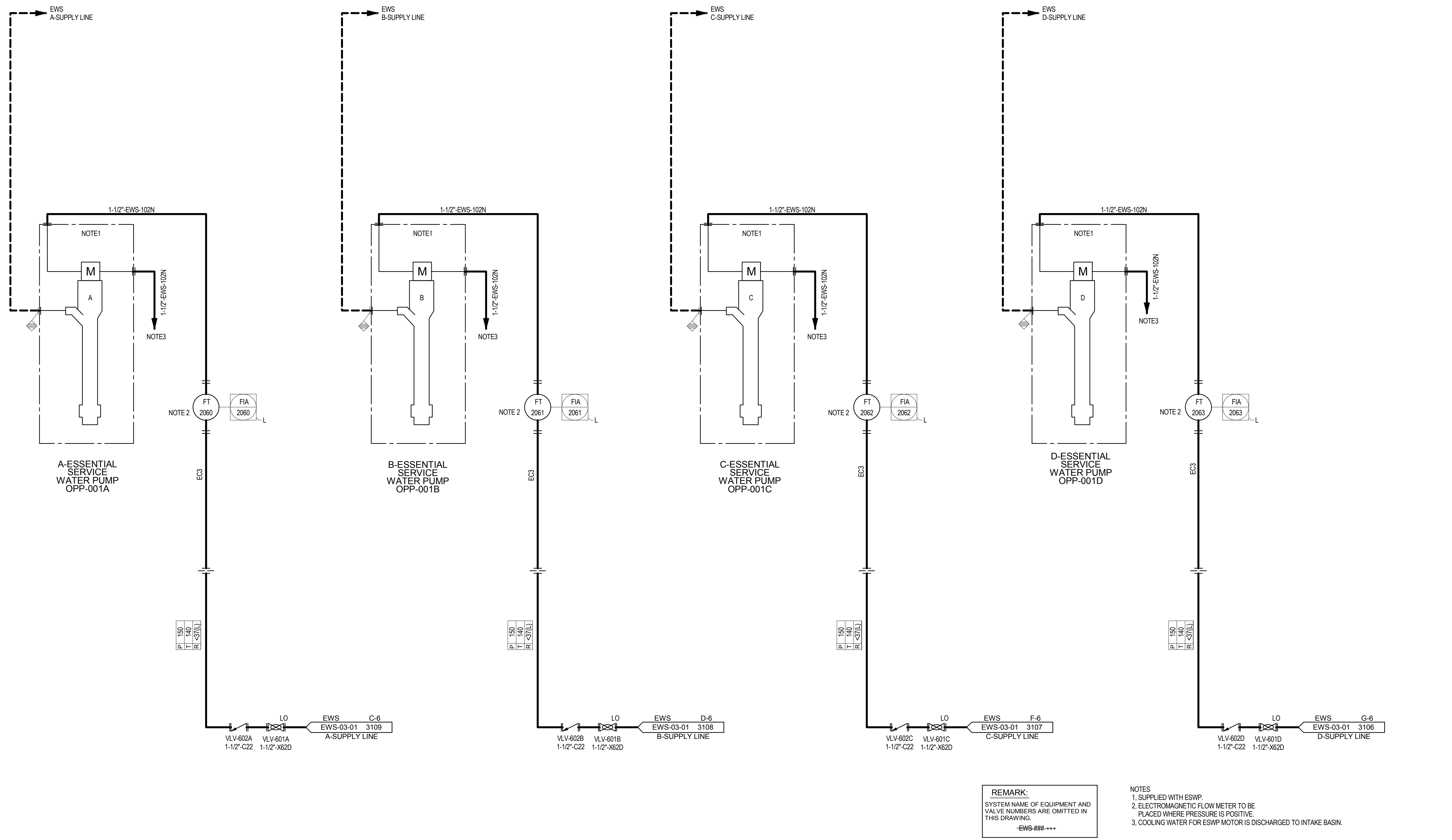
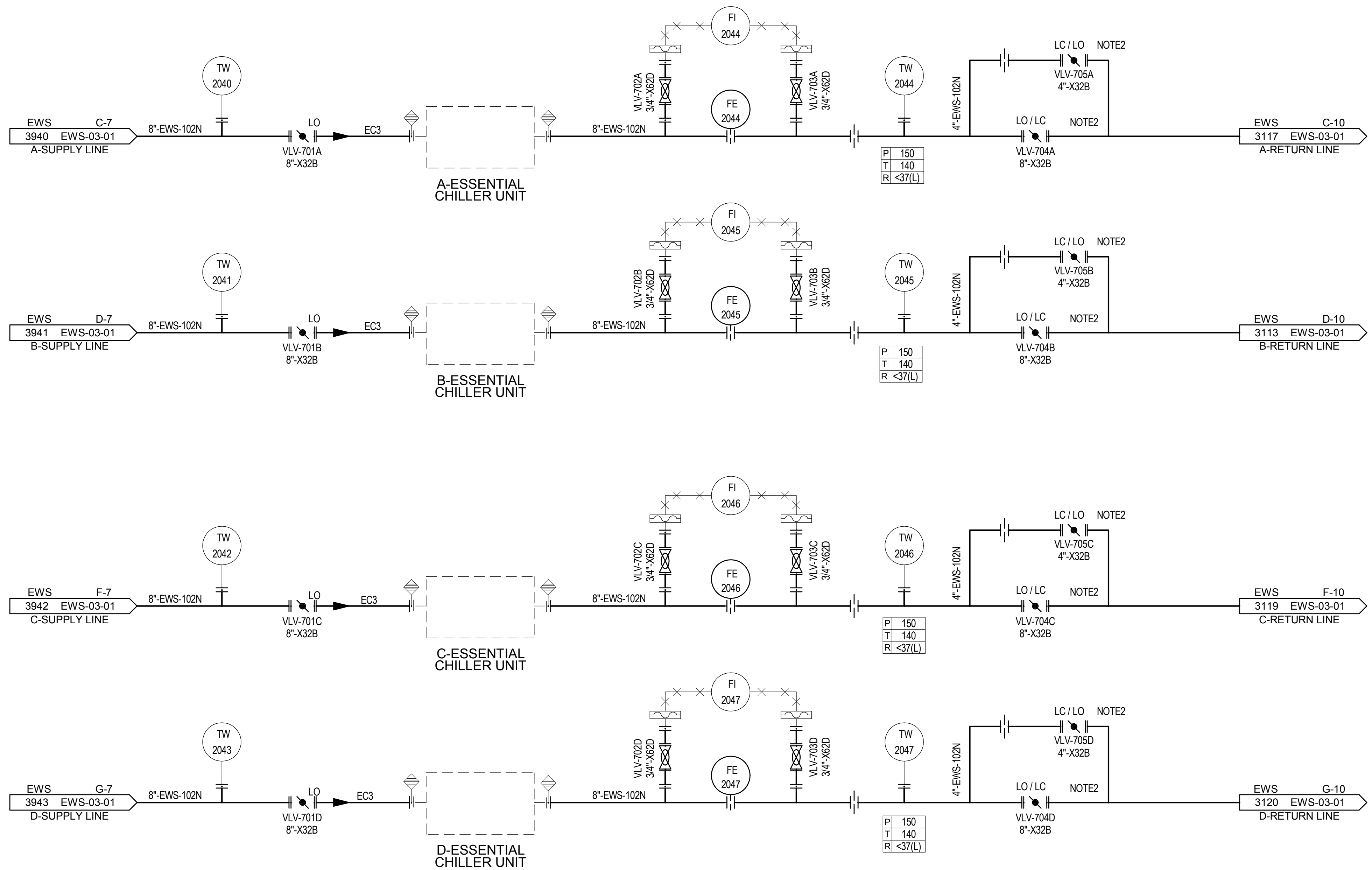


Figure 9.2.1-1 Essential Service Water System Piping and Instrumentation Diagram (Sheet 2 of 3)



REMARK:
SYSTEM NAME OF EQUIPMENT AND VALVE NUMBERS ARE OMITTED IN THIS DRAWING.
~~EWS-###-+++~~

NOTES
1, LINE SPEC FOR INSTRUMENT IMPULSE LINE TO THE FIRST VALVE IS 3/4-EWS-102N.
2, OPENING THE VALVE AT THE MAIN LINE REQUIRES CLOSING THE VALVE AT THE BYPASS LINE AND VICE VERSA.

Figure 9.2.1-1 Essential Service Water System Piping and Instrumentation Diagram (Sheet 3 of 3)

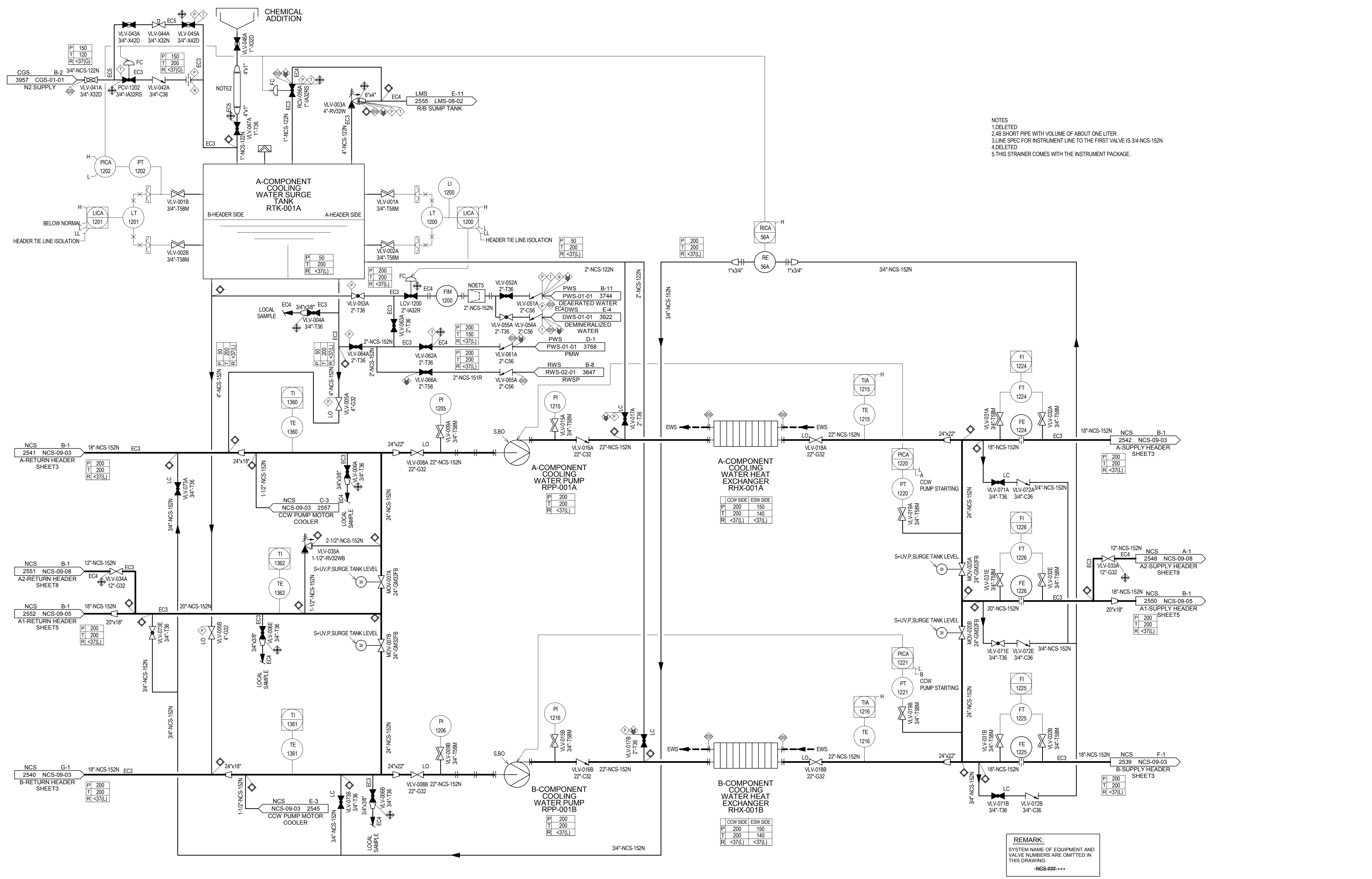


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 1 of 9)

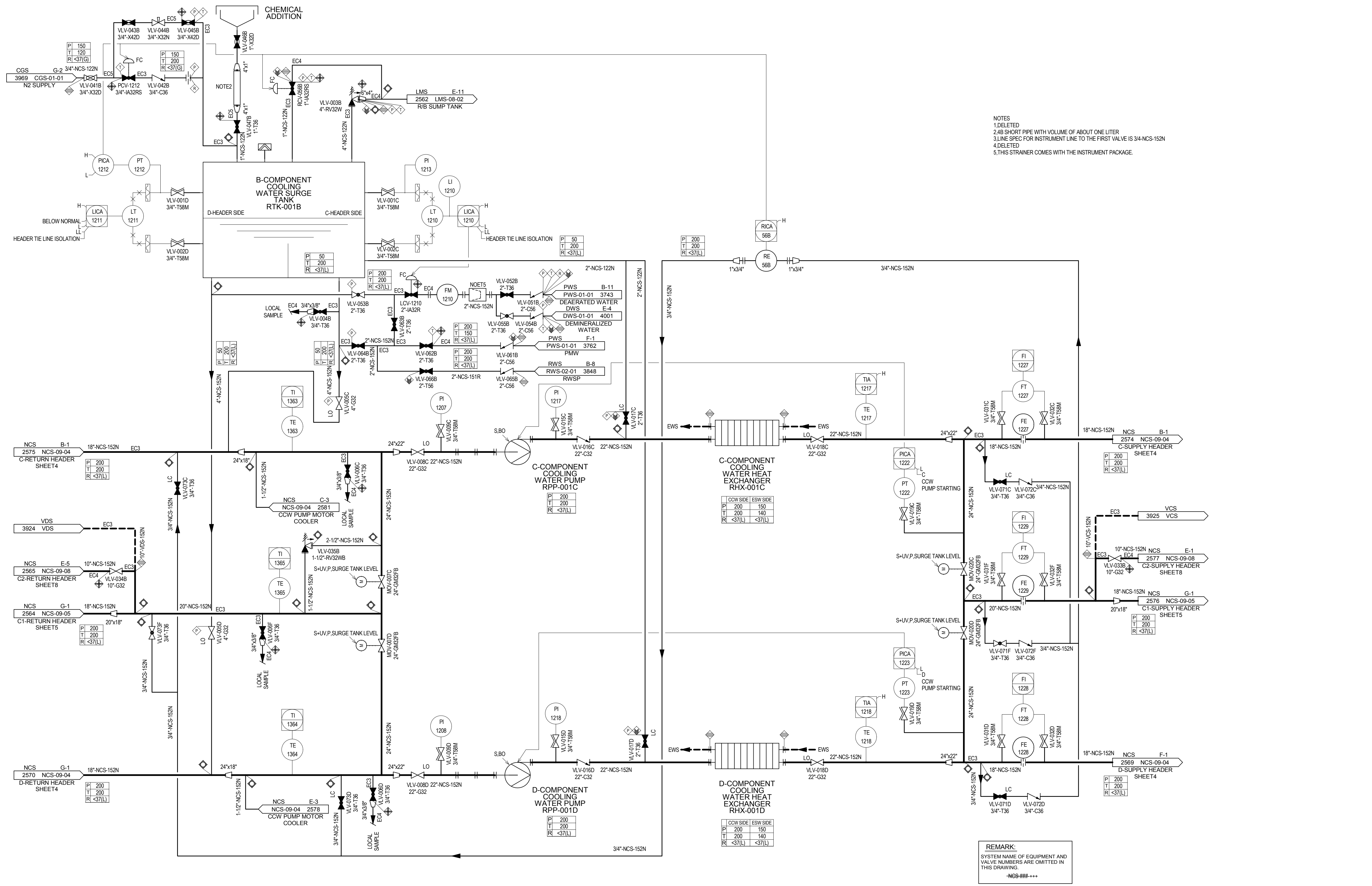


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 2 of 9)

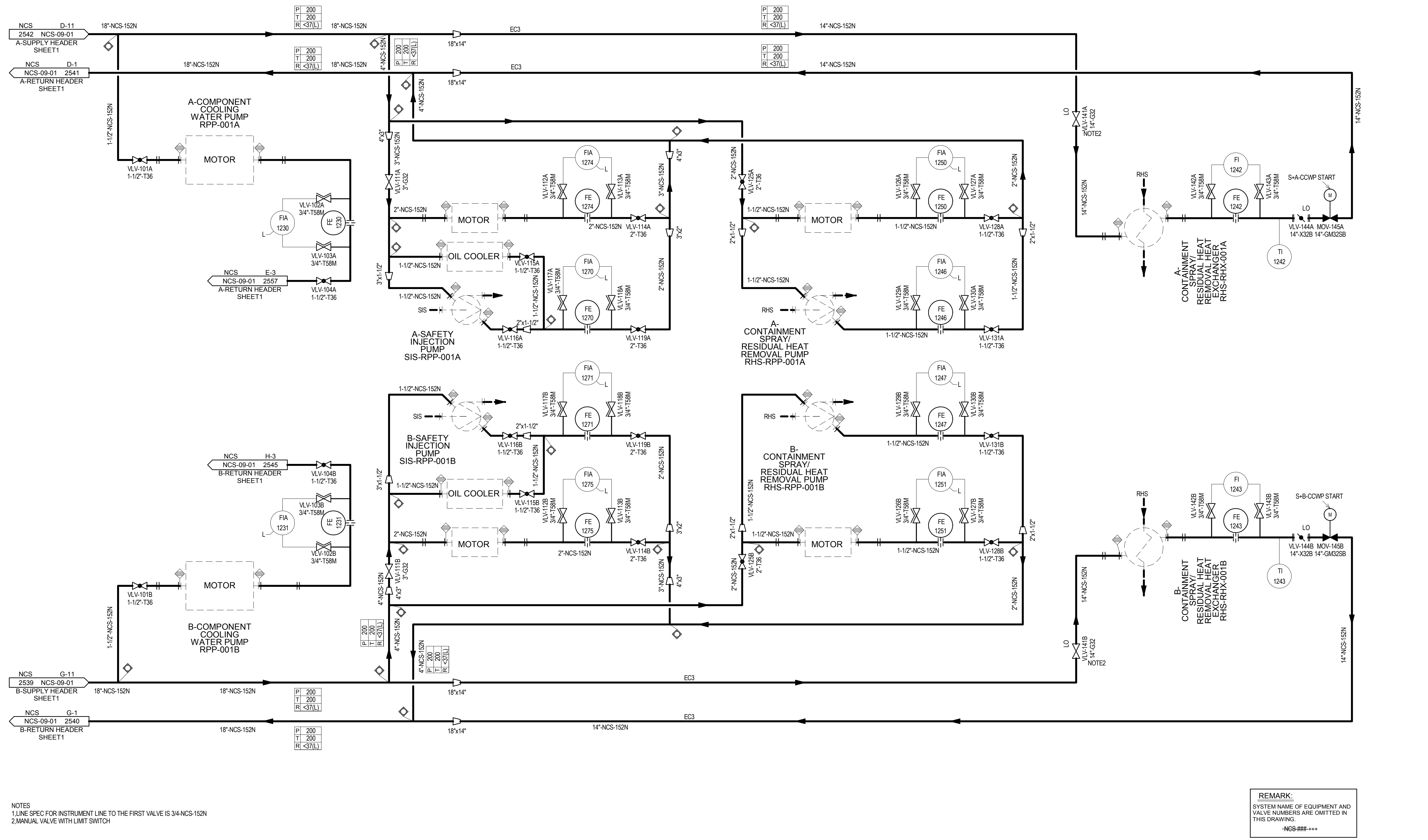


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 3 of 9)

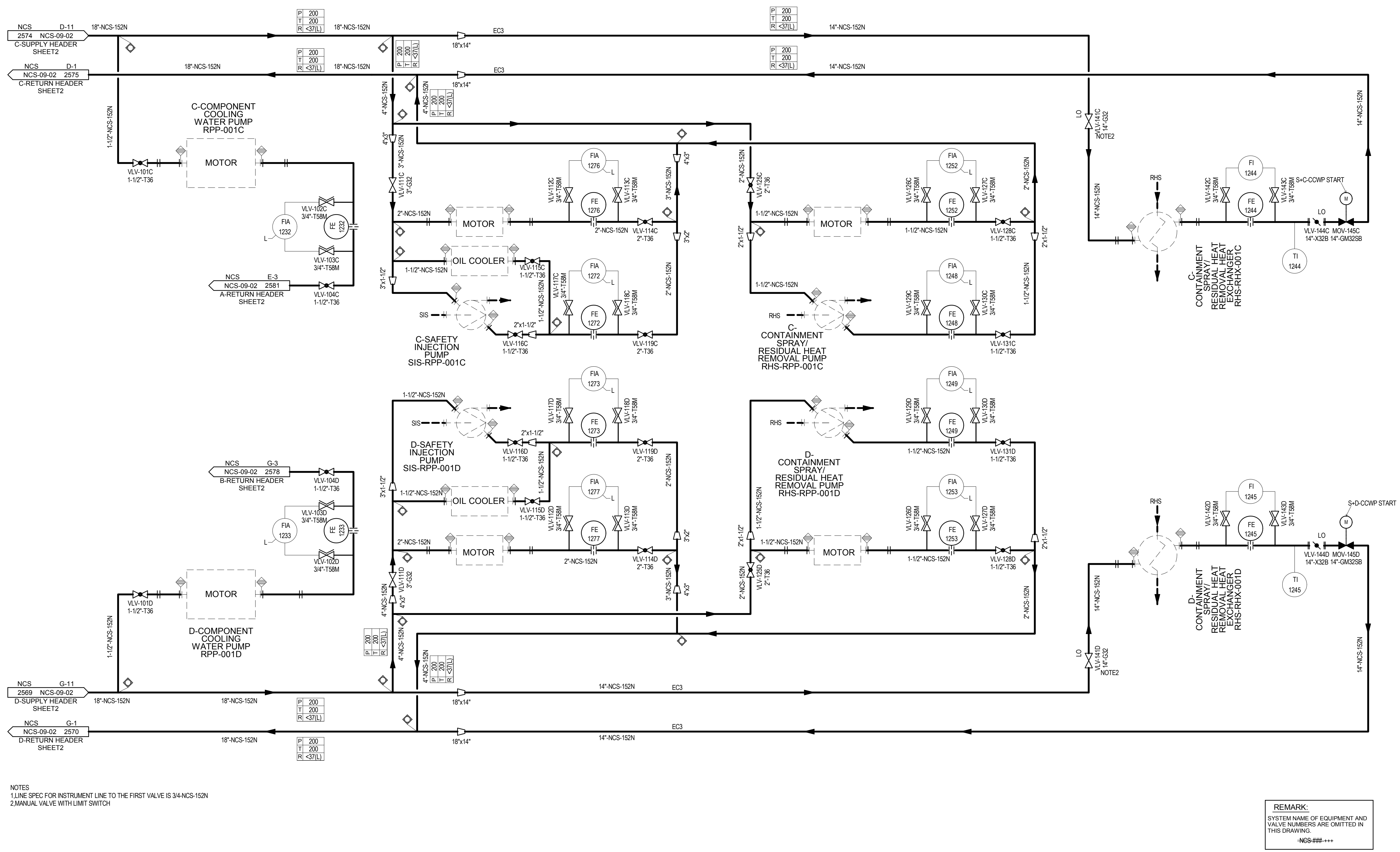


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 4of 9)

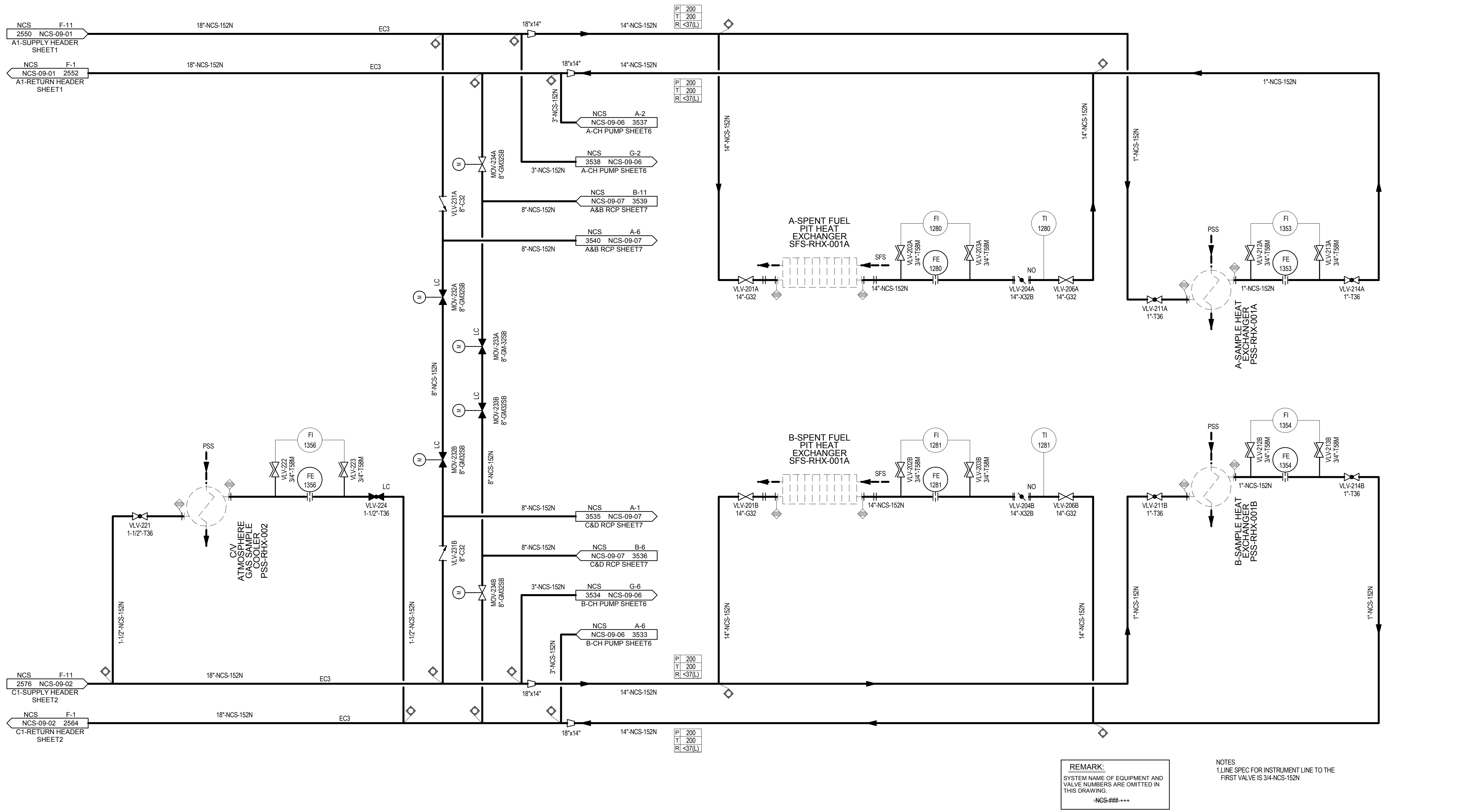


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 5 of 9)

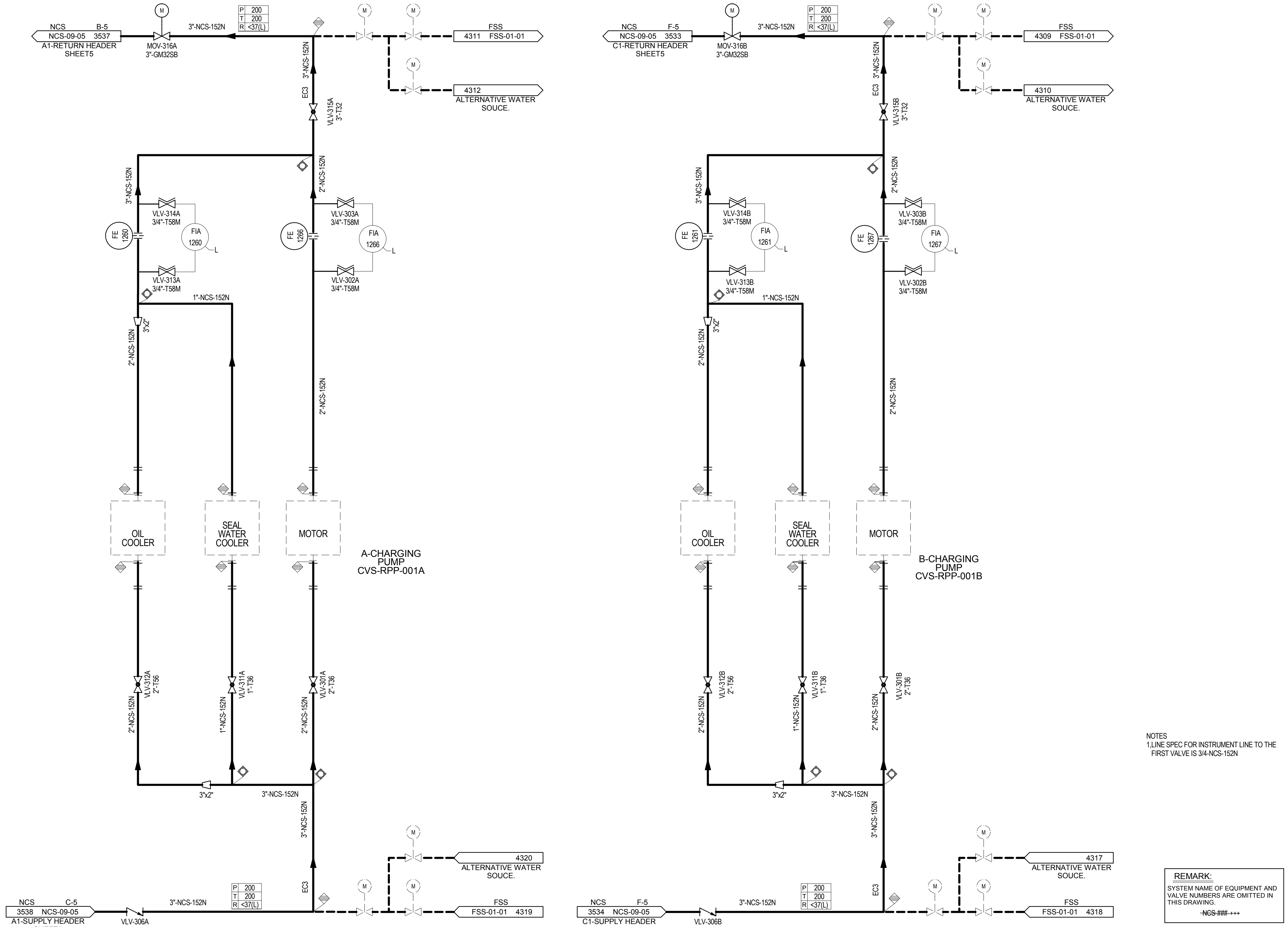


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 6 of 9)

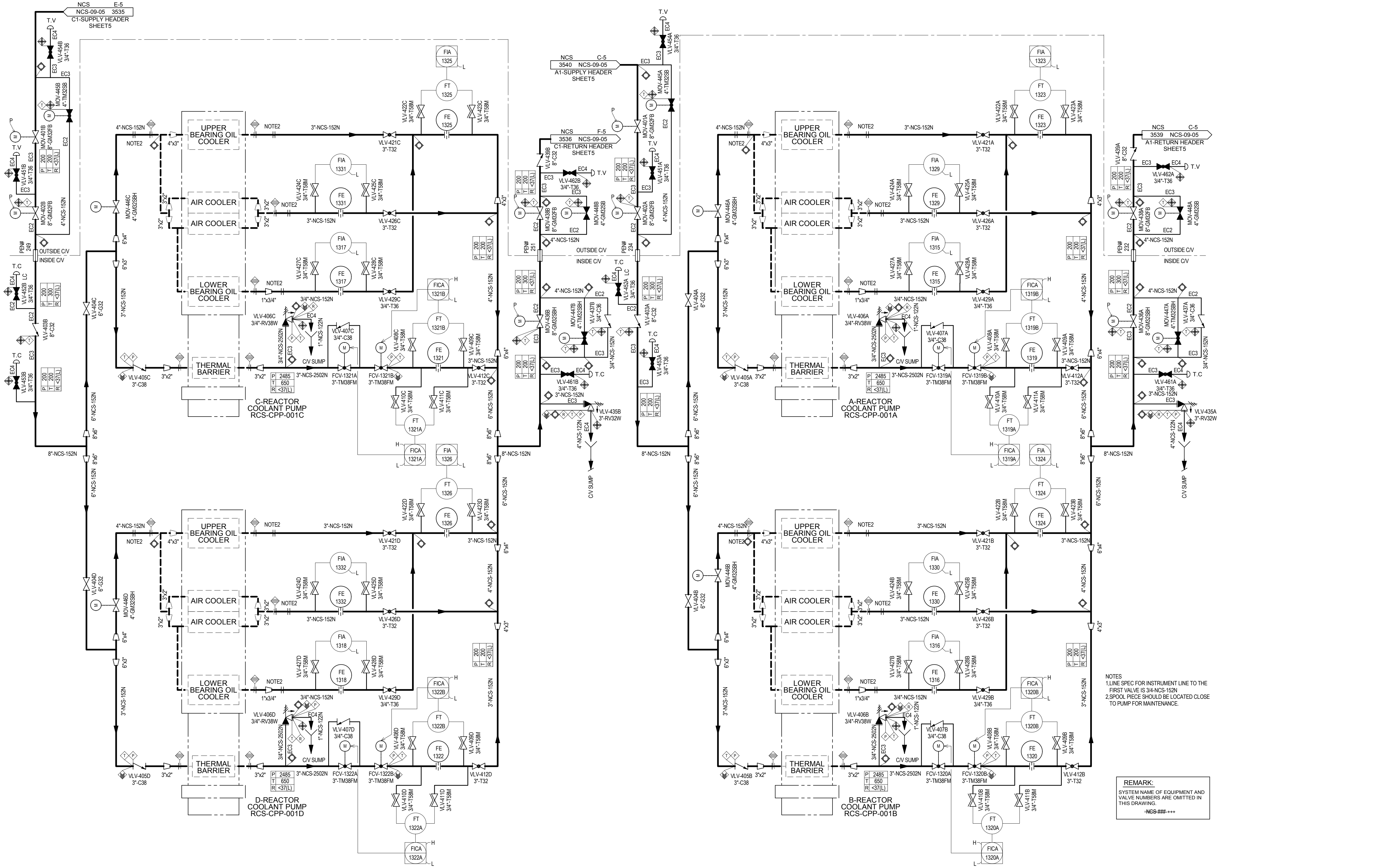


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 7 of 9)

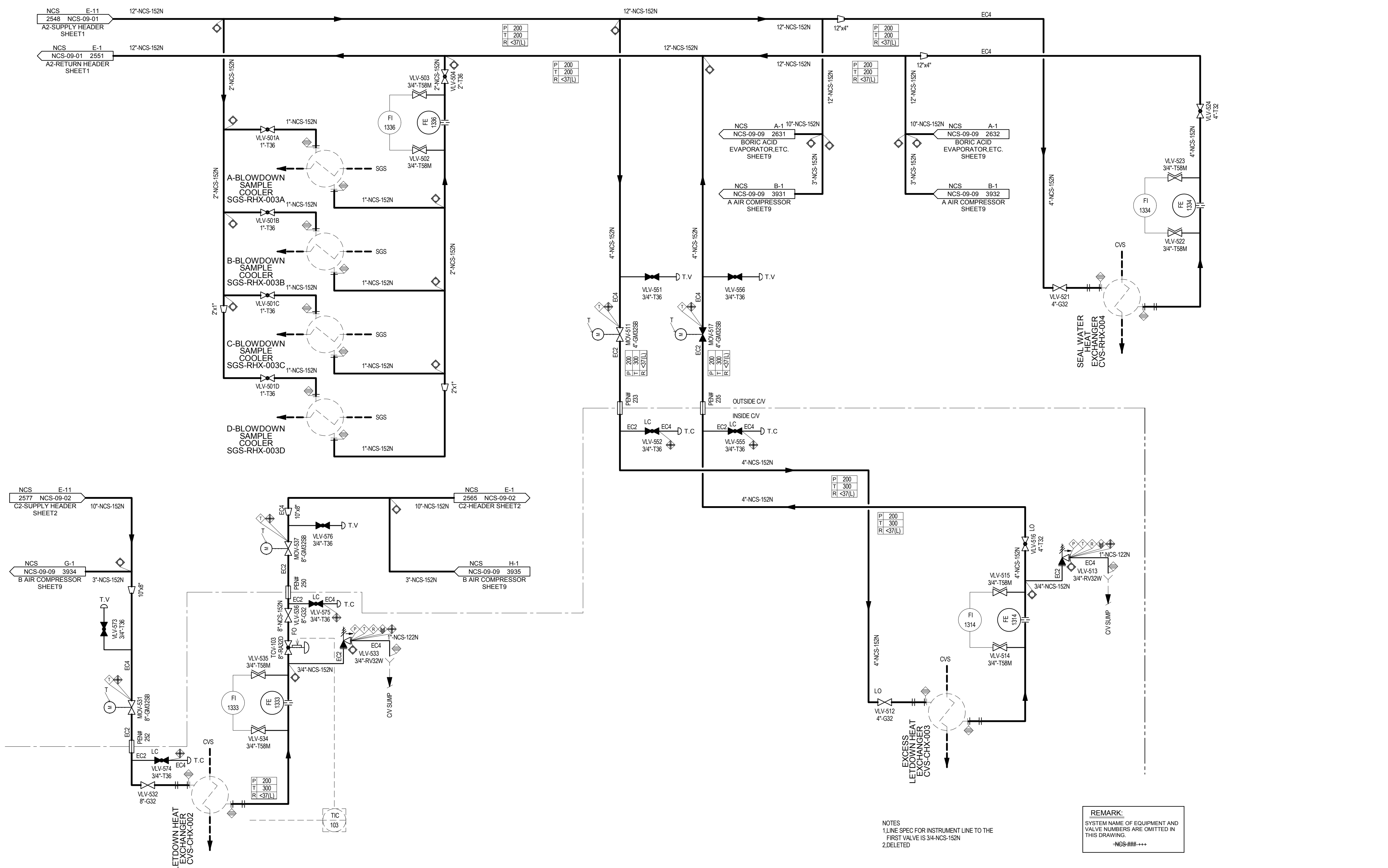


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 8 of 9)

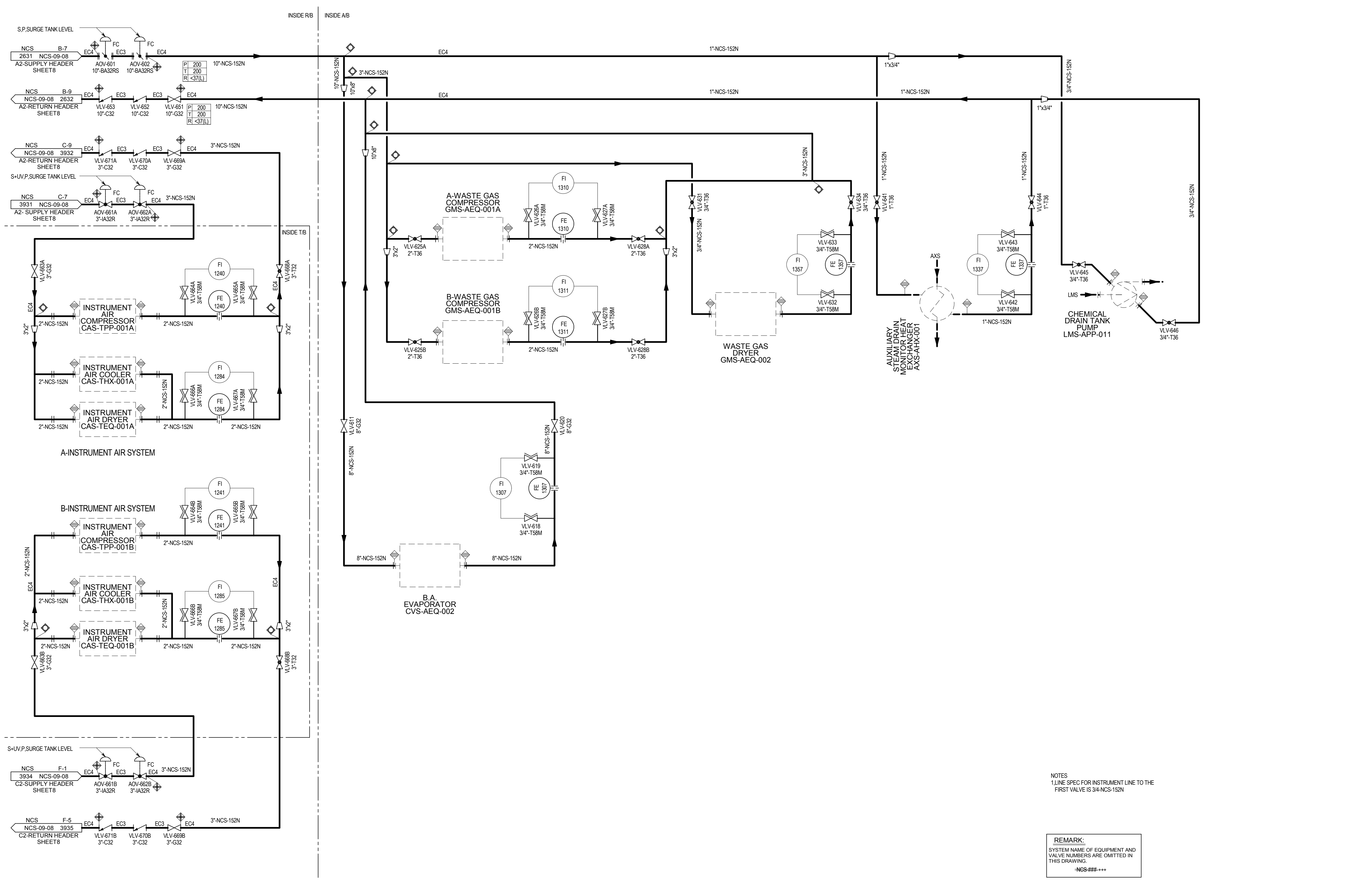


Figure 9.2.2-1 Component Cooling Water System Piping and Instrumentation Diagram (Sheet 9 of 9)

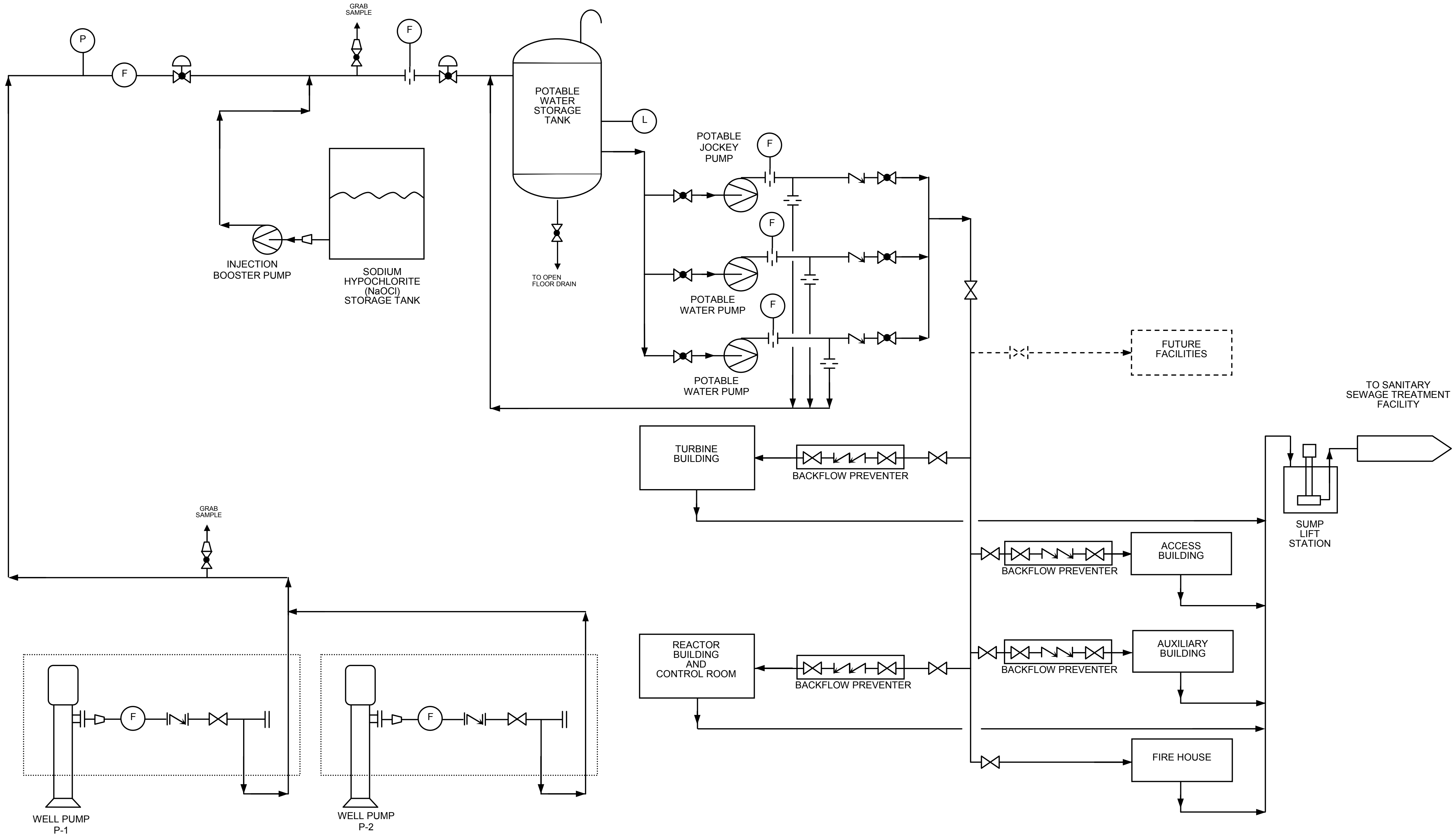


Figure 9.2.4-1 Potable and Sanitary Water System Flow Diagram

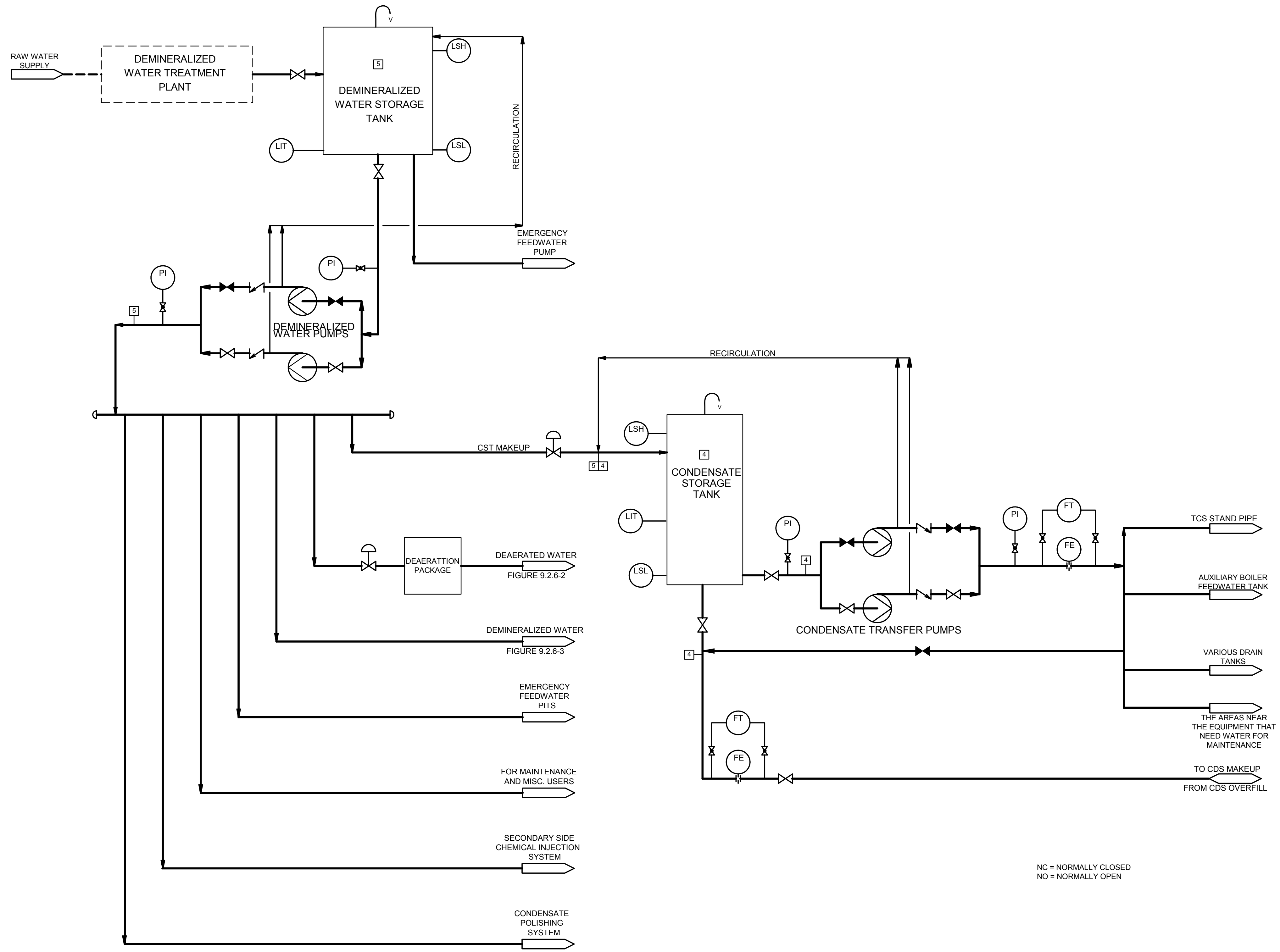


Figure 9.2.6-1 Condensate Storage Facilities System Flow Diagram

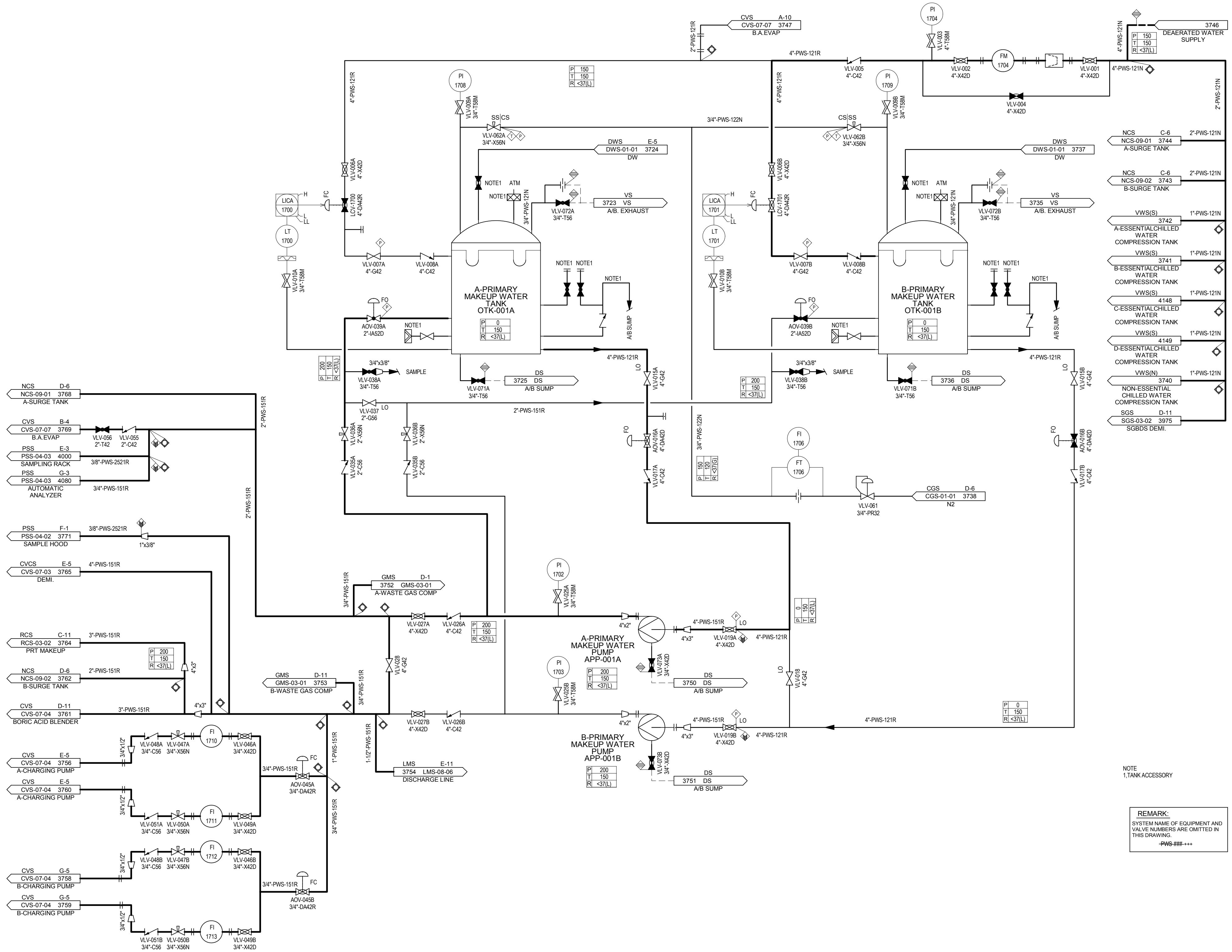


Figure 9.2.6-2 Primary Makeup Water System Flow Diagram

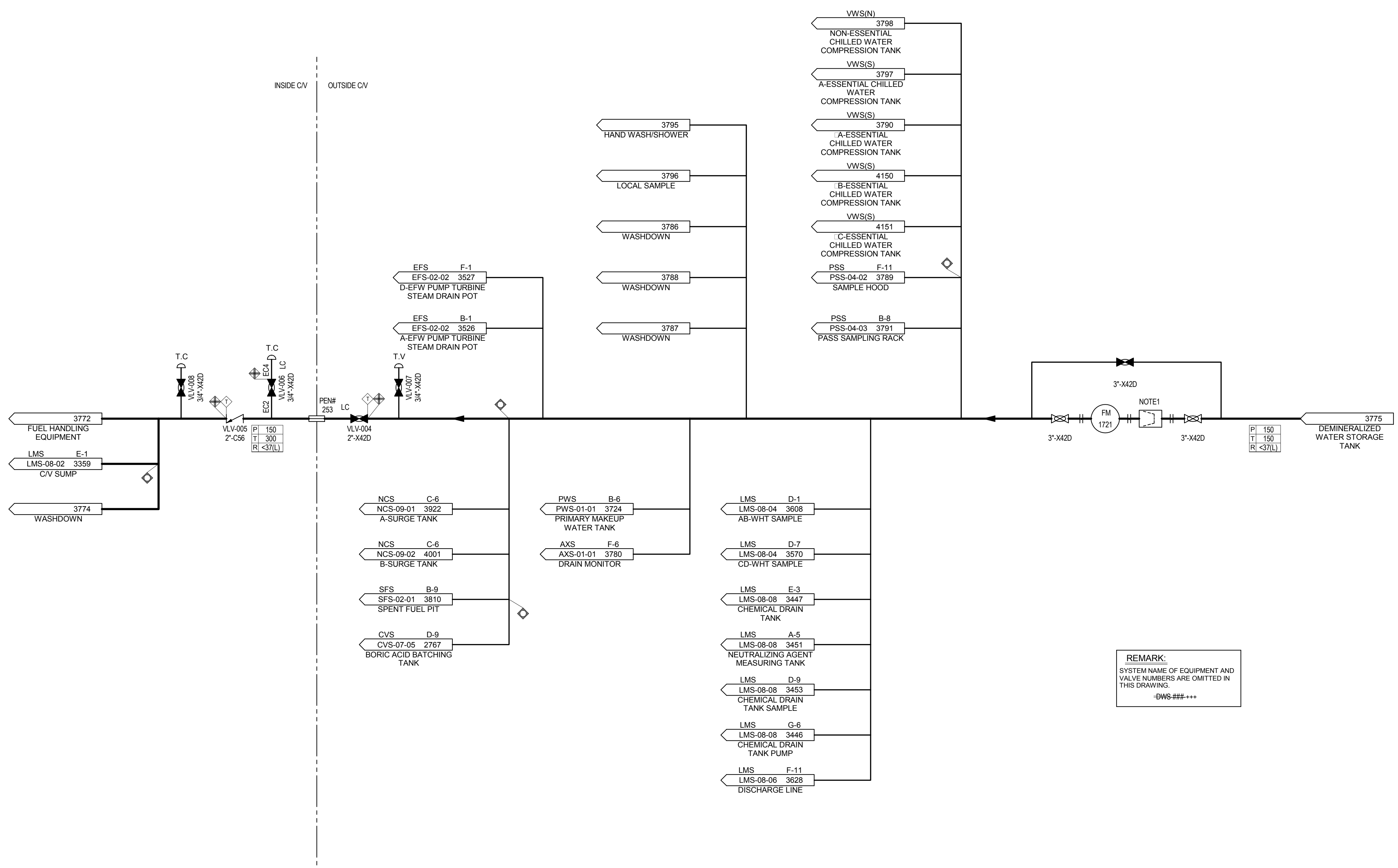


Figure 9.2.6-3 Demineralized Water System Flow Diagram

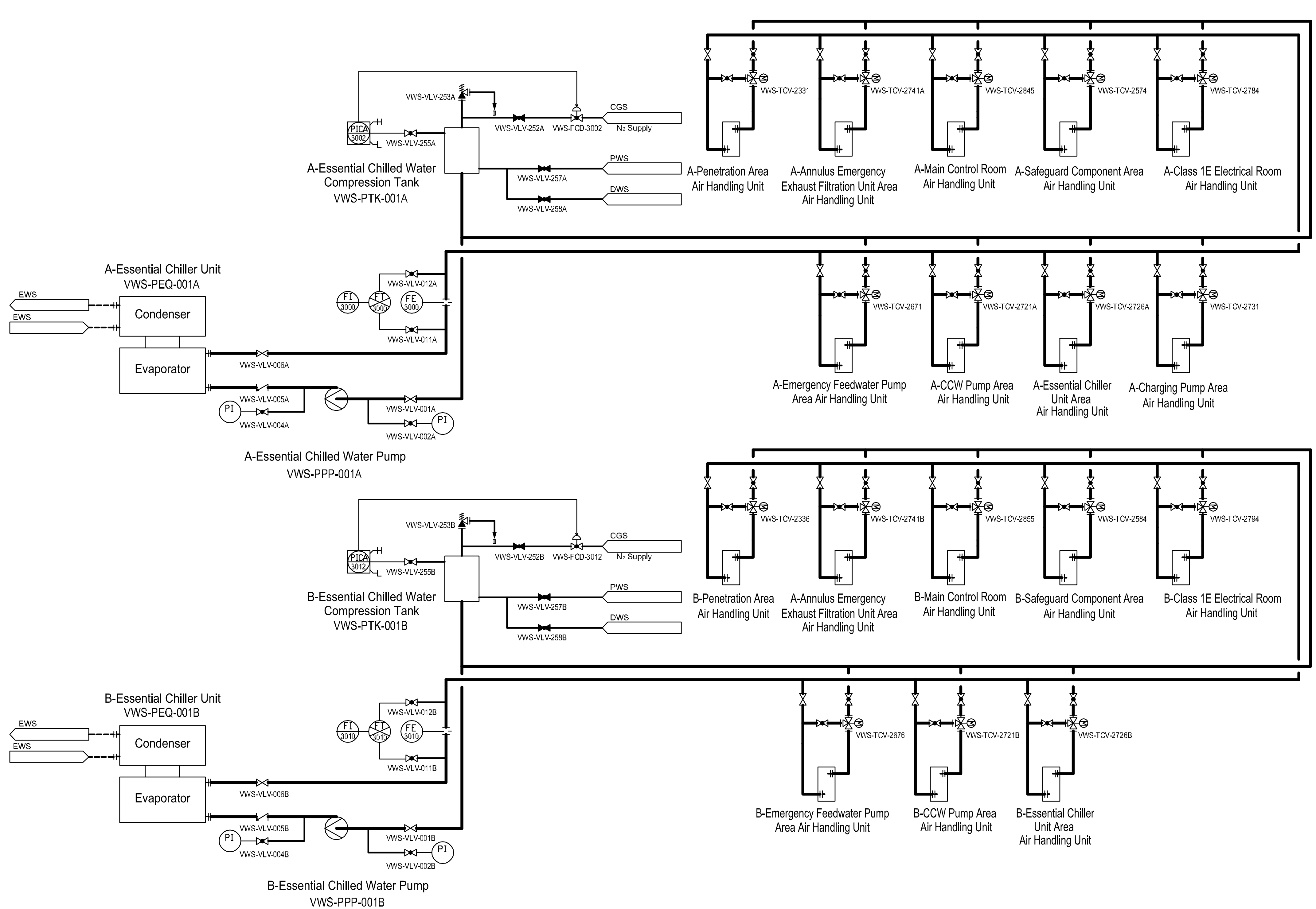


Figure 9.2.7-1 Essential Chilled Water System Flow Diagram (Sheet 1 of 2)

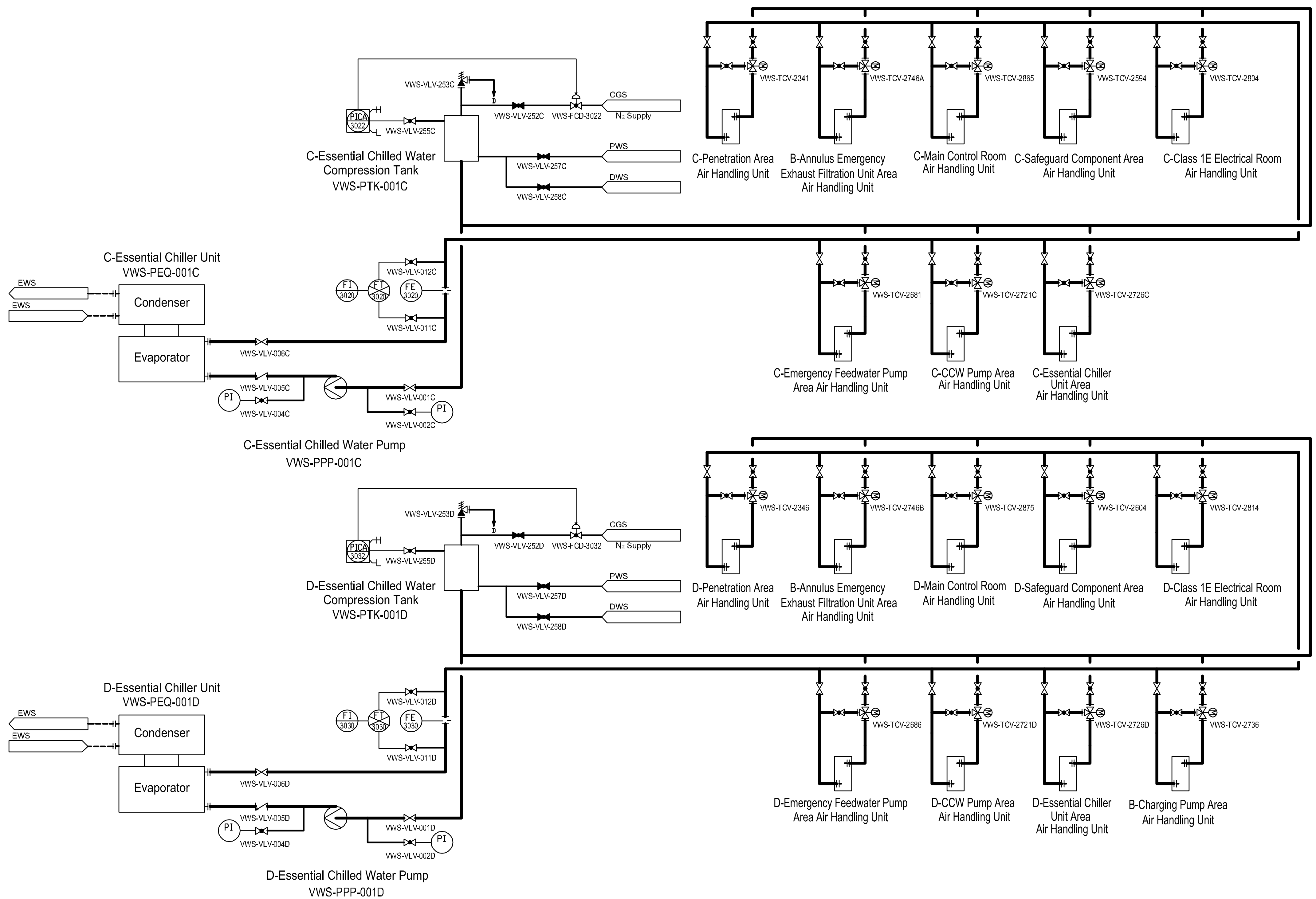


Figure 9.2.7-1 Essential Chilled Water System Flow Diagram (Sheet 2 of 2)

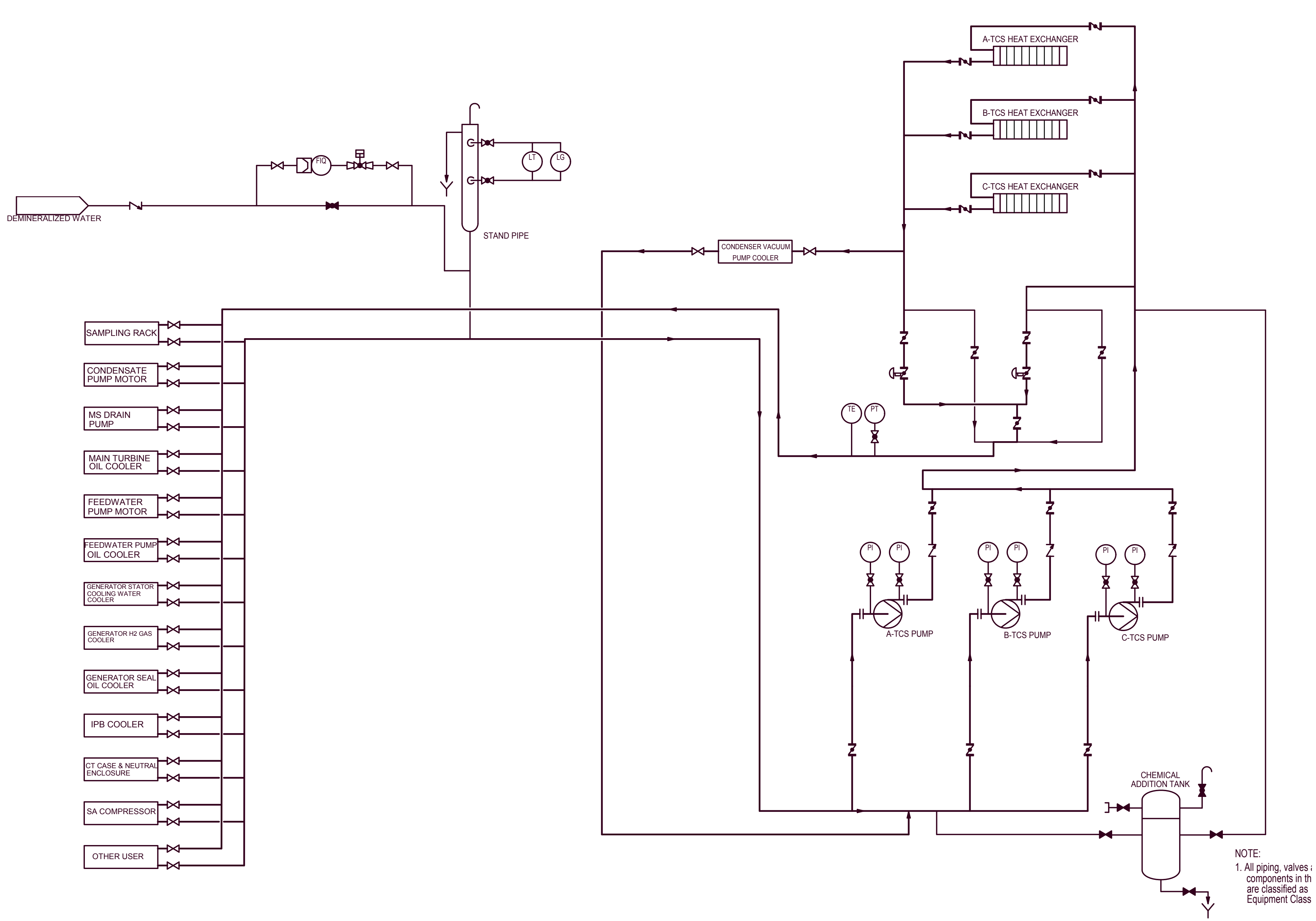
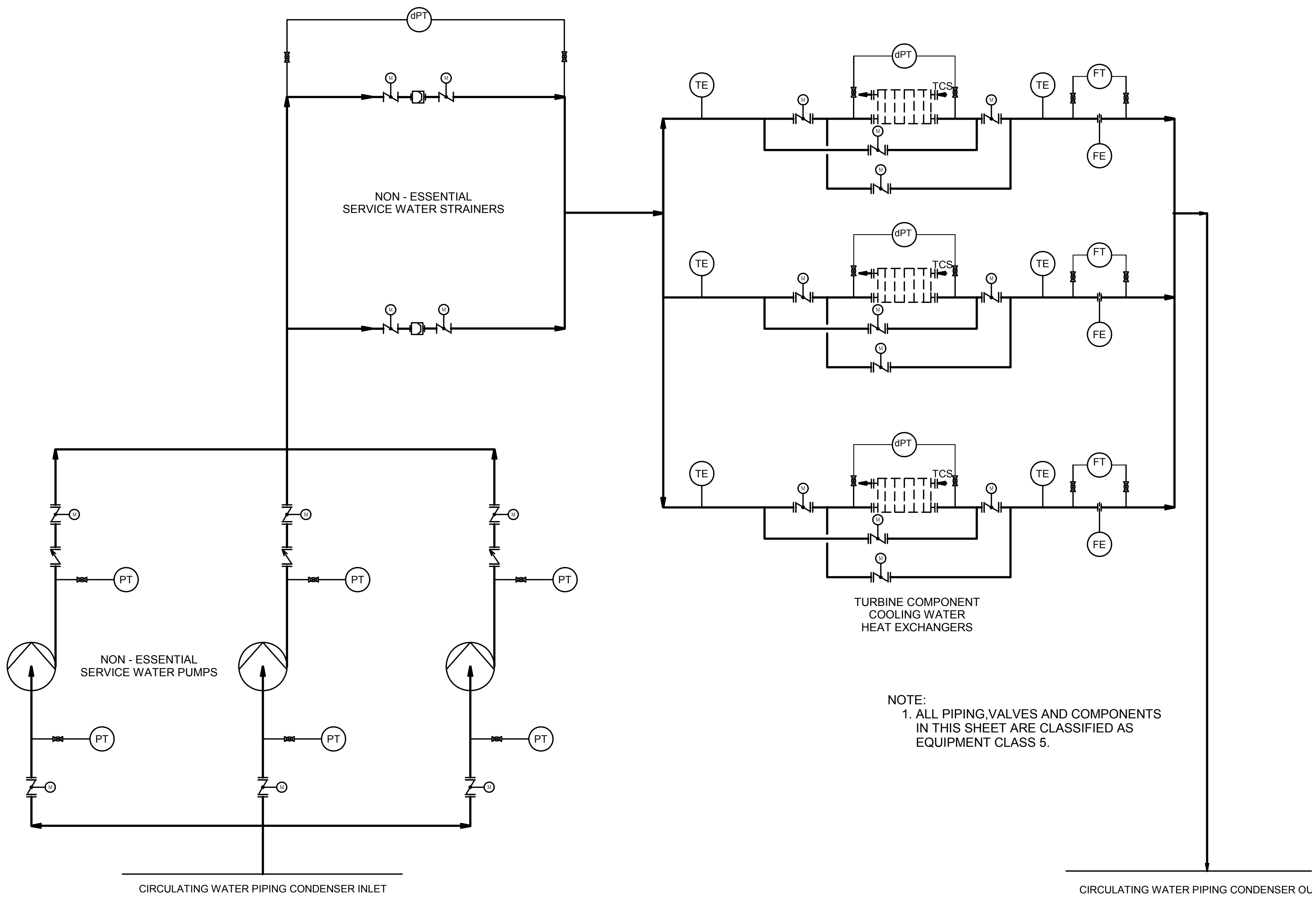


Figure 9.2.8-1 Turbine Component Cooling Water System Piping and Instrumentation Diagram



NOTE:
1. ALL PIPING,VALVES AND COMPONENTS IN THIS SHEET ARE CLASSIFIED AS EQUIPMENT CLASS 5.

Figure 9.2.9-1 Non-Essential Service Water System Flow Diagram

9.3 Process Auxiliaries

9.3.1 Compressed Air and Gas Systems

The compressed air and gas systems are:

- Instrument air system (IAS)
- Station service air system (SSAS)
- Compressed gas system (CGS)

9.3.1.1 Design Bases

9.3.1.1.1 Safety Design Basis

The IAS, SSAS, and compressed gas system serve no safety-related function because the safety-related air-operated valves served by the IAS, shown in Table 9.3.1-1, do not require IAS to perform their safety-related function and these valves fail in the safe position on loss of instrument air pressure. Therefore they have no nuclear safety design basis except for their containment isolation function. The lines that penetrate containment incorporate valve and piping arrangements that meet the containment isolation criteria described in Chapter 6, Subsection 6.2.4. The IAS components that are designed to be safety-related and seismic category I are the motor operated outside containment isolation valve, inside containment isolation check valve and the piping between the motor operated valve and the check valve. The SSAS components that are designed to be safety-related and seismic category I are the manual valve outside containment isolation valve, inside containment isolation check valve and piping between outside and inside isolation valves. These components are designed in accordance with the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III Class 2 (Ref. 9.3.6-1).

In the event of a station blackout (SBO), the safety-related air-operated valves served by the IAS will fail in the safe position. This is in compliance with the requirements of 10 CFR 50.63 (Ref. 9.3.6-2).

9.3.1.1.2 Power Generation Design Basis

Plant breathing air requirements are satisfied by using the SSAS as a supply source. Portable breathing air filtration units are used to improve the service air to Quality Verification Level D breathing air, as defined in ANSI/CGA G-7.1 (Ref. 9.3.6-3). The breathing air filtration units are used for protection against airborne contamination anywhere in the plant where maintenance or operational activities may be required prior to decontamination.

The compressed gas system is separate and independent of the IAS and SSAS.

Classifications of components and equipment in the IAS, SSAS, and compressed gas system are given in section 3.2.

In accordance with NUREG-1275 (Ref. 9.3.6-4), instrument air quality meets the manufacturer's standards for pneumatic equipment supplied as a part of the plant. Intake filters for instrument air and compressors remove particulates greater than 3 microns.

The compressed gas system is comprised of the high pressure nitrogen gas subsystem, the low pressure nitrogen gas subsystem, the hydrogen gas subsystem, the carbon dioxide gas subsystem, and the oxygen gas subsystem. The compressed gas system stores and distributes high pressure nitrogen gas, low pressure nitrogen gas, hydrogen gas, carbon dioxide, and oxygen to the various users within the plant.

9.3.1.2 System Description

9.3.1.2.1 General Description

Major components of the IAS and SSAS are located in the T/B.

9.3.1.2.1.1 Instrument Air System

The IAS supplies filtered, dry, and oil-free compressed air in accordance with ANSI/ISA S-7.3 (Ref. 9.3.6-5) criteria for the following components located throughout the plant:

- Air-operated valves
- Heating, ventilation, and air conditioning (HVAC) air-operated dampers
- Pneumatic instruments and controls

The IAS consists of two 100% capacity trains. One train is normally in service with the other train in standby. The compressor unit in service cycles to maintain instrument air normal instrument air header pressure. The standby train will automatically start upon a low instrument air header pressure. Each train consists of a compressor unit, an air receiver, and a dryer discharging to a common air distribution header. Each compressor unit consists of an inlet air filter/silencer, a compressor, an intercooler, an aftercooler, a moisture separator, and associated controls. Twin tower dryers are used. One tower may be used to dry air while the other tower goes through regeneration. When instrumentation senses a high dew point, the towers switch. The formerly operating tower then undergoes regeneration while the regenerated tower dries the instrument air.

Provisions are made to cross-connect the IAS and SSAS at the distribution header upstream of the dryers. In event that the instrument air compressors cannot meet the demand for instrument air, the station service air compressors will provide a backup supply of air. Isolation valves are provided on the cross-connect to permit isolation of the systems.

The instrument air supply line that penetrates the containment is provided with a normally open motor-operated containment isolation valve that closes on a containment isolation signal. The isolation valve inside the containment is a check valve. Instrument air header pressure is monitored and a low pressure alarm indicates a possible instrument air instrument air line rupture.

Safety-related air-operated valves in various plant systems served by the IAS are identified in Table 9.3.1-1. None of these valves require instrument air to perform their safety-related function. These valves fail in the safe position on loss of instrument air pressure.

Instrument air equipment can be powered from a non-safety related onsite gas turbine generator (GTG) in the event of a loss of offsite power (LOOP). The compressors are cooled by water supplied from the component cooling water (CCW) system. The IAS is shown in Figure 9.3.1-1. Major system components are described in Table 9.3.1-2.

The instrument air compressor unit, instrument air receivers, instrument airA dryers, and accessories are all located in the T/B.

9.3.1.2.1.2 Station Service Air System

The SSAS supplies filtered, dry, and oil-free compressed air for the following components located throughout the plant:

- Air-operated tools
- Air operated pumps
- Breathing air filtration units

Three 50% rated capacity trains are provided for the SSAS. Two trains are normally in service with the third train in standby. A lead compressor unit cycles to maintain normal service air header pressure. The lag compressor will automatically start to maintain service air header pressure in the event that the lead compressor is not able to meet the system demand. The third train can be manually started during periods of heavy demand. Each train contains a compressor unit consisting of an inlet air filter/silencer, a compressor, an intercooler, an aftercooler, and a moisture separator. The three compressor trains share two receivers and two dryers, which connect to a common service air distribution header downstream of the air dryers. Cooling water to the service air compressors is supplied from the turbine plant closed cooling water system.

The service air compressor unit, receivers and dryers are all located in the T/B.

The service air supply line which penetrates the containment is provided with a normally closed manual containment isolation valve and is opened on an as-needed basis. The isolation valve inside the containment is a check valve. The SSAS can supplement the IAS system when additional instrument air capacity is needed. The SSAS is shown schematically in Figure 9.3.1-2 and major system components are described in Table 9.3.1-3.

9.3.1.2.1.3 Compressed Gas System

The compressed gas system provides a pressure-regulated supply of various gases needed for purging, diluting, and inerting.

The high pressure nitrogen gas subsystem consists of a high pressure nitrogen gas header from the high pressure nitrogen gas source provided by the Combined License (COL) Applicant and distribution piping that provides high pressure nitrogen to the safety injection system (SIS) accumulators.

The low pressure nitrogen gas subsystem consists of a low pressure nitrogen gas header from the nitrogen gas source provided by the COL Applicant and distribution piping that provides low pressure nitrogen to the various users throughout the plant.

The hydrogen gas subsystem consists of a hydrogen gas header from the hydrogen gas source provided by the COL Applicant and distribution piping that provides hydrogen to the volume control tank in the CVCS and to the waste gas analyzer in the gaseous waste management system.

Carbon dioxide and oxygen gas sources are provided by the COL Applicant.

9.3.1.2.2 Component Description

9.3.1.2.2.1 Instrument Air System

Table 9.3.1-2 provides design information for the main components associated with the IA system.

<u>Air Compressor Unit</u>

The compressor package utilizes a heavy duty, oil free, non-lubricated asymmetrical twin rotary screw air compressor with sound-attenuated enclosure, as required for noise suppression, and meets the applicable standards of the Compressed Air and Gas Institute (CAGI). Each compressor package includes an intake filter, rotary screw compressor elements, silencer, intercooler, aftercooler, moisture separators, bleed-off cooler, oil cooler, oil reservoir, automatic load controls, relief valves, and a discharge air check valve.

<u>Air Receivers</u>

Two instrument air receivers function as storage devices for compressed instrument air. Each air receiver is equipped with an automatic condensate drain valve and a pressure relief valve.

<u>Air Dryers</u>

Two air dryer assemblies are provided for the instrument air system. Each dryer assembly consists of a desiccant-filled, twin tower design. Each dryer assembly includes a coalescing prefilter that removes oil aerosols and moisture droplets, as well as an afterfilter to remove desiccant dust.

9.3.1.2.2.2 Station Service Air System

Table 9.3.1-3 provides design information for the main components associated with the SSAS.

Air Compressor Unit

Each compressor unit utilizes a heavy duty, oil free, non-lubricated asymmetrical twin rotary screw air compressor with sound attenuated enclosure, as required for noise suppression, and meets the applicable standards of the CAGI. Each compressor unit includes an intake filter, rotary screw compressor elements, silencer, intercooler, aftercooler, moisture separators, bleed-off cooler, oil cooler, oil reservoir, automatic load controls, relief valves, and a discharge air check valve.

Air Receivers

The two service air receivers function as storage device for compressed service ari. The air receivers are equipped with an automatic condensate drain valve and a pressure relief valve.

9.3.1.2.2.3 Compressed Gas System

The compressed gas system consists of gas sources provided by the COL Applicant and the distribution headers, distribution piping, and the associated valves and instrumentation.

9.3.1.2.3 System Operation

9.3.1.2.3.1 Instrument Air System

The instrument air compressors are operated by a local pressure controller located in the instrument air distribution header, which can be programmed for various sequences of operation. Normally, one compressor runs continuously loading and unloading as required to supply compressed air demand. The second compressor serves as a backup and starts automatically if the first unit fails or if demand exceeds the capacity of the operating compressor.

Instrument air pressure is reduced by pressure regulators at the pneumatic component, as required.

9.3.1.2.3.2 Station Service Air System

The SSAS compressors are operated by a local controller that can be programmed for various sequences of operation. Normally one or two compressors are in operation, with the remaining compressor aligned to be manually started if a compressor fails or if demand exceeds the capacity of the operating compressors.

Breathing air can be obtained through portable breathing air filtration packages connected at service air outlets. The breathing air filtration package consists of replaceable cartridge-type filters, a pressure regulator, carbon monoxide monitoring equipment, air supply hoses, and air supply devices. Breathing air of a Quality Verification Level D or better is supplied to personnel from the packaged purification system, in accordance with the requirements of ANSI/CGA G-7.1 (Ref. 9.3.6-3).

9.3.1.2.3.3 Compressed Gas System

The compressed gas system's subsystems have pressure regulation and over pressure protection, as required.

9.3.1.3 Safety Evaluation

The safety-related portions of the IAS, SSAS and compressed gas system, are designed to remain functional during and following a safe shutdown earthquake (SSE) per Regulatory Guide (RG) 1.29, Positions C.1 and C.2 (Ref. 9.3.6-6). This cabability conforms to the requirements of General Design Criteria (GDC) 2.

The IAS meets the requirements of GDC 1 as it pertains to minimum instrument air quality standards in accordance with ANSI/ISA-S7.3 (Ref. 9.3.6-5).

Safety-related system components are not shared with other units; therefore, GDC 5 is not applicable.

The compressed air system has no safety-related function other than a containment isolation function. Air-operated valves served by the IAS that are essential for safe shutdown and accident mitigation are designed to fail in the safe position upon loss of air pressure. Therefore, a supply of instrument air is not required following a design basis event or for safe shutdown of the plant. The IAS is not designed to meet seismic category I requirements or the single failure criterion, except for its containment isolation valves and penetration piping.

The IAS and SSAS are classified as moderate-energy systems. There are no adverse environmental effects associated with a postulated failure of the instrument air and service air piping. Therefore, a failure in the instrument air and service air piping will not compromise the integrity of any safety-related component.

The compressed air and gas systems do not perform any safety-related function and, therefore, have no safety design basis other than provision for safety-related containment isolation valves and penetrations.

9.3.1.4 Inspection and Testing Requirements

Preoperational testing of the compressed air and gas systems is performed as described in Chapter 14, Verification Programs, to verify that the systems are installed in accordance with plans and specifications and in accordance with the guidance of RG 1.68.3 (Ref. 9.3.6-7). The systems are pressure tested and functionally tested to verify that the proper sequencing of valves and air compressors occurs on the appropriate signals. The compressors are tested to verify performance.

During normal operation, the compressor units are periodically tested for operability or, alternatively, placed in service in place of the train which has been operating.

Descriptions of the inspection and testing programs for valves are provided in the following subsections/sections:

- Subsection 3.9.6, Functional design, qualification and in-service testing programs for valves;
- Subsection 6.2.4, Containment Isolation System (applicable to compressed air and gas system containment isolation valves);
- Section 6.6, In-service inspection and testing of class 2 and 3 components.

Periodic checks are made to ensure high quality instrument air, as specified in the ANSI/ISA S-7.3 (Ref. 9.3.6－5) standard.

9.3.1.5 Instrumentation Requirements

An instrumentation package is included with each of the instrument air and service air compressors. Each package consists of locally mounted temperature and pressure transmitters, indicators, and automatic protection devices. The temperature and pressure transmitters support the automatic control modes of compressor operation. The IAS and SSAS also include additional local instrumentation and controls necessary to ensure the ability of the systems to perform their design functions.

Compressed air and gas system lines are provided with low pressure alarms to indicate possible line rupture and leakage from radioactive systems to the compressed air and gas systems, and to preclude releases to the environment.

9.3.2 Process and Post-Accident Sampling Systems

The US-APWR process and post-accident sampling system includes the following sampling sub-systems:

- The primary liquid sampling system (PLSS)
- The primary gaseous sampling system (PGSS)
- The post-accident sampling system (PASS)
- The secondary sampling system (SSS)
- The steam generator blowdown sampling system (SGBDSS)

- Manual local grab sample provisions

These systems contain equipment to collect representative samples of the various process fluids in a safe and convenient manner and provide the means to monitor the overall plant condition; and those of various plant systems using the collected and analyzed samples. These systems include sample lines, pressure reduction valves, sample coolers, and automatic analysis equipment. Their design adheres to the as-low-as-reasonably-achievable (ALARA) principle during both normal and post-accident conditions. The PLSS, PGSS, and PASS are located in the A/B and, R/B and the access building. The SGBDSS is located in the R/B and the T/B. The SSS is located in the T/B.

When applicable, sampling frequency and analyses requirements for these systems are listed in the technical specifications. Related discussion of sampling systems and components is provided as follows:

Containment hydrogen monitoring and control system : Chapter 6 / Section 6.2.5

Liquid waste management system : Chapter 11 / Section 11.2

Waste gas analyzer : Chapter 11 / Section 11.3

Process and effluent radiological monitoring and sampling systems : Chapter 11 / Section 11.5

9.3.2.1 Design Bases

The process and post-accident sampling systems serve no safety functions and therefore have no safety design basis, except for providing for containment isolation, which is described in Chapter 6, Section 6.2.4. The process and post-accident sampling systems are designed in accordance with 10CFR50, Appendix A, General Design Criteria (GDC) 1, 2, 13, 14, 26, 41, 60, 63, 64 (Ref. 9.3.7-8); 10 CFR 20.1101(b) (Ref. 9.3.7-10), NUREG-0737, Item III.D.1.1, SRP Section 9.3.2, 10CFR50.34(f)(2)(viii) and 10CFR50.34(f)(2)(xvii) (Ref. 9.3.7-11).

The containment isolation valves in the PLSS, PGSS, PASS and SGBDSS are selected, tested, and located in accordance with GDC 54, 55, and 56 and 10CFR50, Appendix J, Type C Testing.

The PLSS, PGSS, SSS, SGBDSS and PASS equipment and seismic classification are discussed in Section 3.2.

The US-APWR has its own process and post-accident sampling systems and local grab sample provisions.

Sample lines use 3/8 inch stainless steel tubing and flow restricting orifices to prevent excessive reactor coolant loss.

The PLSS is designed to cool and depressurize samples collected at high temperature and high pressure, and to permit the collection of liquid samples from the RCS, the CVCS, and the RHRS for the purpose of analysis of the reactor coolant, and detecting deviations in the reactor coolant chemistry and accumulation of fission product activity during normal plant operation.

The PLSS is also used to cool and depressurize post-accident samples of reactor coolant as a part of PASS following an accident.

The PGSS is designed to ensure that containment isolation is not violated while collecting representative samples of the containment atmosphere following an accident, while permitting the collection of containment atmosphere gaseous samples during normal operation.

Additionally, instead of the PGSS, a part of the gaseous waste management system (GWMS) collects representative samples from various auxiliary system process streams into a sample vessel.

The PASS is designed to obtain post-accident liquid samples, as listed Table 9.3.2-2, from reactor coolant and refueling water storage pit water (equivalent to containment sump water for conventional PWR) after the samples are cooled and depressurized by the PLSS, for analysis of the boron, dissolved gas concentration, pH, chloride and fission product concentration within a predetermined time following an accident for the purpose of analyzing the post accident conditions to augment the plant monitoring capability in the long term.

Additionally, the PASS is designed to collect representative post-accident gaseous sample from containment atmosphere for analysis of the hydrogen concentration and fission product gas concentration within predetermined time respectively, following an accident for the purpose of analyzing the post-accident conditions to augment the monitoring capability in the long term.

Any leakage outside the containment in the PASS is collected in the R/B sump tank.

The SSS is designed to monitor and maintain impurity levels in the steam, feedwater and condensate purity within predetermined limits during normal plant operation, and assist in the control of secondary side chemical injection system operation, automatically alarm at any off-spec chemistry reading.

The SGBDSS is designed to monitor impurity levels in the secondary water in the SGs within predetermined limits during normal plant operation by providing continuous blowdown samples at an adequate flow rate, and to automatically isolate lines in the event of abnormal conditions within the blowdown system, the RCS, or the main steam system.

The PLSS, PGSS, PASS and SSS flow diagrams are shown in Figure 9.3.2-1. The SGBDSS flow diagram is shown in Figure 10.4.8-1 and Figure 10.4.8-2. (See Chapter 10, Subsection 10.4.8)

Components which provide for containment isolation and components used for the purpose of collecting the post-accident samples are powered from their respective Class 1E power supplies.

9.3.2.2 System Description

9.3.2.2.1 Primary Liquid Sampling System

The PLSS includes sample heat exchangers, a sample hood, a sample sink, sample pressure vessels, and associated piping and valves.

The PLSS performs the following functions:

- Collect liquid samples from the RCS and auxiliary systems.
- Containment isolation.
- Provide liquid samples of reactor coolant.
- Analyze boron and radioactivity in liquid samples.
- Provide protection against exposure and contamination during collection of samples, and route spilled water and wash water to the liquid waste management system (LWMS).

Sampling points of each sampling activity are specified in Table 9.3.2-1.

The PLSS is designed to collect representative samples for analysis by the plant operating staff from the RCS and auxiliary system process streams. Chemical and radiochemical analyses are performed for boron concentration, fission and corrosion product activity levels, dissolved gas concentration, chloride and fluoride concentration, pH and conductivity levels, fission gas content, and dissolved gas compositions in various vessels. The results of these analyses are used to monitor core reactivity and fuel rod integrity, evaluate ion exchanger and filter performance, specify chemical additions to the various systems, maintain acceptable hydrogen levels in the RCS, and detect radioactive material leakage.

The PLSS collects samples from the RCS and the auxiliary systems and transports them to a common location in a sample room in the auxiliary building. The PLSS consists of sample conditioning equipment and a sampling panel. To minimize the source volume exposed at the sampling panel, 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 to minimize radiation exposure to the plant operating staff. The sampling panel also contains grab sampling facilities. Valves on the grab sampling panel have long handles extending out of the enclosure and are manually operated. 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 component cooling water. The sample line instrumentation is designed for the conditions of the sample taken.

After temperature and pressure reduction, the PLSS samples are routed to the sample panel within a ventilated, hooded enclosure to confine any leakage or spillage of radioactive fluids. Temperature, flowrate 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 LWMS.

Most PLSS sample points are manually operated on an intermittent basis to provide samples for laboratory analysis. 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 directed to a sample line at full process pressure and reduced temperature by sample cooler and depressurized by pressure reducing valve. A removable sample pressure vessel is used for collection. These sample vessels are designed for 150 psig at 200° F and are equipped with quick-disconnect couplings to facilitate removal to the radiochemical laboratory for 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, CVCS, and accumulator samples require sufficient purging to ensure representative samples. System pressure provides the motive force for the purging flows. Purge time is determined for each sample by the flow rate and the individual sample line volume. Primary coolant purge flows are discharged to the CVCS volume control tank or the holdup tanks. The sample sink drain, which may be contaminated, is routed to the waste holdup tank.

9.3.2.2.2 Primary Gaseous Sampling System

The PGSS includes a C/V atmosphere gas sample cooler, a containment atmosphere gas sample moisture separator, a sample hood, which is connected to the ventilation system, sample pressure vessels, a containment atmosphere gas sampling compressor, and associated piping and valves. Radiation monitor in the HVAC system will re-route the exhaust to a line with high-efficiency particulate air (HEPA) and charcoal filters when high radiation is detected.

Furthermore, a portion of the GWMS has the additional capability of collecting gaseous samples from auxiliary systems as listed in Table 9.3.2-1 in order to analyze the fission gas content and gas composition of various vessels and detect accumulation of gross fission production gas activity and formation of hydrogen in the gas.

The PGSS and a part of GWMS perform the following functions:

- Provides gaseous sample of containment atmosphere.
- Containment isolation.

- Collects gaseous samples from auxiliary systems.
- Provides protection against exposure and contamination during collection of samples, and send a residual dew condensation water to the LWMS.

Sampling points of each system are specified in Table 9.3.2-1.

The PGSS is designed to collect representative samples for analysis by the plant operating staff from the containment atmosphere during normal operation. Chemical and radiochemical analyses are performed by the plant operating staff to monitor gas compositions in the containment. The results of these analyses are used to detect radioactive material leakage.

In addition, a portion of the GWMS collects gaseous samples from the auxiliary systems. The PGSS is located in the A/B complex. The gas sampling station of the PGSS is inline type, which returns purge gas to containment. Sample line heat tracing and insulation are used on high temperature sample lines to preclude plate out. The gaseous sample vessels are positioned inside a filtered vent hood. The gas sampling station of the PGSS has manual-operated valves with extended handle to minimize radiation exposure to the plant operating staff. Residual dew condensation liquid collected in the gas sample vessel of the PGSS is routed to the holdup tanks. The lines are purged before sampling to ensure that samples are representative. The purged gas is routed back to the containment atmosphere.

9.3.2.2.3 Post-Accident Sampling

The US-APWR has specific post-accident sampling lines, which have the capability to obtain and analyze highly radioactive samples of the reactor coolant, refueling water storage pit water (equivalent to containment sump water for conventional PWR), and containment atmosphere.

The PASS is required to maintain the capability to draw highly radioactive samples following an accident. Analysis of these samples can provide information regarding the cause of the accident, to quantify certain radionuclides that are indicators of the degree of core damage and to measure the post-accident sample activities during the accident recovery phase to determine the degree of core damage and general plant contamination.

The PASS consists of two lines, a post-accident liquid sampling line and a post-accident containment atmosphere sampling line.

The post-accident liquid sampling line is designed to obtain post-accident liquid samples, as listed in Table 9.3.2-2, from the RCS hot leg and refueling water storage pit into a dedicated sample vessel with lead shielding. This line includes a sample hood which is enclosed with a shielded material that provides radiation shielding to minimize radiation exposure, a sample sink and the sample pressure vessel. The hood has an extended handle to manually collect samples and protect the operator from radiation exposure. This is in compliance with the requirement of NUREG-0737, II.B.3 position 6 and 10CFR50.34(f).

The post-accident liquid samples are cooled and depressurized by a portion of the PLSS prior to being transferred to a dedicated post-accident sample vessel. This line has the capability to take a boron concentration sample measurement 8 hours following an accident and take radioactivity, dissolved gas concentration, pH, and chloride sample measurements 24 hours following an accident in accordance with the requirements of NUREG-0737, II.B.3, 10CFR50.34(f), SRP Section 9.3.2 and SECY 93-087 (Ref. 9.3.7-11).

The other post-accident containment atmosphere gas sampling line is designed to obtain the representative post-accident gaseous samples, as listed in Table 9.3.2-2, from containment atmosphere into a dedicated sample vessel with lead shielding. This line includes a specific sample cooler, a moisture separator, a sample hood, a sample sink, and a sampling compressor which transfers samples to a sample vessel and returns purge gas to containment.

The gaseous sample line is used for both PGSS, which is used during normal operation, and PASS, which is used after an accident. The PGSS line is designed to obtain the representative gaseous sample from the containment following an accident with use of a dedicated sample pressure vessel with lead shielding.

The line has the capability of taking hydrogen concentration samples and fission product gas concentration measurements 24 hours following an accident in accordance with the requirements of NUREG-0737, II.B.3, 10CFR50.34(f), SRP Section 9.3.2 and SECY93-087. Radiological dose associated with post-accident actions, including PASS operation, are described in Chapter 12, Subsection 12.3.5.1.

Both the post-accident liquid and containment atmosphere samples can be obtained at a shielded sample location in the R/B. The post-accident sampling system does not perform any direct safety function; however, when post-accident 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 sampling system are designed to comply with seismic category I requirements. A list of qualified post-accident sampling system valves is provided in Table 9.3.2-3. Filtered venting of any post-accident sampling system is released through the HVAC system, and then re-routed to a line with HEPA and charcoal filters when high radiation is detected.

9.3.2.2.4 Secondary Sampling System

The SSS is designed to continuously monitor water samples from the turbine cycle, as listed in Table 9.3.2-4. Water quality analyses are performed on these samples to determine pH and conductivity levels, dissolved oxygen, residual oxygen scavenger, silica, chloride, sodium, and sulfate. These measurements are used to control water chemistry and to permit appropriate corrective action by the plant operating staff. In addition, grab sample capabilities are provided at each of these monitoring points to analyze other chemicals.

The purpose of the SSS is to provide the data necessary for controlling the water quality of the secondary plant systems listed in Table 9.3.2-4. The SSS is located in the T/B.

The SSS samples are specified in Table 9.3.2-4. Primary coolers are provided for the samples whose temperatures exceed 125 ^{o}F. All samples are conditioned to 115 ^{o}F by cooling water or constant temperature bath to approximately 40 psig by pressure regulators.

Sample points may be used to continuously monitor representative samples. The sample line and sample sink drain into the SSS are collected and drained to the T/B floor sump. Each sample line has a grab sampling capability for laboratory analysis. Sampling point is also provided circulating water system (CWS) to ensure that no harmful effects will result to CWS piping and valves due to improper water chemistry.

9.3.2.2.5 Steam Generator Blowdown Sampling System

The SGBDSS is provided to control the steam generator (SG) secondary side water quality and to detect a leak or failure of SG tubes. The SGBDSS includes blowdown lines and blowdown sample lines. The SGBDSS also includes blowdown sample coolers, pressure reducing valves, a radioactive process monitor, instruments, piping and valves. The SGBDSS components are described in Chapter 10, Subsection 10.4.8. The sample points are discussed in Table 9.3.2-5.

The SGBDSS performs the following functions:

- Monitors secondary water quality in SGs to maintain acceptable secondary coolant water chemistry.

- Detects primary to secondary SG tube leakage.

- Containment isolation.

Based on radioactivity and water chemistry monitoring, the blowdown water is purified by its own polishing system. Otherwise, the blowdown is sent to the waste water system (WWS) when disposal is required due to its chemical content; or during start-up. Blowdown water can also be sent to the LWMS when disposal is required due to radioactivity content.

Blowdown sample water is passed through the blowdown sample coolers and pressure reducing valves for sampling. Blowdown samples are used periodically to check the conductivity and pH of the SG secondary water and continuously monitored for radiation to detect leakage or failure of a SG tube.

All SG blowdown lines and SG blowdown sample lines are automatically isolated from the containment on any signal of automatic initiation of the emergency feedwater pumps and/or a high radiation signal of the radiation monitors.

9.3.2.2.6 Manual Local Grab Sample Provisions

Local grab sampling points, as listed in Table 9.3.2-6, are provided as needed for various processes. Manual grab sample points are provided for the liquid sample points as required by the operator. Quick-disconnect type couplings are used for sample vessel connections to provide a convenient and expeditious way of sampling.

Grab sample points for liquids are identified in Table 9.3.2-6. Grab sample points are indicated on the appropriate system flow diagrams.

9.3.2.3 Safety Evaluation

Except for the associated containment penetrations, the process and post-accident sampling systems do not have a safety function. Chapter 6, Subsections 6.2.4 provides the safety evaluation for the containment isolation system. All PLSS, PGSS, PASS and SGBDSS 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. (Chapter 6, Subsection 6.2.4 provides a detailed discussion of containment isolation)

9.3.2.4 Inspection and Testing Requirements

Proper operation of the process and post-accident sampling system is initially demonstrated during preoperational testing.

The proper operation and availability of the PLSS, PGSS, SSS and SGBDSS are proven in service by their use during normal plant operation. Samples from the PLSS, PGSS and PASS 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 SSS and SGBDSS draw continuous samples from the turbine component cooling water system for monitoring water quality. The operation of the SSS and SGBDSS is verified by observing that continuous sample flow is maintained through the analyzers. The calibration of the analyzers is checked periodically by auto-calibration features on the analyzers and by comparing it with laboratory analysis of a grab sample from the same process flow. Section 14.3 provides the ITAAC for the sampling system.

9.3.2.5 Instrumentation Requirements

The process and post accident sampling systems use local pressure, temperature, and flow indicators to facilitate manual operation and verify sample conditions before samples are drawn.

A radiation detector on the SGBDSS continuously monitors the steam generator blowdown system for primary-to-secondary tube leaks. In the event the SGBDSS detector reaches the radiation set-point as discussed in Section 11.5, the blowdown flow path is automatically closed.

The SSS is equipped with continuous analyzers to monitor specific water quality conditions. Certain measurements are used to automatically control pH and corrosion by chemical addition via the main control panel. 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 and to verify analyzer calibration.

9.3.3 Equipment and Floor Drainage Systems

The equipment and floor drainage systems collect liquid waste from equipment and floor drains during all modes of operation and separate the contaminated effluents and transfer them to the processing and disposal systems. Equipment and floor drainage is classified and segregated by the type of waste generated. Liquid waste classification includes:

- Radioactive liquid waste
- Non-radioactive liquid waste
- Chemical and detergent liquid waste
- Oily liquid waste

9.3.3.1 Design Bases

The Equipment and floor drainage systems are designed in accordance with 10CFR50, Appendix A, General Design Criteria (GDC) 2, 4 and 60 (Ref. 9.3.7-8).

9.3.3.1.1 Safety Design Bases

- The equipment and floor drainage systems are not safety-related and serve no safety-related function except the isolation valves installed in the drainage piping from engineered safety feature (ESF) equipment rooms.
- The equipment and floor drainage systems are designed to prevent damage to safety-related systems, structures, and equipment.
- Equipment and floor drainage system failures will not prevent the proper function of any safety-related equipment.
- The drain systems from ESF equipment rooms are designed to prevent flooding due to backflow by the virtue of the difference in elevation between the ESF rooms and the collection sump.
- The floor drains in ESF area are capable to remove expected fire fighting water flow.

- ESF room drain isolation valves are also provided on the ESF room drain piping in order to protect against flooding due to backflow. These isolation valves are safety-related and serve safety-related function.

- The equipment and floor drainage systems are designed to be protected against internally and externally generated missiles (Refer to Chapter 3, Section 3.5) and pipe ruptures (Refer to Chapter 3, Section 3.6).

9.3.3.1.2 Power Generation Design Bases

- The systems are designed with no cross-connection between the radioactive and non-radioactive drainage system to prevent contamination due to possible backflow.

- Radioactive drainage system and non-radioactive drainage system are separated, however, in case that radioactive water flows into non-radioactive system (e.g. CCW component failure), potentially radioactive contaminants are diverted from the non-radioactive drainage system to the LWMS. This is in conformance to the requirement of GDC 60.

- The LWMS collects potentially radioactive liquid wastes, at atmospheric pressure, from equipment and floor drainage in the containment vessel, R/B, A/B and access building. All such drainage is conveyed by gravity to sumps or tanks within the respective buildings and pumped to the waste holdup tanks.

- Chemical and other wastes collected from laboratory, decontamination solutions, and laboratory sinks drain to the chemical drain tank of the LWMS.

- The waste from hand and eyewash stations and the personnel decontamination shower facilities is collected in the detergent drain tank of the LWMS.

- The T/B drain system collects the non-radioactive floor and equipment drains in the non-radioactive drain sump. The liquid waste is sent to the WWS. In the unlikely event, that the fluid becomes radioactive, a radiation monitor determines the level of radioactive contamination, and the waste is then sent to the LWMS.

- Oily waste is collected by separate equipment and rooted to a separate floor drain sump tank. The separated oil is collected for offsite disposal.

- Sump pumps are designed to discharge at a flow rate adequate to preventing sump overflow for drain rate anticipated during normal plant operation and other anticipated drainage periods. Generally these sumps and sump tanks are provided with sufficient storage capacity consistent with sump pump operation.

- The equipment and floor drain systems and components are designed as equipment class 4, 5 and 6 as listed in Table 3.2-2, except for ESF rooms floor drain systems and components that are designed as seismic category I, equipment Class 3.

9.3.3.1.3 Codes and Standards

The equipment and floor drainage systems are designed in accordance with the applicable codes and standards as listed in Chapter 3,Table 3.2-2.

9.3.3.2 System Description

The equipment and floor drains include the drains of A/B, R/B, T/B, and access building. Liquid waste drains by gravity and collects to tanks or sumps in each building. The waste is then transferred to the waste holdup tank for processing. The radioactive waste is discharged to the LWMS for further processing before being discharged to the environment.

The detergent drains, including personnel decontamination waste, and the chemical drains are collected separately, and treated as required.

All the radioactive wastes are monitored prior to discharge, as discussed in Chapter 11, Section 11.2.

9.3.3.2.1 General Description

The equipment and floor drainage systems consist of collection piping, valves, equipment drains, floor drains, collection sumps and sump pumps.

9.3.3.2.2 Component Description

1. Collection piping: In all potentially radioactive areas, the collection system piping for the liquid waste is stainless steel. Potentially radioactive laboratory and decontamination waste, regeneration waste, and detergent waste collection system piping is stainless steel. Non-radioactive collection piping is made of stainless steel.

2. Collection sumps: The centrally located sumps collect normal and potentially radioactive liquid waste. The non-radioactive collection sump is constructed of concrete with a corrosion resistant coating or liner. This sump is fitted with a vent connected to the ventilation system to remove any potential radioactive gases. The sumps also collect discharge by gravity from areas that are maintained under a slight negative pressure boundary.

3. Reactor building equipment and floor drains: The R/B equipment and floor drainage piping are arranged so that any ESF equipment room leakage does not penetrate into other ESF equipment rooms. Discharge from each ESF equipment room is drained by gravity to the R/B sump tank. The drainage piping from each ESF room is equipped with a normally closed, manually operated valve, which is located outside the equipment room.

4. Miscellaneous equipment drains: 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 drain discharge flow will not exceed the gravity flow capacity of the drainage header at atmospheric pressure.

5. Floor drains: All floor drains are installed with rims which are flush with the low-point elevation of the finished floor. All floor drains discharge directly into the respective building sumps or sump tanks.

6. Turbine building equipment and floor drains. The non-radioactive liquid wastes generated in the T/B, including equipment and floor drains and leakages are generally collected in the non-radioactive drain sump in the T/B.

   Turbine building sump pumps discharge to the WWS prior to discharge to the environment. When radioactive contamination in the discharge from the sump is detected and alarmed in the MCR, the discharge from the sump is diverted to the LWMS for processing prior to discharge to the environment.

9.3.3.2.3 System Operation

The equipment and floor drainage systems operate during all modes of operation. The various building drains directly to the corresponding collection point by gravity. The sump pump operation is automatic with level switches. These pumps are automatically started or stopped by a level preset by the local instrumentation in the sump or a sump tank. The T/B sump pumps are not required to operate during design base accident.

Sumps are provided with duplex pumps or with simplex pumps. The T/B sump pumps are aligned to discharge to the waste water system for treatment prior to discharge to the environment. If the radiation level detected in the fluid by the radiation monitor is above a predetermined set point, the discharge from the sump is diverted to the LWMS for processing.

The subsystems and their operation are described in subsequent paragraphs according to their classification as non-radioactive or potentially radioactive.

All liquid wastes drained from potentially radioactive drainage piping are conveyed by gravity to the respective buildings radioactive sump or tanks. The liquid is then discharged to the LWMS for processing.

A. Oily waste

   Potentially radioactive oily waste is drained into the radioactive sump tanks within the respective building. The separated oil is collected for offsite disposal and the clarified effluent is discharged to the LWMS for processing. Refer to Chapter 11.

B. Chemical waste

   The chemical wastes, containing chemicals and corrosive substances are discharged to the chemical drain tank.

C. Liner plate leakage detection

   The leakage from the spent fuel pit, fuel transfer canal, cask pit and the fuel inspection canal is drained to the R/B sump tank.

D. Non-radioactive drain collection points

- Reactor building non-radioactive drain sump

  This sump is located in the R/B and collects all non-radioactive equipment and floor drainage by gravity. The sump pumps normally discharge to the T/B sump. Both sump pumps are operated by the level instrumentation in the sump.

- Turbine building sump

  The T/B drain sump collects drain from all equipment and floor drainage in the T/B and non-radioactive drain sump. This sump normally discharges to the WWS for treatment. However, if it should become contaminated, the discharge is automatically diverted to LWMS. Radiation monitor located in the Turbine building sump, which alarms in the MCR when a pre-determined contamination level is reached. Upon receipt of a radiation signal the discharge valve is automatically shutoff and the waste water of the sump is pumped to the LWMS for treatment, as discribed in Chapter 11 Section 11.2.

- Oily waste

  The oily waste system collects liquid waste which enters floor drains located in areas that are normally not sources of potentially radioactive waste, and where possibility for oil spillage, especially from equipment exists. The system conveys the waste to the sump tank via an oil separator that separates the oil in the sump tanks prior to processing. The separated oil is collected for offsite disposal.

9.3.3.3 Safety Evaluation

The drainage systems are designed so that they do not compromise the integrity of the negative pressure boundary. The drainage lines from negative pressure boundary areas that terminate outside the negative pressure boundary are provided with a normally closed valve, plugged drain, or water seal to maintain the integrity of the negative pressure boundary at all times. Chapter 9, Section 9.4 discusses the areas that are maintained under a negative pressure.

The manually closed valves prevent potential for backflow through the drainage lines during all modes of operation. These valves are physically located outside of the area they serve.

- Drain piping is designed to non-seismic categories as noted in Chapter 9, Section 9.3.3.1.2. The safety class of the drain piping and valves is discussed in Chapter 3, Section 3.2.

- Rooms housing ESF equipment where flooding potential exists are analyzed for flood retaining capability, and watertight doors are provided where needed to prevent the spread of flooding damage and the 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 electrodes to provide indication in the main control room for the purpose of leakage source. A common alarm in the MCR provides audible indication of a leak.

9.3.3.4 Inspection and Testing Requirement

9.3.3.4.1 Testing During Construction

Equipment and floor drain piping in the A/B, access building, R/B, and T/B are hydrostatically tested with the static leak test method by filling the lines with water under atmospheric pressure. Pump suction and discharge piping are also tested hydrostatically. Where these tests are not practical, the exposed welds are tested by nondestructive examination.

9.3.3.4.2 Operational Testing Capability

The operability of equipment and floor drainage systems dependent on gravity flow can be checked by normal usage.

Pumps and level controls are adjusted for maintenance of proper sump level. Refer to Chapter 14, Subsection 14.3.3 provided a discussion on the ITAAC for piping system and components.

9.3.3.5 Instrumentation Requirements

A 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. The sump and sump tank outside containment are monitored for water level.

9.3.4 Chemical and Volume Control System

The CVCS performs the following functions:

- Maintain the coolant inventory in the RCS for all modes of operation, including startup, full-power operation, and cool-down.
- Provide seal-water flow to the reactor coolant pumps.
- Provide makeup capability for small RCS leaks.
- Regulate the boron concentration in the reactor coolant during normal operation.
- Control the reactor coolant water chemistry.
- Perform purification by removal of the fission and activation products in the reactor coolant.

- Borate the RCS for cold shutdown.
- Provide pressurizer auxiliary spray water for depressurization of the RCS when none of the RCPs are operating.

9.3.4.1 Design Bases

9.3.4.1.1 Safety Design Bases

The safety design bases for the CVCS are as follows:

- Provide reactor coolant pressure boundary (RCPB).
- Provide containment isolation of CVCS lines penetrating containment.
- Provide capability for isolation the charging line upon safety injection signal and high Pressurizer water level.
- Provide isolation capability for a boron dilution source in reactor coolant to prevent inadvertent RCS boron dilution.

9.3.4.1.2 Power Generation Design Bases

The power generation design bases for the CVCS are as follows:

- Maintain appropriate volume and quality of reactor coolant for the RCS
- Regulate the boron concentration for the chemical shim control
- Remove fission products and ionic corrosion products from the reactor coolant
- Supply seal water to the reactor coolant pump seals
- Receive borated water discharged from the RCS
- Provide pressurizer auxiliary spray water for depressurization of the RCS when none of the RCPs are operating

System reliability is achieved by the use of redundant equipment (pumps, filters, and demineralizers). The equipment classification for the CVCS is contained in Chapter 3, Section 3.2.

9.3.4.1.2.1 Reactor Coolant System Inventory Control and Makeup

The CVCS provides a means to maintain a programmed inventory of reactor coolant during all phases of plant operation.

The CVCS is capable of maintaining a constant volume in the RCS by means of a continuous feed and bleed process. The nominal makeup and letdown flowrates are shown in Table 9.3.4-2. The amount of feed is automatically controlled based on pressurizer water level. The amount of bleed is selected by switching the proper combination of the letdown orifices in the letdown flow path to accommodate the various plant operating conditions. The CVCS has sufficient makeup capacity to maintain the minimum required inventory in the event of minor leaks in the RCS, as discussed in Subsection 9.3.4.2.7.4.

9.3.4.1.2.2 Chemical Shim and Chemical Control

The CVCS provides the following functions to support the water chemistry and chemical shim requirements of the RCS:

- Means of addition and removal of pH control chemicals for startup and normal operation.

- Means of addition and removal of soluble chemical neutron absorber (boron) and makeup water, to control reactivity changes resulting from the change in reactor coolant temperature between cold shutdown and hot full-power operation, burn-up of fuel and burnable poisons, buildup of fission products in the fuel, and xenon transients. Two boric acid tanks are capable of providing the total boric acid solution for refueling shutdown plus one cold shutdown from full power operation immediately following refueling.

- Means to control the oxygen concentration after venting the RCS prior to startup and suppress the oxygen generated by radiolysis of water in the reactor during power operation.

RCS chemistry changes are accomplished with a feed and bleed operation. The letdown and makeup paths are operated simultaneously and appropriate chemicals are provided at the suction of the charging pumps.

The water chemistry specification for the reactor coolant during normal operation is shown in Table 9.3.4-1.

9.3.4.1.2.3 Purification

The CVCS removes radioactive corrosion products, ionic fission products, and fission gases from the reactor coolant to maintain low RCS activity levels. The CVCS purification capability takes into account occupational radiation exposure (ORE) to support ALARA goals.

The purification rate is based on minimizing ORE and providing access to the equipment for maintenance and inspection activities.

The CVCS has sufficient RCS purification and degasification capability to allow the reactor vessel head to be removed expeditiously during a refueling shutdown. In addition, purification during shutdowns has positive impact on reducing the ORE to workers during the outage. The CVCS supports the plant ALARA goals with its shutdown purification function.

9.3.4.1.2.4 Reactor Coolant Pump Seal Water Injection

The CVCS continuously supplies seal water to the reactor coolant pump seals, as required by the reactor coolant pump design. The seal water flow requirement is specified in Table 9.3.4-2. During a SBO, the reactor coolant pumps seal integrity is maintained until the charging pumps are powered from an alternate power source and seal water injection restarts.

9.3.4.2 System Description

The CVCS consists of charging pumps, regenerative heat exchanger, letdown heat exchanger, excess letdown heat exchanger, demineralizers, filters, pumps, tanks, and associated valves, piping, and instrumentation. The system parameters are given in Table 9.3.4-2. The piping and instrumentation diagram for the CVCS is included in Figure 9.3.4-1. The seismic category and quality group classification for CVCS components are specified in Chapter 3, Section 3.2.

9.3.4.2.1 Reactor Coolant System Inventory Control, Reactor Coolant Pump Seal Injection and Makeup

Reactor coolant is discharged to the CVCS from the crossover piping. During normal operation, the reactor coolant is cooled by flowing through the shell side of the regenerative heat exchanger, and then flows through the letdown orifices where the reactor coolant pressure is reduced. The coolant passes through the letdown heat exchanger, where its temperature is further reduced. The reactor coolant pressure is further reduced by a pressure control valve located downstream of the letdown heat exchanger. This valve is provided to maintain upstream pressure to prevent flashing downstream of the letdown orifices.

Normally, the reactor coolant flows through one mixed bed demineralizer inlet filter and one mixed bed demineralizer, then passes through the reactor coolant filter, and then enters the volume control tank (VCT) through the spray nozzle.

The gas space of the VCT is filled with hydrogen. The hydrogen pressure in the VCT is controlled to establish the concentration of hydrogen dissolved in the reactor coolant.

To reduce, if required, the amount of the radioactive gases dissolved in the reactor coolant, if required, the gas in the VCT gas space can be purged to and processed by the gaseous waste management system (GWMS).

Normal charging is performed by utilizing a single charging pump. The charging pump takes suction from the VCT and returns the purified reactor coolant to the RCS. The flow rate of the charging pump is controlled by the flow control valve located in the charging line and the flow control valve located in the reactor coolant pump seal injection line. The charging line flow control valve is controlled by the charging flow rate control unit, which is adjusted by the pressurizer water level signal, the charging flow rate signal and the letdown flow rate signal. A portion of the flow is directed to the reactor coolant pumps through a seal water injection filter. The flow to the reactor coolant pumps is controlled by a flow control valve located in the reactor coolant pump seal injection line.

The flow control valve in the seal injection line is adjusted by a reactor coolant pump seal injection flow rate signal.

A minimum amount of flow branches off at the discharge side of the charging pump for pump protection, and returns to the outlet of the VCT through the seal water heat exchanger.

Most of the charging flow is injected to a cold leg of the RCS through the tube side of the regenerative heat exchanger. The regenerative heat exchanger performs heat exchange between the charging flow and the letdown flow to raise the charging flow temperature approximately to the temperature in the reactor coolant loop.

A branch line off the charging line downstream of the regenerative heat exchanger is routed to the auxiliary pressurizer spray line. The auxiliary pressurizer spray provides a mean of cooling and depressurizing the pressurizer near the end of plant cooldown, when the reactor coolant pumps are not operating.

The remainder of the charging flow is supplied to the RCP shaft No. 1 seal through the seal water injection filter. A portion of the seal water flows along the pump shaft downward into the RCS through the pump shaft bearing-labyrinth seal and the thermal barrier. The remainder of the seal water runs along the pump shaft upward through the No.1 seal and exits the pump and discharges to the common No. 1 seal water return line. The seal water exits the containment vessel, passes through the seal water return strainer and the seal water heat exchanger, and returns to the VCT outlet line.

The excess letdown line from the RCS is provided for the possible malfunction of the normal letdown line. The reactor coolant is directed to the CVCS from the crossover piping to the tube side of the excess letdown heat exchanger where it is cooled to about 165 °F. The excess letdown flow rate is controlled by the excess letdown flow control valve located downstream of the heat exchanger. During excess letdown operation, the flow joins with that from the No. 1 seal water flow return line, and flows through the seal water heat exchanger, then on to the outlet line of the VCT. The excess letdown flow can also be discharged directly to the reactor coolant drain tank.

The excess letdown flow path is also utilized to supplement the normal letdown flow at the final stage of the plant heatup.

Excess reactor coolant due to reactor coolant expansion during heatup of the RCS can be released through the excess letdown flow path that drains into the reactor coolant drain tank.

Surges due to load changes in the RCS are mostly accommodated by the pressurizer; however, the VCT provides surge capacity for part of the reactor coolant expansion volume which can not be accommodated by the pressurizer. The letdown flow normally flows into the VCT. When the water level in the VCT reaches the high-level setpoint, the letdown flow is routed to the holdup tank by the VCT inlet three-way valve. When the water level in the VCT reaches the low-level setpoint, the reactor makeup water control system starts to provide makeup. If the reactor makeup water control system cannot supply sufficient makeup water necessary to prevent decrease of the VCT water level, a low-low VCT level alarm is actuated and the suction of the charging pump is switched from the VCT to the RWSAT. The charging pump can also take suction from the SFP as a SSE makeup water source.

9.3.4.2.2 Purification

9.3.4.2.2.1 Ionic Purification

Two mixed bed demineralizers are provided in the letdown line to remove ionic fission and corrosion products.

One mixed bed demineralizer is continuously utilized during normal letdown operation, and can be supplemented intermittently or continuously at small flow rate by the cation bed demineralizer. If the ion exchange capability of the normally operating mixed bed demineralizer is diminished, the other mixed bed demineralizer will be utilized.

The cation bed demineralizer is used for adjusting the pH in reactor coolant by removing lithium and purification in case of fuel defects to improve the purification function. The cation bed demineralizer mainly removes lithium and cesium isotopes. Reactor coolant filters are provided downstream of the demineralizers to collect particulates and resin fines, and perform purification of the reactor coolant.

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 a high alarm are provided on the main control board. The air-operated three-way valve failure mode directs flow to the VCT.

9.3.4.2.2.2 Gaseous Purification

Removal of radioactive gases from the RCS is not normally necessary because the gases do not build up to unacceptable levels when fuel defects are within normally anticipated ranges. If radioactive gas removal is required because of high fuel defects, fission gasses are removed from the reactor coolant by purging of the VCT to the GWMS.

A spray nozzle located inside the VCT on the letdown line provides liquid-to-gas contact between the incoming fluid and the hydrogen atmosphere in the tank.

Hydrogen is continuously supplied to the VCT. Gases are stripped from the reactor coolant and collected in the VCT. A remotely operated vent valve in the GWMS permits continuous removal of gaseous fission products from the VCT.

9.3.4.2.3 Chemical Shim and Chemical Control

9.3.4.2.3.1 Chemical Shim and Makeup

RCS boron changes are required to compensate for fuel depletion, startups, shutdowns, and refueling.

The concentration of boric acid and the makeup water flow are controlled by the reactor makeup control system. Boric acid water at a concentration of 7,000 ppmB is stored in the two boric acid tanks.

Boric acid from the boric acid transfer pump and primary water from the primary makeup water pump are supplied to the boric acid blender by a signal transmitted from the reactor makeup control system, and then sent to the suction side of the charging pump and/or sprayed into the VCT through the spray nozzle.

The boric acid transfer pump is also utilized to circulate the boric acid solution in the boric acid tank.

All portions of the CVCS which normally contain 4 weight percent (wt. %) of boric acid solution are maintained at a temperature of greater than or equal to 65 °F. Heat tracing or heated areas are provided for portions of the system which normally contain 4 wt. % of boric acid solution. Temperature alarms are provided to assure that boric acid solution temperature does not go below 65 °F.

During long term dilution, a primary makeup water supply line is routed to the VCT inlet. This flow mixes with the hydrogen blanket in the tank to ensure hydrogen entrainment in the water. If alternate dilution is necessary, the line routed to the suction side of the charging pump is utilized, in addition to the line to the volume control tank.

Boric acid can also be removed from the reactor coolant by utilizing the deborating demineralizer to compensate the fuel burn-up near the end of the core life.

9.3.4.2.3.2 pH Control

The chemical agent used for pH control is lithium hydride (LiOH). This chemical is chosen for its compatibility with the material and water chemistry of borated water, stainless steel and zirconium systems. In addition, lithium-7 is produced in the core region because of irradiation of the dissolved boron in the coolant.

A chemical mixing tank is provided to introduce the chemical solution to the suction of the charging pumps, as required to maintain the proper concentration of Li-7 in the RCS.

The chemical solution is added into the chemical mixing tank and is then flushed to the suction side of the charging pumps with the primary makeup water. To maintain the reactor coolant pH to 7.3±0.1, the Li-7 concentration in the reactor coolant is controlled by feed of the LiOH from the chemical mixing tank and bleed of the reactor coolant to the cation bed demineralizer.

9.3.4.2.4 Oxygen Control

The CVCS provides control of the RCS oxygen concentration during plant startup from cold condition by employing hydrazine as an oxygen scavenging agent. The hydrazine solution is injected into the RCS in the same manner as described above for LiOH. Hydrazine is only used during the startup from cold shutdown condition.

Control and scavenging of oxygen generated by water radiolysis in the core region during normal power operation is performed by supplying hydrogen to the reactor coolant. The VCT maintains sufficient hydrogen pressure; therefore, the equilibrium hydrogen concentration in the reactor coolant is maintained. Hydrogen is supplied from the hydrogen manifold, and the required pressure of the gas space in the VCT is maintained by a hydrogen supply pressure control valve. This control valve can be adjusted to provide appropriate equilibrium hydrogen concentration.

9.3.4.2.5 Boron Recycle Subsystem

The CVCS includes the boron recycle subsystem. The holdup tank receives the reactor coolant discharged from the RCS and other reactor coolant recyclable drains, that are recyclable water to be processed as makeup water and concentrated boric acid water.

The holdup tank is operated under a slight positive pressure. The tank has a vent header which operates in conjunction with the GWMS. The maximum pressure of the vent header is determined by the pressure control system located at the inlet of the waste gas compressor. The holdup tank is filled with nitrogen, the nitrogen cover gas is displaced by the entering reactor coolant and the displaced nitrogen is routed to the waste gas surge tank through the waste gas compressor.

The reactor coolant entering into the holdup tank releases dissolved hydrogen and gaseous fission product. These gases are mixed with the nitrogen cover gas in the holdup tank.

Makeup of the cover gas to the holdup tank is normally done by reusing the gas from the surge tank. If necessary, makeup nitrogen can be supplied through the nitrogen supply manifold.

The boric acid evaporator feed pump transfers water from the holdup tank to the boric acid evaporator by first passing the waste through the boric acid evaporator feed demineralizer, where lithium and radioactive ions are removed.

The boric acid evaporator removes hydrogen, nitrogen, and residual gaseous fission products from the reactor coolant. The coolant is then separated into boric acid water of approximately 7,000 ppmB and distilled water. While one batch of concentrated boric acid water is being processed, the boric acid evaporator continuously receives feed water and discharges distilled water.

The distilled water coming from the boric acid evaporator is transferred to the primary makeup water tank or released to the liquid waste management system (LWMS).

The concentration of the boric acid is gradually increased until it reaches 7,000 ppmB. The boric acid water is intermittently sampled to determine whether further processing is necessary. If the sampling results meet the specification for boric acid water for makeup, the operation is terminated and the concentrate is transferred to the boric acid tank. If the concentrate does not satisfy the specification after the concentration procedure, it is returned to the holdup tank for reprocessing.

9.3.4.2.6 Component Descriptions

The general descriptions and summaries of the CVCS components are provided below. The key equipment parameters for the CVCS components are contained in Table 9.3.4-3.

9.3.4.2.6.1 Charging Pumps

Two multi-stage centrifugal charging pumps are provided to supply reactor coolant to the RCS. Each pump has a minimum flow recirculation line for pump protection.

The pump can take suction from the VCT, the reactor makeup control system, the refueling water storage auxiliary tank and the spent fuel pit.

Normally, one charging pump is operating and takes suction from the VCT, supplies charging flow to the RCS and seal water to the reactor coolant pumps. And the purification flow is increased following plant shutdown, two charging pumps can be in operation.

The flow rate of the charging pump can be controlled by the charging flow control valve in the charging line and the seal injection flow control valve in the reactor coolant pump seal injection line.

The charging flow control valve is controlled by the pressurizer water level control signal, the charging flow rate signal and the letdown flow rate signal. Additionally, the seal injection line flow control valve is controlled by the reactor coolant pump seal injection flow rate signals.

The charging pumps are arranged in parallel with common suction and discharge headers. Each pump provides full capability for normal makeup; thus, there is redundancy for normal operations.

Those parts of the pump in contact with reactor coolant are constructed of stainless steel.

9.3.4.2.6.2 Boric Acid Transfer Pumps

Two centrifugal boric acid transfer pumps are utilized for the transfer and circulation of the boric acid solution in the boric acid tank. The boric acid transfer pump is automatically activated by a signal from the reactor makeup control system and transfers the boric acid solution to the boric acid blender, where it mixes with the primary makeup water and then is sent to the suction side of the charging pump, or sprayed into the VCT through the spray nozzle.

9.3.4.2.6.3 Boric Acid Evaporator Feed Pump

Two centrifugal boric acid evaporator feed pumps are provided. The pumps supply the water in the holdup tanks to the boric acid evaporator by first passing if through the boric acid evaporator feed demineralizer.

The pumps are also used to recirculate the water in the holdup tanks to mix the tank contents. The pumps are made of stainless steel.

9.3.4.2.6.4 Regenerative Heat Exchanger

One regenerative heat exchanger is provided. This heat exchanger is used to recover heat from the letdown flow during normal operation and heat up the charging flow to provide increased thermal efficiency and reduce thermal stresses on the pipe nozzle connecting to the RCS. The heat exchanger reduces the letdown flow temperature to prevent steam flashing downstream of the letdown orifices.

The charging flow passes through the tube side, and the letdown flow passes through the shell side. This arrangement allows the shell side to have a lower design pressure than that of the tube side.

The regenerative heat exchanger employs stainless steel materials and all-welded structure.

9.3.4.2.6.5 Letdown Heat Exchanger

One horizontal U-tube letdown heat exchanger is provided. The heat exchanger is designed to cool the letdown flow from the regenerative heat exchanger outlet temperature to the desired operating temperature of the VCT. The letdown heat exchanger outlet temperature is controlled by adjusting the component cooling water flow rate with the temperature control valve placed on the component cooling water outlet line (See Section 9.2.2, component cooling water system).

The letdown flow enters the letdown heat exchanger through the stainless steel tubes, and component cooling water flows through the shell, which is made of carbon steel.

9.3.4.2.6.6 Excess Letdown Heat Exchanger

The excess letdown heat exchanger is designed to cool excess letdown flow equivalent to that portion of the nominal seal injection flow which flows into the RCS through the reactor coolant pump shaft bearing labyrinth seals. The excess letdown is used when the normal letdown line is not available. The heat exchanger is also utilized to supplement maximum letdown flow in conjunction with the normal letdown during the final stages of heat-up.

The letdown water flows through the tube side and component cooling water flows through the shell side of the heat exchanger .

All parts of the heat exchanger in contact with the reactor coolant are made of stainless steel. The shell side is made of carbon steel and has all-welded structure.

9.3.4.2.6.7 Seal Water Heat Exchanger

The seal water heat exchanger is provided to cool reactor coolant from the following sources and discharges to it the charging pump suction:

- Seal water return flow from the reactor coolant pumps
- Letdown flow from the excess letdown heat exchanger
- Minimum flow of the charging pumps

The reactor coolant flows through the tube side and the component cooling water flows through the shell side of the heat exchanger.

The seal water heat exchanger is designed to be capable of cooling the combined volumes of the seal water return flow from the reactor coolant pumps, the excess letdown flow, and the minimum flow of the charging pumps to the VCT normal operating temperature.

All parts of heat exchanger in contact with the reactor coolant are made of stainless steel. The shell side is made of carbon steel.

9.3.4.2.6.8 Volume Control Tank

The VCT is designed to receive a surge of reactor coolant that cannot be accommodated by the pressurizer during a power increase, and to provide a hydrogen blanket for maintaining adequate hydrogen concentration in the reactor coolant.

The gas in the VCT gas space can be processed by the GWMS to reduce the radioactive gas concentration of the reactor coolant, if required.

The VCT is equipped with a spray nozzle at the letdown inlet to facilitate equilibrium by maintaining effective gas-liquid mass transfer. A second spray nozzle is utilized when letdown flow is increased.

The tank is made of stainless steel.

9.3.4.2.6.9 Boric Acid Tanks

Two boric acid tanks are provided. The combined capacity of the two tanks provides the total boric acid solution volume for refueling shutdown plus one cold shutdown from full power operation immediately following refueling. Additionally, each tank has a boric acid capacity required for plant cold shutdown assuming that the control rod with the highest reactivity worth is stuck in the fully withdrawn position.

The boron concentration in the boric acid tank is confirmed by periodic sampling. The tank is made of stainless steel.

9.3.4.2.6.10 Holdup Tanks

Three holdup tanks are provided for storing the reactor coolant discharged from the RCS during plant startup, shutdown, load changes, and boron dilution. The holdup tanks are provided with relief valves and vent headers.

Normally, one tank receives the reactor coolant, the second tank is utilized for processing by the boric acid evaporator and sampling, and the third tank is kept on standby.

The combined capacity of the three tanks is designed to receive the total coolant water discharged during cold shutdown and unit restart at approximately 80% of the core cycle. The tanks are constructed of stainless steel.

9.3.4.2.6.11 Chemical Mixing Tank

The chemical mixing tank is utilized for adding chemical solutions to perform pH control and oxygen removal of the reactor coolant (pH control is discussed in Section 9.3.4.2.3.2). The tank is made of stainless steel.

9.3.4.2.6.12 RCP Purge Water Head Tank

The reactor coolant pump purge water head tank is provided to continuously supply the purge water to the reactor coolant pump No.2 and No.3 shaft seals for cooling by utilizing static head. Makeup for the purge water in the tank is provided intermittently and automatically with the primary makeup water.

The gas space of the tank is connected to the reactor coolant drain tank to prevent oxygen intrusion into the tank.

9.3.4.2.6.13 Resin Fill Tank

The resin fill tank is provided to fill each demineralizer with fresh resins. The tank is capable of being connected to each demineralizer resin fill line with flexible hoses connected to the conical-shaped bottom of the tank. The slurry of resin mixed with makeup water flows into the demineralizer through the flexible hose.

9.3.4.2.6.14 Mixed Bed Demineralizers

Two mixed bed demineralizers are provided in the purification loop to maintain reactor coolant purity. Each demineralizer is sized to accept the full purification flow during normal plant operation and to have a minimum design life of one core cycle.

A mixture of cation and anion resins is utilized in the demineralizers to remove fission and corrosion products. The anion resin is converted to borate form by addition of reactor coolant containing boric acid. During the operation, if ion exchange capability of the resin is diminished, the other demineralizer is utilized.

The demineralizer vessel is made of stainless steel and is equipped with connections for the exchange of resins and a screen for resin effluent prevention.

9.3.4.2.6.15 Cation Bed Demineralizer

One cation resin bed demineralizer located downstream of the mixed bed demineralizers removes Li-7 produced in the reactor coolant and maintain the desired pH of the reactor coolant. The demineralizer is sized to provide adequate purification flow to control the Li-7 and/or the cesium concentration in the reactor coolant in the event of a fuel defect.

The demineralizer vessel is made of stainless steel and is equipped with connections for adjusting its resin contents and a screen for resin effluent prevention.

9.3.4.2.6.16 Deborating Demineralizer

Two deborating demineralizers are utilized to compensate for fuel burn-up near the end of the core life. Anion resins are provided to remove boric acid from the reactor coolant.

The demineralizer vessel is made of stainless steel and is equipped with connections for adjusting its resin contents and a screen for resin effluent prevention.

9.3.4.2.6.17 Boric Acid Evaporator Feed Demineralizer

One boric acid evaporator feed demineralizer is utilized to remove Li and ionic impurities in the reactor coolant feed to the boric acid evaporator.

The demineralizer vessel is made of stainless steel and is equipped with connections for the exchange of resins and a screen for resin effluent prevention.

9.3.4.2.6.18 Reactor Coolant Filters

Two reactor coolant filters are provided to remove particulate and fine resins larger than 25 microns in diameter in the letdown flow. Each filter is designed to accept maximum purification flow.

The reactor coolant filter housing is made of stainless steel and has a removable cartridge type filter element.

9.3.4.2.6.19 Boric Acid Filter

One boric acid filter is provided to collect particulates from the boric acid solution makeup stream, such as boric acid tank sediment. The filter is designed to accept maximum makeup flow.

The boric acid filter housing is constructed of stainless steel and has a removable cartridge type filter element.

9.3.4.2.6.20 Seal Water Injection Filters

Two seal water injection filters are provided to remove particulates and thereby prevent foreign materials from entering in the seal of the reactor coolant pumps.

Each seal water injection filter housing is made of stainless steel and has a removable cartridge type filter element.

9.3.4.2.6.21 Mixed Bed Demineralizer Inlet Filter

Three mixed bed demineralizer inlet filters are provided to remove particulates and prevent accumulation of particulates in the demineralizers. Two filters are utilized in parallel in case of increase of purification flow following plant shutdown.

The mixed bed demineralizer inlet filter housing is made of stainless steel and has a removable cartridge type filter element.

9.3.4.2.6.22 Seal Water Return Strainer

One seal water return strainer is provided to remove particulates from the return flow of the reactor coolant pump seal water and the letdown flow which passed through the excess letdown heat exchanger.

The strainer is designed to be capable of passing the maximum design excess letdown flow, plus the return flow of the reactor coolant pump seal water.

The strainer is made of stainless steel.

9.3.4.2.6.23 Letdown Orifices

Three equal capacity letdown orifices are provided in parallel to reduce the letdown pressure from reactor coolant and to control the flow of reactor coolant leaving the RCS. Two of the orifices are required for normal operation flow.

The orifices can be controlled or isolated by remote control isolation valves located on each line. When the RCS is in a low pressure condition, the letdown flow rate can be increased by utilizing the third orifice, in addition to the orifices used during normal operation. The orifices are made of stainless steel.

9.3.4.2.6.24 Boric Acid Evaporator

The boric acid evaporator is provided to remove nitrogen, hydrogen, and gaseous fission products from the reactor coolant, for processing increase the borated water concentration to approximately 7,000 ppmB for reuse as reactor coolant, and stored it in the boric acid tank.

The boric acid evaporator consists of the feed pre-heater, the gas stripper column, the vent condenser, the evaporator, the absorption tower, the condenser, distillate pump, the distillate cooler, the concentrate pump, piping, valves, and instrumentation.

9.3.4.2.6.25 Boric Acid Blender

The boric acid blender is provided to mix the concentrated boric acid solution with the primary makeup water to provide makeup to the reactor coolant. The boric acid blender is made of stainless steel.

9.3.4.2.6.26 CVCS Valves

The CVCS valves are stainless steel except those used for gaseous system components, for compatibility with the borated reactor coolant. Isolation valves are provided at connections to the RCS.

The CVCS employs non-leakage type valves such as diaphragm-type valves or leak control valves with graphite packing for handling radioactive fluid. For components which cannot structurally employ these types of valves, a leak-off connection is provided to prevent leakage to atmosphere.

Lines penetrating the reactor containment normally have check valves inside the containment to prevent reverse flow from the containment.

9.3.4.2.6.27 Containment Isolation Valves

Containment isolation valves are located in the following lines:

- Letdown line
- Charging line
- Seal water return line
- Seal water injection line

9.3.4.2.6.28 Relief Valves

Relief valves are provided for the following:

- Regenerative heat exchanger charging line relief check valve
- Letdown relief valve
- Letdown orifice relief valve
- Volume control tank relief valve
- Reactor coolant pump seal water return relief valve
- Seal water heat exchanger inlet relief valve
- Boric acid tank relief valve
- Holdup tank relief valve
- RCP purge water head tank relief valve

9.3.4.2.6.29 Piping Requirements

The CVCS piping that handles radioactive liquid is made of austenitic stainless steel. The piping joints and connections are welded, except where flanged connections are required for equipment removal for maintenance and hydrostatic testing.

9.3.4.2.7 System Operation and Performance

The operation of the CVCS for the various modes of reactor plant operation is described in the following subsections.

9.3.4.2.7.1 Plant Startup

The pH control is accomplished by injecting LiOH solution into the chemical mixing tank and transferred with the primary makeup water to the suction side of the charging pump.

At the final stage of the plant heatup, the excess letdown line is utilized to increase the letdown flow to accommodate reactor coolant expansion due to increased temperature of the RCS.

Hydrazine is utilized for oxygen removal in the reactor coolant during plant startup from cold condition. The hydrazine solution is injected into the chemical mixing tank where it is mixed with the primary makeup water. The hydrazine and primary makeup water solution is injected into the RCS through the suction side of the charging pump.

9.3.4.2.7.2 Normal Operation

At a constant power level, the CVCS purification loop operates continuously as a closed loop connected to the RCS. The purification flow is approximately 180 gallons per minute with one mixed bed demineralizer and one reactor coolant filter in service.

Normally, one charging pump is operating and takes suction from the volume control tank and supplies the charging flow to the RCS and seal water to the reactor coolant pumps.

To maintain the reactor coolant pH to 7.3±0.1, the LiOH concentration in the reactor coolant is controlled by bleed of the reactor coolant to the cation bed demineralizer and feed of the LiOH from the chemical mixing tank if required.

Control and scavenging of oxygen generated by water radiolysis in the core region is performed by supplying hydrogen to the reactor coolant. The volume control tank maintains sufficient hydrogen pressure; therefore, the equilibrium hydrogen concentration in the reactor coolant is maintained. Hydrogen is supplied from the hydrogen manifold, and the required pressure of the gas space in the volume control tank is maintained by a hydrogen supply pressure control valve. This control valve can be adjusted to provide appropriate equilibrium hydrogen concentration.

9.3.4.2.7.3 Plant Shutdown

During plant shutdown, when the RHR system is in operation, the RHR system provides reactor coolant to the CVCS, upstream of the letdown heat exchanger in the letdown line. Cooling of the pressurizer fluids can be accomplished by charging through the auxiliary spray connection as an alternative way while pressurizer spray is normally used.

When the purification flow is increased, two charging pumps can be in operation. The letdown flow passes through the letdown heat exchanger, two mixed bed demineralizer inlet filters, two mixed bed demineralizers, two reactor coolant filters, two spray nozzles, and into the volume control tank. During plant shutdown, the gas space of the volume control tank is replaced with nitrogen. The reactor coolant is returned to the RCS through the normal charging flow path.

9.3.4.2.7.4 Reactor Coolant System Leak

One CVCS charging pump is capable of maintaining normal RCS inventory with small system leak if the leakage rate is less than that form a break of a pipe 3/8 inch in inside diameter.

9.3.4.2.7.5 Abnormal Operations

In the case of malfunction of the normal letdown line, reactor coolant is directed from the crossover piping to the tube side of the excess letdown heat exchanger, where it is cooled to about 165 °F. The excess letdown flow rate is controlled by the excess letdown flow control valve located downstream of the heat exchanger.

9.3.4.2.7.6 Boron Dilution Events

The CVCS is designed to provide isolation to limit boron dilution by closing either one of the two redundant safety-related, motor operated valves from the primary makeup water system.

During “dilute” mode and “alternate dilute” mode, a pre-selected quantity of reactor makeup water is supplied to the RCS at a pre-selected flow rate.

When the preset quantity of reactor makeup water has been supplied, the batch integrator will cause the primary makeup water pump to stop and the reactor water control valve to close. The “dilute” and “alternate dilute” modes of operation may be manually terminated at any time by selecting the makeup stop.

When the reactor makeup water flow exceeds the predetermined setpoint, the instruments provide a high alarm signal, the automatic isolation valves close, and the operation is terminated to prevent abnormal boron dilution.

9.3.4.3 Safety Evaluation

The CVCS has redundant, safety-related isolation valves to support the RCPB, charging isolation, and inadvertent boron dilution prevention. The CVCS lines that penetrate containment incorporate valves and piping arrangements that meet the containment isolation criteria described in subsection 6.2.4. Containment isolation valves in the CVCS are required to operate under accident conditions to provide containment isolation,as required.

Since the CVCS supplies non-borated water to the RCS, the potential for inadvertent boron dilution events exists. The design feature for preventing an inadvertent boron dilution is described in Subsection 9.3.4.2.7.6.

The charging line is isolated on a safety injection signal and a Pressurizer high water level signal, to terminate unnecessary RCS makeup that can cause an overfilling of the pressurizer and steam generator overfilling during a steam generator tube rupture.

During a SBO, the reactor coolant pumps seal integrity is maintained until the charging pumps are powered from an alternate power source and seal water injection restarts using the normal seal injection flow path.

The CVCS is designed to provide makeup for minor leaks in the RCS. The makeup capability is limited to the leakage equivalent to a pipe break with 3/8 inch inside diameter.

The CVCS does not provide an ECCS function. Therefore, the provision for a leakage detection and control program in accordance with 10 CFR 50.34 (f) (xxvi) does not apply.

CVCS components and piping are compatible with the radioactive fluids they contain and the functions they perform. The equipment classification for the CVCS is contained in Section 3.2.

The CVCS is designed to ensure that the boric acid solution remains soluble. Heat tracing or a heated area with temperature alarms are provided for portions of the system which normally contain 4 wt. % of boric acid solution, to assure that boric acid solution temperature does not go below 65 °F.

The VCT is designed to withstand vacuum conditions to prevent wall inward buckling and failure. The boric acid tanks are provided with vacuum breakers to prevent a vacuum condition. The holdup tanks are provided with sufficient nitrogen gas supply to prevent vacuum condition.

The CVCS is designed in accordance with the requirements of 10 CFR 50, Appendix A, GDCs are GDC 1, 2, 14, 33, 60, and 61.

The protection of safety-related portions of CVCS against natural phenomena and internal missiles is addressed in the following sections in Chapter 3:

Section 3.3, Wind and tornado loadings;

Section 3.4, Water level (Flood) protection;

Section 3.5, Missile protection;

Section 3.7, Seismic design;

Section 3.11, Environmental qualification of mechanical and electrical equipment.

Pipe rupture protection is addressed in Chapter 3 Section 3.6, Protection against Dynamic effects associated with postulated rupture of piping.

9.3.4.4 Inspection and Testing Requirements

In-service inspection and testing of ASME Code Classes 2 and 3 components is discussed in Chapter 6, Section 6.6. Chapter 3, Subsection 3.9.6 discusses in-service testing and inspection of pumps and valves. Chapter 5, Subsection 5.2.4 discusses in-service inspection and testing of ASME Code Class 1 components that are part of the RCPB.

9.3.4.4.1 Preoperational Inspection and Testing

Tests for the CVCS pumps, valves and piping are conducted during preoperational testing as discussed in Chapter 14, Section 14.2. The CVCS is designed to provide makeup for minor leaks in the RCS. The makeup capability is limited to the leakage equivalent to a pipe break with 3/8 inch inside diameter.

9.3.4.5 Instrumentation and Controls

9.3.4.5.1 Reactor Makeup Control

The reactor makeup control consists of instruments, pumps, and valves arranged to provide a manually pre-selected makeup composition to the charging pump suction header or the volume control tank. The reactor makeup control maintains the desired operating fluid inventory in the volume control tank and adjusts reactor coolant boron concentration for reactivity and shim control.

The control switches are located on the main control board along with the batch integrators and the flow controllers.

Two switches are provided as follows:

- Mode select switch, that includes – Off/Automatic (auto makeup) / Manual / Borate / Dilute / Alternate dilute

- Control switch, that includes Stop/Start

All makeup modes can be terminated manually at any time by actuating the makeup stop.

9.3.4.5.1.1 Automatic Makeup Mode

The automatic makeup mode of operation provides diluted boric acid solution during a low-level signal from the volume control tank controller. The solution is preset to match the boron concentration in the RCS and is supplied to the charging pump suction header via the boric acid blender.

9.3.4.5.1.2 Manual Mode

The manual mode permits the addition of pre-selected quantities of boric acid solution and primary makeup water at pre-selected flow rates to the refueling water storage pit, to the holdup tanks, or to a temporary connection to other plant equipment. While in the manual mode, automatic makeup to the RCS is precluded.

9.3.4.5.1.3 Borate Mode

The borate mode permits the addition of pre-selected quantity of concentrated boric acid solution at a pre-selected flow rate to the RCS. The concentrated boric acid is added to the charging pump suction header.

9.3.4.5.1.4 Dilute Mode

The dilute mode permits the addition of a pre-selected quantity of primary makeup water at a pre-selected rate to the RCS. The primary makeup water is added to the volume control tank through the volume control tank spray nozzle.

9.3.4.5.1.5 Alternate Dilute Mode

The alternate dilute mode is the same as the dilute mode except a portion of the primary makeup water flows directly to charging pump suction and a portion flows into the volume control tank through the spray nozzle and then flows to the charging pump suction.

9.3.4.5.1.6 Alarm

The reactor makeup control system has alarms to call the operator’s attention to the following conditions:

- Deviation of reactor makeup flow rate from setpoint
- Deviation of boric acid flow rate from setpoint
- Low-level in the volume control tank when the reactor makeup selector switch is not at “Automatic” or the “Automatic” mode is not working.

9.3.4.5.1.7 Makeup Isolation Valve

The reactor makeup water line is isolated by the safety-related automatic isolation valve when the high flow rate signal of the reactor makeup water is received, to prevent abnormal boron dilution.

9.3.4.5.2 Temperature

9.3.4.5.2.1 Regenerative Heat Exchanger Letdown Outlet Temperature

Instrumentation is provided to indicate the letdown flow temperature at the regenerative heat exchanger outlet, and provide indication and high alarm in the main control room (MCR).

9.3.4.5.2.2 Letdown Orifice Relief Valve Outlet Temperature

Instrumentation is provided to indicate the temperature of the letdown orifice relief valve line, and provide indication and high alarm in the MCR.

9.3.4.5.2.3 Letdown Temperature Control

Instrumentation is provided to indicate and control the letdown flow temperature at the letdown heat exchanger outlet and control the component cooling water flow rate through the shell side. Temperature indication is provided in the MCR.

9.3.4.5.2.4 Letdown Heat Exchanger Outlet Temperature to Demineralizers

Instrumentation is provided to indicate the letdown flow temperature at the letdown heat exchanger outlet. If the letdown flow temperature exceeds the allowable temperature for the demineralizer resin, an alarm is activated and the letdown flow bypasses the demineralizer and flows to the VCT. Temperature indication and high alarm are provided on the MCR.

9.3.4.5.2.5 Volume Control Tank Outlet Temperature

Instrumentation is provided to indicate the charging flow temperature at the VCT outlet, and provide indication and high alarm in the MCR.

9.3.4.5.2.6 Regenerative Heat Exchanger Charging Outlet Temperature

Instrumentation is provided to monitor the charging flow temperature at the regenerative heat exchanger outlet, and provide indication in the MCR.

9.3.4.5.2.7 Reactor Coolant Pump Seal Water Inlet and Outlet Temperatures

Instrumentation is provided to measure the reactor coolant pump seal water temperature and No. 1 seal leak off water temperature. The indication, measurement, and high alarm are provided in the MCR.

9.3.4.5.2.8 Excess Letdown Heat Exchanger Outlet Temperature

Instrumentation is provided to monitor the excess letdown flow temperature at the excess letdown heat exchanger outlet, and provide indication and high temperature alarm in the MCR.

9.3.4.5.2.9 Reactor Coolant Pump Seal Water Injection Temperatures

Instrumentation is provided to indicate the temperature of the seal water injection line, and provide indication and high alarm in the MCR.

9.3.4.5.2.10 Seal Water Exchanger Inlet Temperature

Instrumentation is provided to indicate the seal water heat exchanger outlet temperature, and provide the indication in the MCR.

9.3.4.5.2.11 Seal Water Exchanger Outlet Temperature

Instrumentation is provided to indicate the seal water heat exchanger outlet temperature and provide local indication.

9.3.4.5.2.12 Boric Acid Tank Temperature

A temperature indicator is provided in each boric acid tank to indicate the boric acid temperature in the boric acid tank and to provide indication and high and low alarms in the MCR.

9.3.4.5.2.13 Boric Acid Batching Tank Temperature

Instrumentation is provided to locally indicate and control the boric acid water temperature in the boric acid batching tank, and provide high and low temperature alarms in the MCR.

9.3.4.5.2.14 Boric Acid Evaporator Feed Demineralizer Inlet Temperature

Instrumentation is provided to locally indicate the boric acid water temperature at the boric acid evaporator feed demineralizer inlet. The high alarm is provided in the MCR.

9.3.4.5.3 Pressure

9.3.4.5.3.1 Letdown Line Pressure

Instrumentation is provided downstream of the letdown heat exchanger to control the letdown pressure control valve to prevent the letdown flow from flashing downstream of the letdown orifices. Indication and high alarm are provided in the MCR.

9.3.4.5.3.2 Volume Control Tank Pressure

Instrumentation is provided to indicate the pressure in the volume control tank, and provide indication and high and low alarms in the MCR. The purge gas discharge stop valve in the GWMS is closed by actuating the low alarm.

9.3.4.5.3.3 Demineralizer and Filter Differential Pressure

Differential pressure gauges are provided for the following filters and demineralizers to provide local indication and high alarm:

- Reactor coolant filters
- Mixed bed demineralizers inlet filters
- Seal water injection filters
- Boric acid filter
- Boric acid evaporator feed demineralizer filter
- Mixed bed demineralizers
- Cation bed demineralizer
- Deborating demineralizer
- Boric acid evaporator feed demineralizer

9.3.4.5.3.4 Pumps Discharge Pressure

Instrumentation is located at the following pump discharge lines to provide local indication of the discharge pressure:

- Charging pump
- Boric acid transfer pump
- Boric acid evaporator feed pump

9.3.4.5.3.5 Charging Header pressure

Instrumentation is provided to indicate the charging header pressure and to provide indication in the MCR.

9.3.4.5.3.6 Excess Letdown Heat Exchanger Outlet Pressure

Instrumentation is provided to indicate the pressure of the reactor coolant coming from the excess letdown heat exchanger and provide indication in the MCR.

9.3.4.5.3.7 Volume Control Tank Hydrogen and Nitrogen Supply Pressure

Instrumentation is provides locally to indicatef the volume control tank pressure in order to constantly control the hydrogen and nitrogen pressures to be supplied to the volume control tank.

9.3.4.5.3.8 Boric Acid Tank Pressure

Instrumentation is provided to indicate the boric acid tank pressure, and to provide indication and high and low alarms in the MCR.

9.3.4.5.3.9 Holdup Tank Pressure

Instrumentation is provided to indicate the holdup tank pressure, and provide indication and high and low alarms in the radwaste control room. Additionally, the instrument controls the control valve for the nitrogen gas supply from the waste gas surge tanks in GWMS.

9.3.4.5.3.10 Charging Pump Inlet Pressure

Instrumentation is provided for monitoring the charging pump operating condition during normal operation. Local indication is provided.

9.3.4.5.4 Water Level

9.3.4.5.4.1 Volume Co Volume

Instrumentation is comprised of an indicator and control system with two redundant channels for controlling the VCT water level, is provided to indicate status and activate high, low, and low-low alarms in the MCR.

Operation above the normal water level

Instrumentation transmits a signal to the three-way valve located downstream of the reactor coolant filter in the letdown line to maintain the VCT level within the normal operating band.

The instrument causes the three-way valve to split the letdown flow so that a portion goes to the holdup tank and a portion goes to the VCT. The controller will operate in the abovementioned manner when makeup is provided from the reactor makeup water control system to the VCT.

If one instrument fails to perform continuous adjustment and causes the volume of the VCT level to increase, the controller of the other instrument switches the three-way valve to fully diverted position (to the holdup tanks). Both channels provide the high alarm at that time.

Operation below the normal water level

During normal operation, the VCT water level is controlled by automatic makeup. A predetermined makeup composition of the boric acid solution and primary makeup water is supplied to the charging pump suction header via the boric acid blender. If the water level at the VCT decreases below the normal operation level, the automatic makeup starts, and then stops after restoring the normal level.

Low level and low-low level alarms are provided. In case the automatic makeup fails to actuate and the water level in the VCT gradually decreases, both channels provide a low-low level signal that opens the stop valves in the refueling water storage auxiliary tank supply line, and closes No. 1 and No. 2 stop valves in the VCT outlet to provide emergency makeup.

9.3.4.5.4.2 Boric Acid Tank Level

Instrumentation is provided to indicate the boric acid tank level. It provides below normal, low, low-low and high alarms in the MCR.

9.3.4.5.4.3 Holdup Tank Level

Instrumentation is located at each holdup tank to indicate tank level and provide indication and high and low alarms in the radwaste control room.

9.3.4.5.5 Flow Rate

9.3.4.5.5.1 Letdown Flow

Instrumentation provides indication of letdown flow rate and control the charging flow control valve in conjunction with a pressurizer level signal. The instrument provides indication and high alarm in the MCR.

9.3.4.5.5.2 Charging Flow

Instrumentation is provided to controls the charging flow rate to the RCS by adjusting the charging flow control valve. The flow controller to control the charging flow control valve receives a pressurizer level signal and a letdown flow rate signal. The instrumentation provides an indication and low and high alarms in the MCR.

9.3.4.5.5.3 Reactor Coolant Pump Seal Water injection Flow

Instrumentation is provided to locally indicate the injection flow rate into the reactor coolant pump seal, input the injection flow signal into the recorder, and provide a low flow alarm in the MCR.

Each RCP seal water injection flow signal controls the seal injection flow control valve to adjust the seal water injection flow rate within the specified limit.

9.3.4.5.5.4 Boric Acid Flow

Instrumentation is provided to input the integrated value of the boric acid flow rate supplied by the boric acid transfer pump into the recorder during automatic makeup, boration and manual makeup operations. Indication and a deviation alarm are provided. The boric acid flow rate is predetermined and the boric acid flow stop valve at the VCT outlet is closed by the deviation alarm.

9.3.4.5.5.5 Reactor Makeup Water Flow

Instrumentation is provided to input the total makeup flow rate (boric acid flow plus primary makeup flow) or the integrated value of the primary makeup water flow rate into the recorder during the automatic makeup, dilution, alternate dilution, and manual makeup operations. Indication and a deviation alarm are provided. The makeup flow rate is predetermined and the reactor makeup flow stop valves at the VCT inlet and outlet are closed by the deviation alarm.

9.3.4.5.5.6 Primary Makeup Water Flow

Instrumentation is provided to measure the primary makeup water flow rate supplied to the CVCS. The instrument also provides a high alarm and closes the primary makeup water isolation valve to prevent abnormal dilution. Indication and a high alarm are provided in the MCR.

9.3.4.5.6 Radiation Monitor

9.3.4.5.6.1 Primary Coolant Radiation Monitor

A reactor coolant radiation monitor is provided in the letdown line to measure the concentration of radioactive material in the CVCS. The instrument provides indication and a high radiation alarm in the MCR (See Chapter 11, Section 11.5).

9.3.4.5.7 Remote Shutdown Console

In those conditions when the MCR needs to be evacuated, indications and alarms are provided in the remote shutdown console. The required CVCS instrumentation for reactor shutdown from outside the MCR is discussed in Chapter 7, Section 7.4.

9.3.5 Standby Liquid Control System - NA (Boiling Water Reactor)

Not applicable to the US-APWR.

9.3.6 Combined License Information

COL 9.3(1) *The COL Applicant is to provide the high pressure nitrogen gas, low pressure nitrogen gas, the hydrogen gas, carbon dioxide, and oxygen supply systems.*

COL 9.3(2) *Deleted*

COL 9.3(3) *Deleted*

COL 9.3(4) *Deleted*

COL 9.3(5) *Deleted*

COL 9.3(6) *Deleted*

COL 9.3(7) Deleted

9.3.7 References

9.3.7-1 American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section III

9.3.7-2 Loss of All Alternating Current Power, NRC Regulations Title 10, Code of Federal Regulations, CFR Part 50.63.

9.3.7-3 Specifications for Air. ANSI/CGA G-7.1, American National Standards Institute.

9.3.7-4 U.S. Nuclear Regulatory Commission, Evaluation of Air-Operated Valves at U.S. Light-Water Reactors, NURGE-1275 Vol.13, February 2000

9.3.7-5 Quality Standards for Instrument Air. ANSI/ISA-S7.3-R 1981, American National Standards Institute/Instrument Society of America, 1981.

9.3.7-6 Seismic Design Classification. Regulatory Guide 1.29, Rev. 4, U.S. Nuclear Regulatory Commission, March 2007.

9.3.7-7 Preoperational Testing of Instrument and Control Air Systems. Regulatory Guide 1.68.3, U.S. Nuclear Regulatory Commission, April 1982.

9.3.7-8 General Design Criteria for Nuclear Power Plants, NRC Regulations Title 10, Code of Federal Regulations, CFR Part 50, Appendix A.

9.3.7-9 Pressure Vessel, ASME Boiler and Pressure Vessel Code Division 1, Section VIII

9.3.7-10 Radiation protection programs NRC Regulations Title 10, Code of Federal Regulations, CFR Part 20.

9.3.7-11 Contents of Applications; Technical Information, NRC regulations Title 10, Code of Federal Regulations, CFR Part 50.34.

9.3.7-12 Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs, SECY-93-087, U.S. Nuclear Regulatory Commission, , letter issued April 2, 1993 and staff requirements memoranda issued July 21, 1993.

Table 9.3.1-1 Safety-Related Air-Operated Valves (Sheet 1 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Reactor Coolant System	2	Pressurizer spray	NC	Closed	FC
Reactor Coolant System	1	Nitrogen supply containment isolation outside containment	NO	Closed	FC
Reactor Coolant System	1	Primary Make-Up Water System supply containment isolation outside containment	NO	Closed	FC
Reactor Coolant System	1	Waste Management System gas analysis containment isolation inside containment	NO	Closed	FC
Reactor Coolant System	1	Waste Management System gas analysis containment isolation outside containment	NC	Closed	FC
Chemical and Volume Control System	1	1st letdown isolation	NO	Closed	FC
Chemical and Volume Control System	1	2nd letdown isolation	NO	Closed	FC
Chemical and Volume Control System	3	Letdown Orifice outlet	NO	Closed	FC
Chemical and Volume Control System	1	Low pressure letdown flow control	NC	Closed	FC
Chemical and Volume Control System	1	Letdown containment isolation inside containment	NO	Closed	FC
Chemical and Volume Control System	1	Letdown containment isolation outside containment	NO	Closed	FC
Chemical and Volume Control System	1	Charging flow control	NO	Open	FO
Chemical and Volume Control System	1	Charging flow control orifice bypass line isolation	NO	Open	FO
Chemical and Volume Control System	1	A-loop charging line isolation	NO	Open	FO

Table 9.3.1-1 Safety-Related Air-Operated Valves (Sheet 2 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Chemical and Volume Control System	1	Pressurizer auxiliary spray line isolation	LC	Closed	FC
Chemical and Volume Control System	1	1st excess letdown isolation	NC	Closed	FC
Chemical and Volume Control System	1	2nd excess letdown isolation	NC	Closed	FC
Chemical and Volume Control System	1	Excess letdown flow control	NC	Closed	FC
Chemical and Volume Control System	1	Excess letdown flow path selection	NO(to VCT)	To VCT	To VCT
Chemical and Volume Control System	1	Seal water flow control	NO	Open	FO
Chemical and Volume Control System	1	Seal water flow control orifice bypass line isolation	NO	Open	FO
Chemical and Volume Control System	4	Seal water return orifice bypass line isolation	NO	Closed	FC
Safety Injection System	1	Accumulator nitrogen discharge pressure control	NC	Closed	FC
Safety Injection System	2	Safety injection pump accumulator makeup line isolation	LC	Closed	FC
Safety Injection System	1	Safety injection pump accumulator makeup flow control	NC	Closed	FC
Safety Injection System	4	Accumulator makeup line isolation	NC	Closed	FC
Residual Heat Removal System	2	Containment spray / Residual heat removal heat exchanger outlet flow control	NO	Open	FO
Residual Heat Removal System	2	Containment spray / Residual heat removal heat exchanger bypass flow control	NC	Closed	FC

Table 9.3.1-1 Safety-Related Air-Operated Valves (Sheet 3 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Residual Heat Removal System	2	Low pressure letdown line isolation	NC	Closed	FC
Main Feed Water System (Nuclear system)	4	Feedwater control	NO	Closed	FC
Main Feed Water System (Nuclear system)	4	Feedwater bypass control	NC	Closed	FC
Main Feed Water System (Nuclear system)	4	Steam generator filling water control	NC	Closed	FC
Main Steam System (Nuclear system)	4	Main steam relief line isolation	NC	Closed	FC
Main Steam System (Nuclear system)	4	Main steam isolation	NO	Closed	FC
Main Steam System (Nuclear system)	4	Main steam isolation valve bypass line isolation	NC	Closed	FC
Component Cooling Water System	2	Nitrogen supply line isolation	NC	Closed	FC
Component Cooling Water System	2	Deaerated water and Demineralized water supply line isolation	NC	Closed	FC
Component Cooling Water System	2	Component cooling water surge tank relief	NC	Closed	FC
Component Cooling Water System	1	Letdown heat exchanger outlet temperature control	NO	Open	FO
Component Cooling Water System	1	Excess letdown heat exchanger supply line containment isolation	NO	Closed	FC
Component Cooling Water System	1	Excess letdown heat exchanger return line containment isolation	NC	Closed	FC
Component Cooling Water System	2	1st instrument air compressor package supply line isolation	NO	Closed	FC
Component Cooling Water System	2	2nd instrument air compressor package supply line isolation	NO	Closed	FC

Table 9.3.1-1 Safety-Related Air-Operated Valves (Sheet 4 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Component Cooling Water System	1	1st boric acid evaporator package supply line isolation	NO	Closed	FC
Component Cooling Water System	1	2nd boric acid evaporator package supply line isolation	NO	Closed	FC
Liquid Radiation Waste Management System	1	Nitrogen supply containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Nitrogen supply containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Vent header line containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Waste Management System gas analyzer line containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Waste Management System gas analyzer containment isolation outside containment	NC	Closed	FC
Liquid Radiation Waste Management System	1	C/V reactor coolant drain pump outlet containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	C/V reactor coolant drain pump outlet containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	C/V sump pump outlet containment isolation inside containment	NC	Closed	FC
Liquid Radiation Waste Management System	1	C/V sump pump outlet containment isolation outside containment	NC	Closed	FC
Process and Post Accident Sampling System	1	Pressurizer gas phase sampling containment isolation inside containment	NC	Closed	FC

Table 9.3.1-1 Safety-Related Air-Operated Valves (Sheet 5 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Process and Post Accident Sampling System	4	Accumulator sampling containment isolation inside containment	NC	Closed	FC
Process and Post Accident Sampling System	1	Accumulator sampling containment isolation outside containment	NO	Closed	FC
Steam Generator Blow Down System	4	Steam generator blow down water sampling containment isolation outside containment	NO	Closed	FC
Steam Generator Blow Down System	4	Steam generator blow down containment isolation outside containment	NO	Closed	FC
Steam Generator Blow Down System	4	Steam generator blow down line isolation	NO	Closed	FC
Refueling Water Storage System	4	Refueling water recirculation pump outlet containment isolation outside containment	NO	Closed	FC
Containment Purge System	4	Containment isolation inside and outside containment	NC	Closed	FC
Containment Purge System	4	Containment isolation inside and outside containment	NO	Closed	FC
MCR HVAC System	6	MCR isolation	NO	Closed	FC
Emergency Feedwater Pump Area HVAC System	4	Emergency Feedwater Pump Area Isolation	NO	Closed	FC
Auxiliary Building HVAC System	26	Isolation	NO	Closed	FC
Incore Nuclear Instrumentation System	2	Containment isolation inside and outside containment	NO	Closed	FC

NOTE:

NC	Normally Closed	FC	Fail Closed	LC	Locked Closed
NO	Normally Open	FO	Fail Open	VCT	Volume Control Tank

Table 9.3.1-2 Nominal Component Design Data - Instrument Air System

Air Compressors	
Quantity	2
Type	Rotary
Capacity (each)	600 scfm
Design pressure	150 psig
Air Receivers	
Quantity	2
Type	Vertical cylinder type
Capacity, each	230 ft^3
Design pressure	150 psig
Design code	ASME Section VIII (Ref. 9.3.7-9)
Air Dryers	
Quantity	2
Type	Twin-tower desiccant type
Capacity, each	600 scfm
Design pressure	150 psig
Design code	ASME Section VIII (Ref. 9.3.7-9)
Outlet dew point	Below -40 °F at 128 psig

Table 9.3.1-3 Nominal Component Design Data - Station Service Air System

Air Compressor	
Quantity	3
Type	Rotary
Capacity (each)	600 scfm
Design pressure	150 psig
Air Receivers	
Quantity	2
Type	Vertical cylinder type
Capacity, each	230 ft^3
Design pressure	150 psig
Design code	ASME Section VIII (Ref. 9.3.7-9)
Air Dryers	
Quantity	2
Type	Cartridge type
Capacity, each	600 scfm
Design pressure	150 psig
Design code	ASME Section VIII (Ref. 9.3.7-9)
Outlet dew point	Below -40 °F at 128 psig

Table 9.3.2-1 Primary Liquid and Gaseous Sampling Systems – Sample Points

Sample Point No.	Sample Point Name	Type of Sample[(a)]	Analysis	Pressure (psig)	Temperature[(b)] (°F)
Primary Liquid Sampling System Points					
1	RCS Hot Leg (upstream of CVCS demineralizers)	Grab	Boron, radioactivity, dissolved oxygen, hydrogen, halogens, pH, and conductivity, acid soluble iron and SiO_2	140	115
2	Pressurizer Vapor Space	Grab	Dissolved oxygen	140	115
3	Pressurizer Liquid Space	Grab	Boron, pH, conductivity and radioactivity	140	115
4	CVCS downstream of Letdown Heat Exchanger	Grab	Radioactivity, (zinc;only for zinc injection plant)	140	115
5	CVCS upstream of Mixed bed demineralizer	Grab	Radioactivity and halogens, conductivity, acid soluble iron and SiO_2	140	115
6	CVCS downstream of Mixed Bed Demineralizer	Grab	Radioactivity and halogens, conductivity, acid soluble iron and SiO_2	140	115
7	CVCS downstream of Cation bed demineralizer	Grab	Radioactivity and halogen concentration, conductivity, acid soluble iron and SiO_2	140	115
8	CVCS downstream of Deborating demineralizer	Grab	Boron concentration and conductivity	140	115
9	RHR Downstream of Containment spray/Residual heat removal Heat Exchanger (Train A and D)	Grab	Boron concentration, radioactivity, halogens, pH and conductivity and acid soluble iron and SiO_2	140	115
Primary Gaseous SS & GWMS Sampling Points					
10	Holdup Tanks	Grab	H_2, O_2	2	104
11	Waste Gas Surge Tanks	Grab	H_2, O_2, radioactivity	105	104
12	C/V Reactor Coolant Drain Tank	Grab	H_2, O_2	2	120
13	Volume Control Tank	Grab	H_2, O_2, radioactivity	16	115
14	Pressurizer Relief Tank	Grab	H_2, O_2	2	120
15	Spent Resin storage Tanks	Grab	radioactivity	140	104
16	Containment atmosphere gas	Grab	H_2, radioactivity	Atmospheric	104

NOTE:

a. This column shows methods to obtain a sample for chemical analysis. It does not specify the frequency of sampling nor does it specify actual location of sample location. “Grab” means that a grab sample is required for the intended chemical analysis. Depending on the sampling condition, this grab sample can be obtained in the laboratory or in the grab sampling unit.

b. Maximum-under normal conditions.

Table 9.3.2-2 Post-Accident Sampling System (PASS) Sample Points

PASS Sample Point Name	Analysis	Pressure (psig)	Temperature (°F)
RCS Hot Leg	Boron, Cl, Dissolved gas, radioactivity gamma spectrum	140	115
Refueling Water Storage Pit (Obtained from Residual Heat Removal System)	Boron, pH, radioactivity gamma spectrum	140	115
Containment Atmospheric Gas	Radioactivity gamma spectrum, hydrogen concentration	0 to 70	0 to 350

Table 9.3.2-3 Environmentally Qualified Post Accident Valves

Valve Tag No.	Function
PSS-MOV-013	Containment isolation valve inside C/V on sample from RCS hot leg loop C
PSS-MOV-023	Containment isolation valve inside C/V inside C/V on sample from RCS hot leg loop B
PSS-VLV-072	Containment isolation valve inside C/V on post-accident liquid sample return to containment sump

NOTE) PASS gas sample is taken from and return to containment atmosphere through containment penetration of RMS. (containment isolation valves; RMS-MOV-001, 002, 003, and RMS-VLV-005)

Table 9.3.2-4 Secondary Sampling System Sample Points

Sample Point No.	Sample Point Name	Analysis(b)
Secondary SS Sample Points		
1	Condenser A Hotwell Side A(a)(d)	SC & CC
2	Condenser A Hotwell Side B(a) (d)	SC & CC
3	Condenser B Hotwell Side A(a) (d)	SC & CC
4	Condenser B Hotwell Side B(a) (d)	SC & CC
5	Condenser C Hotwell Side A(a) (d)	SC & CC
6	Condenser C Hotwell Side B(a) (d)	SC & CC
7	Condenser Condensate Makeup(a) (d)	SC, SiO_2
8	Condenser Discharge(d)	Na(a) DO Cl(a) SC(a) pH(a) CC(a) Fe(a)
9	Filter/Demineralizer Vessel A(a) (d)	SC, Na(a)
10	Filter/Demineralizer Vessel B(a) (d)	SC, Na(a)
11	Filter/Demineralizer Vessel C(a) (d)	SC, Na (a)
12	Demineralizer Total Effluent(c) (d)	SC, Na(a), Cl(a), SO_4, Fe(a),
13	Point After Chemical Injection(d)	SC, pH
14	Feedwater to SG(d)	DO, SC(a), CC(a), pH(a), Oxygen Scavenger (N_2H_4) Fe, Cu (only copper using plant) ECP(a), Pb(a)
15	SGBDS Discharge(d)	SC, CC, pH Na, Cl, SO_4
16	Main Steam from SG A(d)	CC(a)
17	Main Steam from SG B(d)	CC(a)
18	Main Steam from SG C(d)	CC(a)
19	Main Steam from SG D(d)	CC(a)
20	Reheat Steam A1(d)	CC(a)
21	Reheat Steam A2(d)	CC(a)
22	Reheat Steam B1(d)	CC(a)
23	Reheat Steam B2(d)	CC(a)
24	Reheat Steam C1(d)	CC(a)
25	Reheat Steam C2(d)	CC(a)
26	HP Heater Drain A, B(d)	SC(a), CC(a), Fe(a)
27	LP Heater Drain A, B, C(d)	SC(a), CC(a), Fe(a)
28	MS Drain A, B(d)	SC(a), CC(a), Fe(a)
29	Deaerator Inlet(d)	SC(a), DO(a),
30	Deaerator Outlet A, B, C, D(d)	SC(a), DO(a),

NOTE:
(a) These points are provided with grab sampling capability but are not always continuously monitored.
(b) Symbols used:
SC - specific conductivity
CC - cation conductivity
DO - dissolved oxygen
ECP - Electric Corrosion Potential
(c) Continuous monitoring during startup only.
(d) Grab Samples are also available for other offsite analysis at panel after sample conditioning.

Table 9.3.2-5 Steam Generator Blowdown Sampling System Sample Points

Sample Point No.	Sample Point Name	Analysis[b]
1	A-SG Blowdown	Na, SC[a], CC, pH[a] Cl, SO_4[d]
2	B-SG Blowdown	Na, SC[a], CC, pH[a] Cl, SO_4[d]
3	C-SG Blowdown	Na, SC[a], CC, pH[a] Cl, SO_4[d]
4	D-SG Blowdown	Na, SC[a], CC, pH[a] Cl, SO_4[d]

NOTE:
(a) These points are provided with grab sampling capability but are not always continuously monitored.
(b) Symbols used:
SC - specific conductivity
CC - cation conductivity
DO - dissolved oxygen
(c) Continuous monitoring during startup only.
(d) Continuous monitoring during normal operation

Table 9.3.2-6 Process Grab Sample Points [a] (Sheet 1 of 3)

Sample Point No.	Sample Point Name	Analysis	Pressure[b] (psig)	Temperature [b] (°F)
Auxiliary and Reactor Building				
1	Boric Acid Blender Discharge	Boron	115	104
2	Boric Acid Tank Discharge	Boron, halogens SiO_2 and acid soluble iron	115	104
3	Boric Acid Batching Tank	Boron	Atmospheric	104
4	A-Accumulator	Boron, halogens	640	120
5	B-Accumulator	Boron, halogens	640	120
6	C-Accumulator	Boron, halogens	640	120
7	D-Accumulator	Boron, halogens	640	120
8	Refueling Water Storage Pit	Boron, halogens	90	120
9	A-Safety Injection Pump Discharge	Boron, halogens	715	120
10	B-Safety Injection Pump Discharge	Boron, halogens	715	120
11	C-Safety Injection Pump Discharge	Boron, halogens	715	120
12	D-Safety Injection Pump Discharge	Boron, halogens	715	120
13	A-CS/RHR Pump Discharge	Boron, halogens	575	360
14	B-CS/RHR Pump Discharge	Boron, halogens	575	360
15	C-CS/RHR Pump Discharge	Boron, halogens	575	360
16	D-CS/RHR Pump Discharge	Boron, halogens	575	360
17	A-B.A Evaporator Feed Pump Discharge	Boron, halogen, SiO_2 and acid soluble iron	115	104
18	B-B.A Evaporator Feed Pump Discharge	Boron, halogen, SiO_2 and acid soluble iron	115	104
19	B.A Evaporator Package, Concentrates Sample	Boron, halogen, SiO_2 and acid soluble iron	140	176
20	B.A Evaporator Package, Distillate Sample	Boron, radioactivity, halogens, pH, and conductivity, dissolved oxygen	140	126
21	A-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
22	B-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
23	C-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
24	D-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
25	A, B-Component Cooling Water Pump Tie Line suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
26	C, D-Component Cooling Water Pump Tie Line suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
27	A-Component Cooling Water surge Tank Outlet	Conductivity, halogens, dissolved oxygen and N_2H_4	80	100

Table 9.3.2-6 Process Grab Sample Points [(a)] (Sheet 2 of 3)

Sample Point No.	Sample Point Name	Analysis	Pressure[(b)] (psig)	Temperature [(b)] (°F)
28	B-Component Cooling Water surge Tank Outlet	Conductivity, halogens, dissolved oxygen and N_2H_4	80	100
29	A,B-Spent Fuel Pit Filter Outlet	Boron, Halogens, radioactivity, pH and conductivity	100	120
30	A,B-Spent Fuel Pit Demineralizer Outlet	Boron, Halogens, radioactivity, pH and conductivity	100	120
31	Non-radeoactive Drain Sump Pump Discharge	Radioactivity	145	140
32	Auxiliary Boiler Feed water	pH[(c)], SiO_2, Specific Conductivity[(c)] , Suspended solids, Cation Conductivity[(c)]	110	85
33	Auxiliary Boiler steam	Cation Conductivity[(c)]	110	345
34	A-SG Blowdown Cation Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
35	B-SG Blowdown Cation Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
36	A-SG Blowdown Mix Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
37	B-SG Blowdown Mix Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
38	Steam Generator blowdown demineralizers inlet filters inlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
39	Steam Generator blowdown demineralizers inlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
Yard Area				
1	External Water Makeup	pH, conductivity	Atmospheric	Ambient
2	Waste Water Effluent (from sump)	pH, conductivity	Atmospheric	Ambient
3	Sewage and Industrial waste Effluent	pH, conductivity	Atmospheric	Ambient
4	Primary Makeup Water Tank outlet	Dissolved oxygen, radioactivity, halogens, conductivity, pH	155	Ambient
5	Refueling Water Storage Auxiliary Tank outlet	Boron, halogens	Atmospheric	Ambient
Radwaste				
1	C/V Reactor Coolant Drain Tank Outlet	Boron, halogens, pH, conductivity, O_2, H_2 and turbidity	155	120
2	C/V Sump Pump Discharge	Boron, halogens, pH, conductivity, chloride ion and radioactivity	40	120
3	R/B Sump Pump Discharge	Boron, halogens, pH, conductivity, chloride ion and radioactivity	55	104
4	A/B Sump Pump Discharge	Boron, halogens, pH, conductivity, chloride ion and radioactivity	55	104

Table 9.3.2-6 Process Grab Sample Points [(a)] (Sheet 3 of 3)

Sample Point No.	Sample Point Name	Analysis	Pressure[(b)] (psig)	Temperature [(b)] (°F)
5	A,B-Waste Holdup Tank Pump Discharge	Boron, halogens, pH, conductivity, , chloride ion, fluoride ion, turbidity, solid, oil and radioactivity	115	104
6	A/B Equipment Drain Sump Pump Discharge	Boron, halogens, pH, conductivity, chloride ion and radioactivity	115	104
7	Activated Carbon Filter Outlet	Boron, halogens, pH, conductivity, chloride ion, fluoride ion, turbidity, solid, oil and radioactivity	115	104
8	A-Waste Demineralizer Outlet	radioactivity, pH and conductivity	115	104
9	B-Waste Demineralizer Outlet	radioactivity, pH and conductivity	115	104
10	C-Waste Demineralizer Outlet	radioactivity, pH and conductivity	115	104
11	D-Waste Demineralizer Outlet	radioactivity, pH and conductivity	115	104
12	Waste Monitor Tank Pump Discharge	Radioactivity, pH	80	104
13	Detergent Drain Tank Pump Discharge	Radioactivity, pH and chloride ion	145	104
14	Detergent Drain Monitor Tank Pump discharge	Radioactivity, pH and chloride ion	145	104
15	Chemical Drain Tank Pump Discharge	Radioactivity, pH	145	104

NOTE:
(a) Additional grab sample points are provided on all continuous sampling lines of the turbine plant sampling system (Table 9.3.2-4).
(b) Under normal conditions.
Other existing connections such as instrument test connections may be used as alternate sample collection points when so directed in approved plant procedures.
(c) These points are provided with grab sampling capability but are not always continuously monitored.

Table 9.3.4-1 Water Chemistry Specification for the Reactor Coolant

Analysis Items	Standard Value	Limited Value
Conductivity mS/m	0.1 - 4.0 at 25°F (1)	-
pH	4.2 - 10.5 at 25°F	-
Dissolved oxygen (ppm)	$\leq$ 0.005	$\leq$ 0.10
Chloride ion (ppm)	$\leq$ 0.05	$\leq$ 0.15
Fluoride ion (ppm)	$\leq$ 0.05	$\leq$ 0.15
Dissolved Hydrogen (cc (STP)/kg · H_2O)	25 -35	$\geq$ 15, $\leq$ 50
Suspended Solids (ppm)	$\leq$ 0.35	-
pH control agent (ppm)	0.2 - 3.5 as Li-7	-
Boron (ppm)	0 - 4000 as B (Note 1)	-

Note (1) It depends on plant operating conditions.

Table 9.3.4-2 Chemical and Volume Control System Parameters During Normal Plant Operation

Seal water supply flow rate	32 gpm
Seal water return flow rate	12 gpm
Normal letdown flow rate (Note)	180 gpm
Normal charging flow rate	160 gpm
Temperature of letdown water at full power	550.8° F (at normal letdown flow)
Temperature of charging water at full power	464° F (at normal letdown flow)
Temperature of coolant discharged to the holdup tanks	115° F
Charging pumps mini flow	70 gpm

(Note) US-APWR has two letdown mode of 90gpm and 180gpm (maximum) and normally operated at 180gpm.

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 1 of 6)

Charging Pumps		
Number of units	2	
Design flow rate	275 gpm	
Type	Multistage horizontal centrifugal	
Design pressure	3,185 psig	
Design temperature	200° F	
Fluid	Reactor coolant	
Material	Stainless steel	
B.A. Transfer Pumps		
Number of units	2	
Type	Horizontal centrifugal	
Design flow	130 gpm	
Design pressure	200 psig	
Design temperature	200 °F	
Fluid	Boric acid water (approximately 7,000 ppmB)	
Material	Stainless steel	
B.A. Evaporator Feed Pumps		
Number of units	2	
Type	Horizontal centrifugal	
Design flow (process operation)	45 gpm	
Design flow (circulation operation)	130 gpm	
Design pressure	200 psig	
Design temperature	200° F	
Fluid	Reactor coolant	
Material	Stainless steel	
Regenerative Heat Exchanger		
Number of units	1	
Heat Transfer rate	27.4×10^6 BTU/h	
Type	Shell and tube type	
	Shell Side (Letdown)	Tube Side (Charging)
Design pressure	2485 psig	3185 psig
Design temperature	650 ° F	650 ° F
Design Flow rate	8.95×10^4 lb/h	7.98×10^4 lb/h
Design Inlet temperature	550.8° F	130.0° F
Design Outlet temperature	269.1° F	464.0° F
Material	Stainless steel	Stainless steel

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 2 of 6)

Letdown Heat Exchanger		
Number of unit	1	
Type	Single-shell pass U-tube	
Heat exchanger rate	24.2 x 10^6 BTU/H	
	Shell Side (CCW)	Tube side (Reactor coolant)
Design pressure	200 psig	700 psig
Design Temperature	300 ° F	400 ° F
Design flow rate	6.5 x 10^5 lb/h	8.95 x 10^4 lb/h
Design Inlet temperature	100° F	380° F
Design Outlet temperature	137.7° F	115° F
Material	Carbon steel	Stainless steel
Excess Letdown Heat Exchanger		
Number of unit	1	
Type	Vertical U-bend tube type	
Heat transfer rate	5.12 x 10^6 BTU/h	
	Shell side	Tube Side
Design pressure	200 psig	2485 psig
Design Temperature	300° F	650° F
Design Flow rate	1.37 x 10^5 lb/h	1.24 x 10^4 lb/h
Inlet temperature	100 ° F	550.9 ° F
Outlet temperature	137.8 ° F	165.0 ° F
Material	Carbon steel	Stainless steel
Seal Water Heat Exchanger		
Number of unit	1	
Type	Horizontal U-bend tube type	
Heat transfer rate	1.77 x 10^6 BTU/h	
	Shell Side	Tube Side
Design pressure	200 psig	150 psig
Design temperature	200° F	200° F
Design flow rate	1.25 x 10^5 lb/h	5.6 x 10^4 lb/h
Inlet temperature	100 ° F	146.7 ° F
Outlet temperature	113.5 ° F	115 ° F
Material	Carbon steel	Stainless steel

Mixed Bed Demineralizer	
Number of units	2
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	300 psig
Design temperature	150° F
Design flow	180 gpm
Material	Stainless steel

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 3 of 6)

Cation Bed Demineralizer	
Number of units	1
Type	Vertical cylindrical
Resin volume	30 ft^3
Vessel capacity	45 ft^3
Design pressure	300 psig
Design temperature	150° F
Design flow	110 gpm
Material	Stainless steel
Deborating Demineralizer	
Number of units	2
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	300 psig
Design temperature	150° F
Design flow	180 gpm
Material	Stainless steel
B.A. Evaporator Feed Demineralizer	
Number of units	1
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	200 psig
Design temperature	200° F
Design flow	45 gpm
Vessel material	Stainless steel
B.A. Evaporator	
Number of units	1
Capacity	30 gpm
Material	Stainless steel
B.A. Blender	
Number of units	1
Fluid	Boric acid water (approximately 7,000 ppmB)
Design pressure	200 psig
Design temperature	200° F
Material	Stainless steel

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 4 of 6)

Volume Control Tank	
Number of units	1
Capacity	670 ft^3
Type	Vertical cylindrical
Design pressure (internal)	75 psig
Design pressure (external)	15 psig
Design temperature	200° F
Material	Stainless steel
Boric Acid Tanks	
Number of units	2
Type	Vertical cylindrical
Capacity	66,000 gal
Design pressure	7 psig
Design temperature	200° F
Fluid	Boric acid water (approximately 7,000 ppmB)
Material	Stainless steel
Holdup Tanks	
Number of units	3
Type	Vertical cylindrical type
Capacity	16,000 ft^3 (0 to approximately 100% level)
Design pressure	15 psig
Design temperature	200° F
Fluid	Reactor coolant drain
Material	Stainless steel
RCP Purge Water Head Tank	
Number of units	1
Type	Horizontal cylindrical type
Capacity	46 ft^3 (0 to approximately 100% level)
Design pressure (internal)	25 psig
Design pressure (external)	15 psig
Design temperature	200° F
Fluid	Primary makeup water
Material	Stainless steel
Resin Fill Tank	
Number of units	1
Type	Vertical cone type
Capacity	21 ft^3
Design pressure	Atmosphere
Design temperature	150° F
Fluid	Resin slurry
Material	Stainless steel

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 5 of 6)

Chemical Mixing Tank	
Number of units	1
Type	Vertical Cylindrical
Capacity	0.67 ft^3
Design pressure	200 psig
Design temperature	150° F
Fluid	LiOH, Hydrazine, etc.
Material	Stainless steel
Boric Acid Batching Tank	
Number of units	1
Type	Vertical Cylindrical
Capacity	1,050 gallon
Design pressure	Atmosphere
Design temperature	200° F
Fluid	Boric acid water (approximately 7,000 ppmB)
Material	Stainless steel
Reactor Coolant Filter	
Number of units	2
Type	Disposable cartridge [250gpm type]
Design pressure	300 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel
Seal Water Injection Filter	
Number of units	2
Type	Vertical cylinder cartridge [80gpm type]
Design pressure	3,185 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel
Mixed Bed Demineralizer Inlet Filter	
Number of units	3
Type	Vertical cylinder cartridge [250gpm type]
Design pressure	300 psig
Design temperature	150° F
Filter element material	Polypropylene
Vessel material	Stainless steel

Table 9.3.4-3 Chemical and Volume Control System Equipment Design Parameters (Sheet 6 of 6)

Boric Acid Filter	
Number of units	1
Type	Vertical cylinder cartridge [250gpm type]
Design pressure	200 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel
B.A. Evaporator Feed Demineralizer Filter	
Number of units	1
Type	Vertical cylinder cartridge [150gpm type]
Design pressure	200 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel

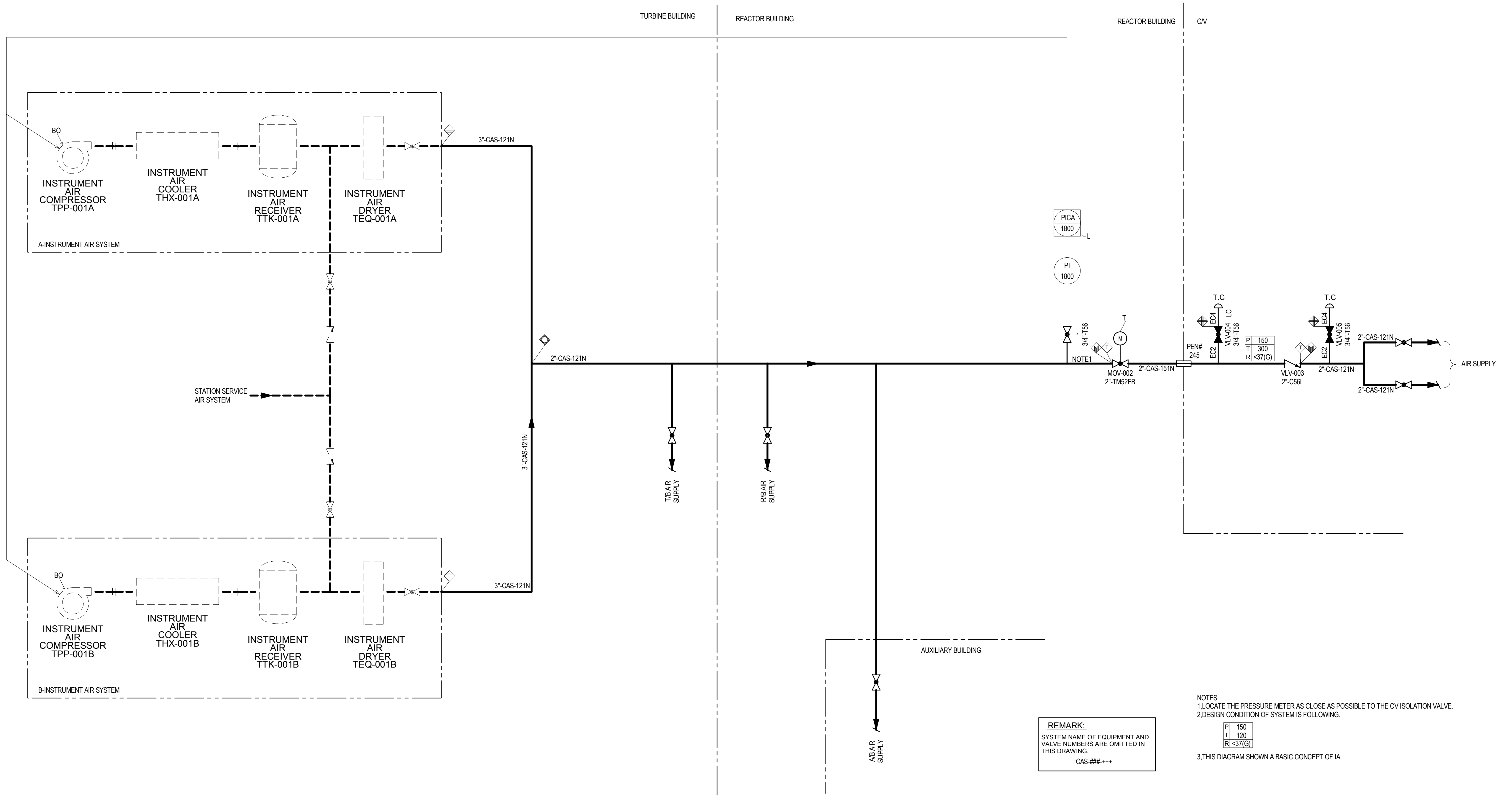


Figure 9.3.1-1 Instrument Air System

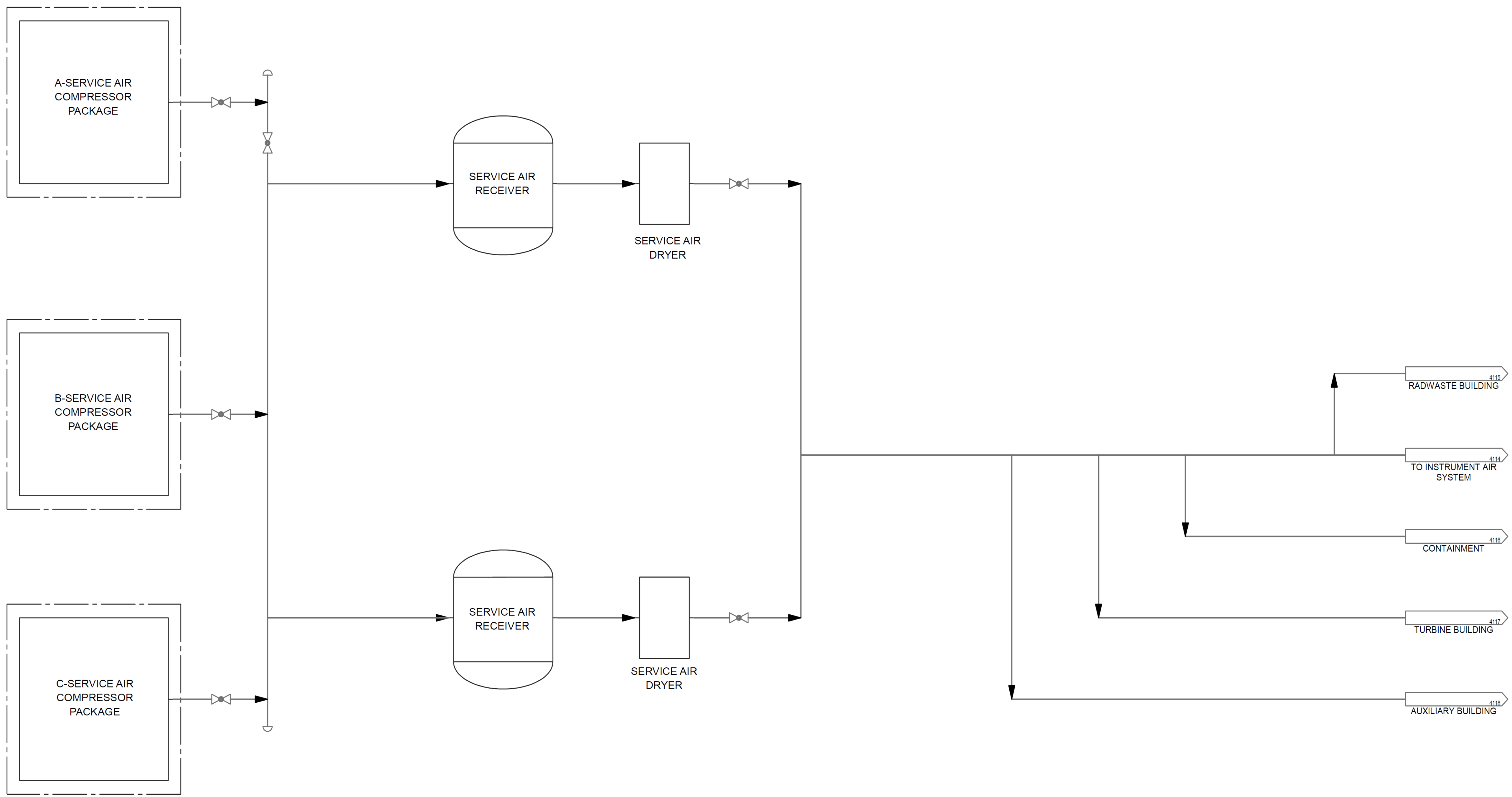


Figure 9.3.1-2 Station Service Air System

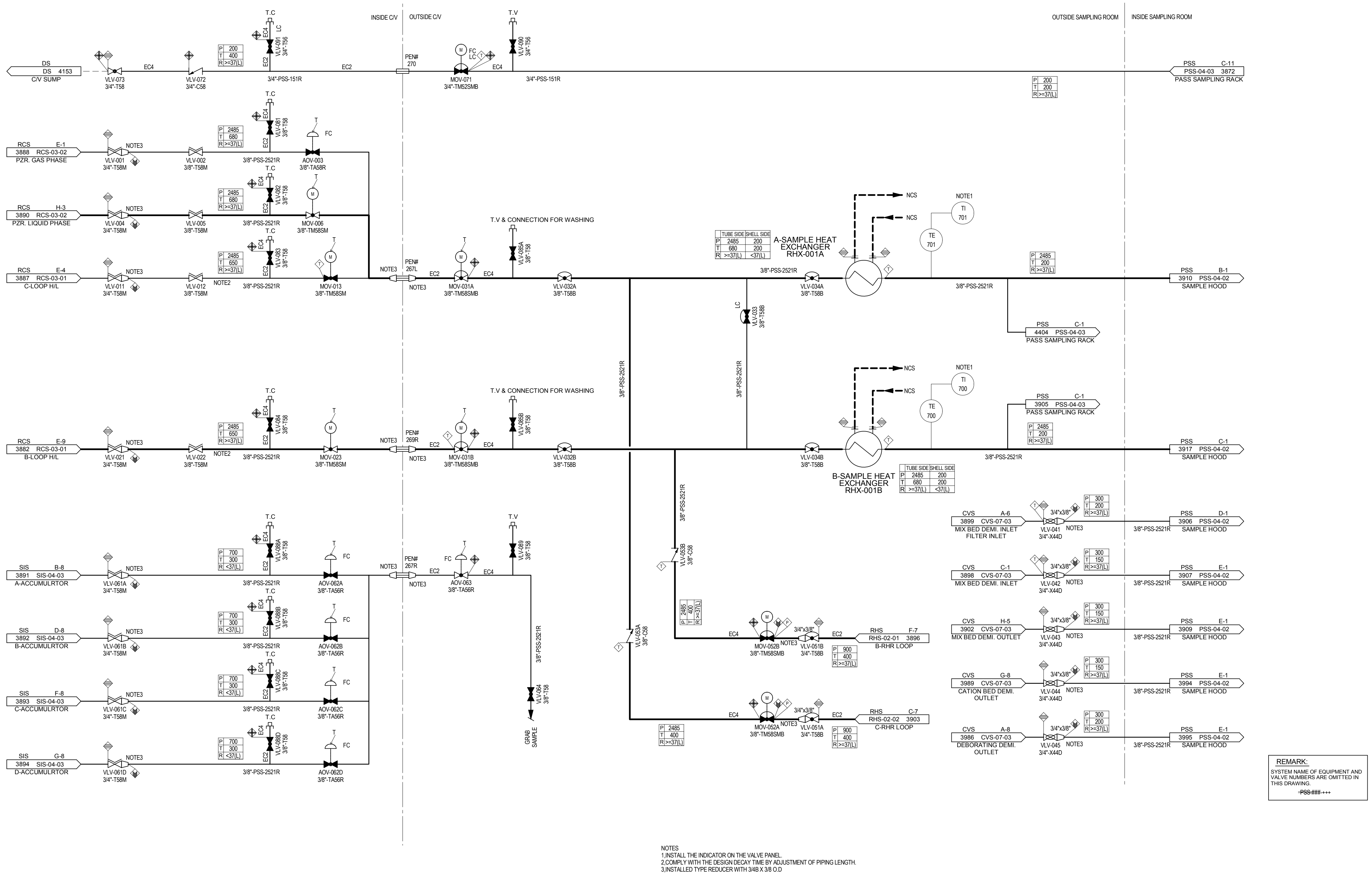


Figure 9.3.2-1 PSS Flow Diagram (Sheet 1 of 5)

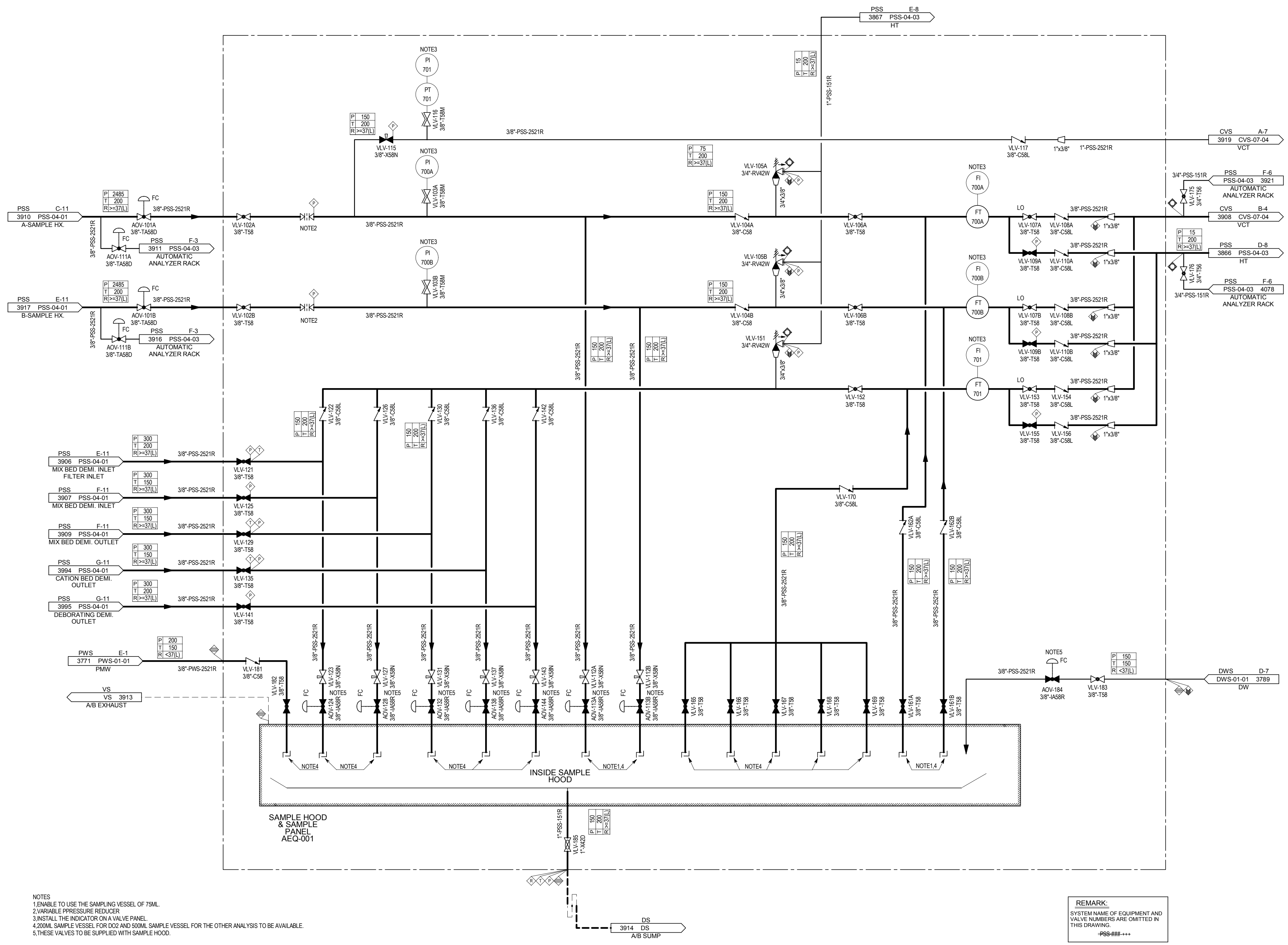


Figure 9.3.2-1 PSS Flow Diagram (Sheet 2 of 5)

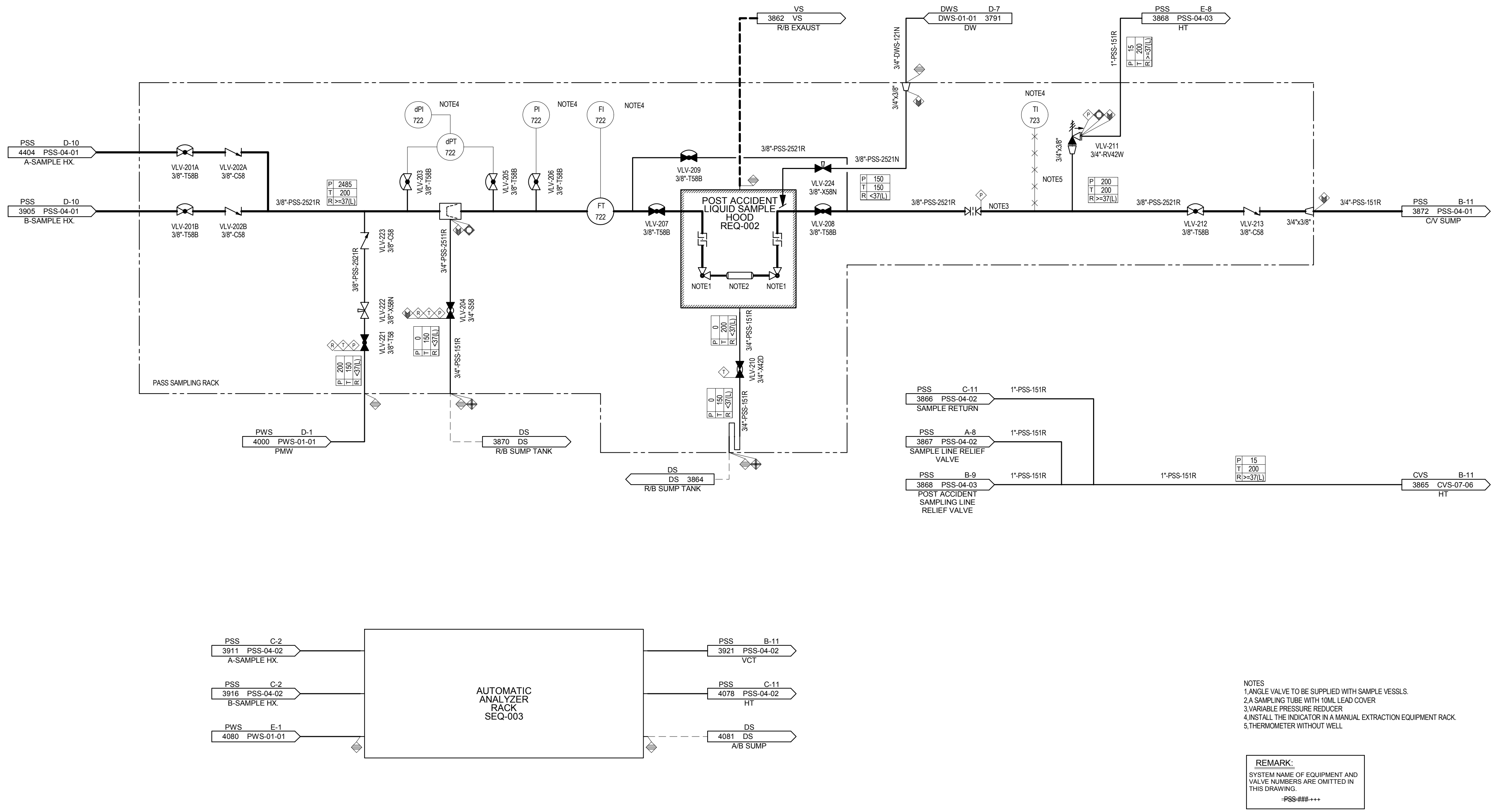


Figure 9.3.2-1 PSS Flow Diagram (Sheet 3 of 5)

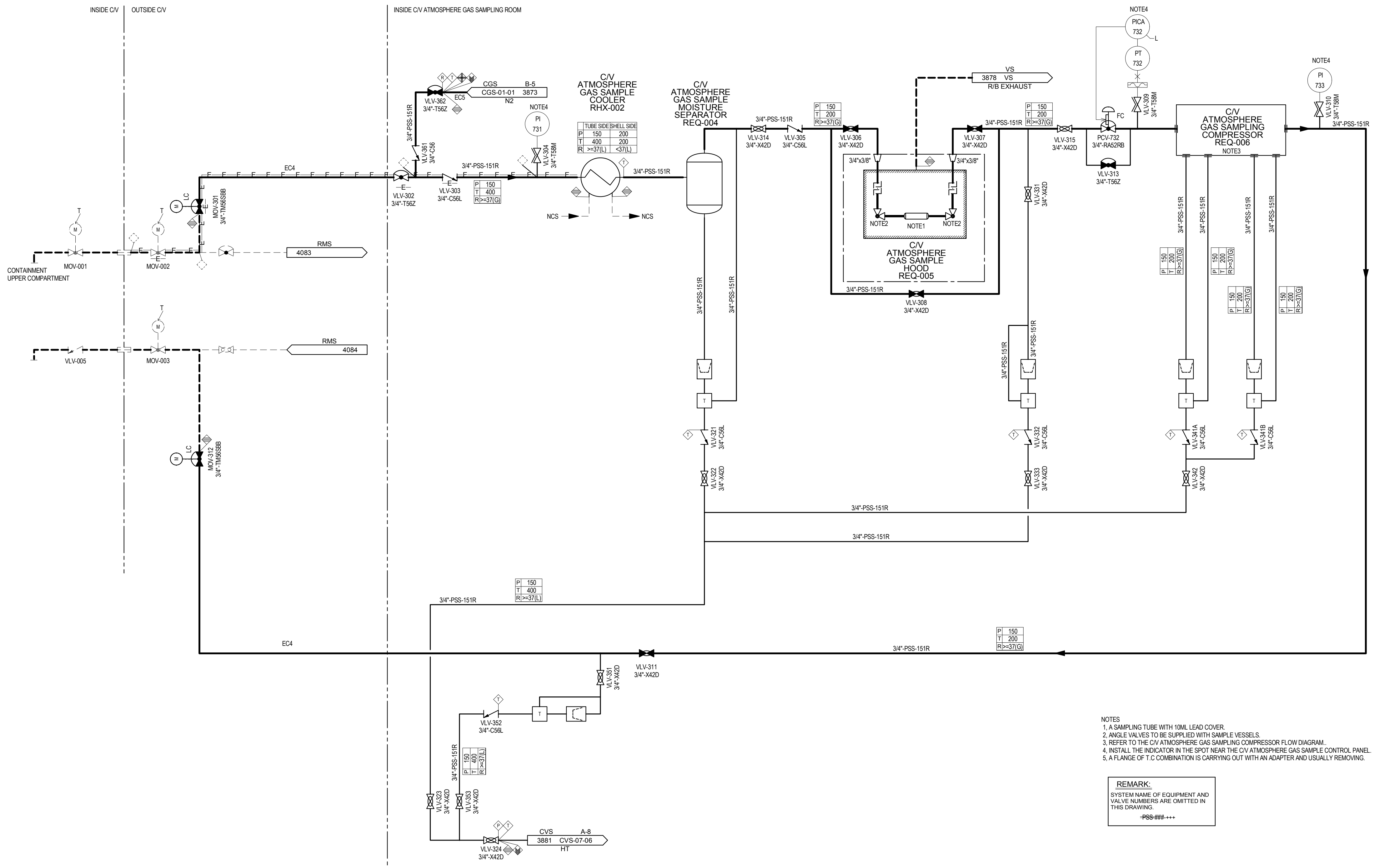


Figure 9.3.2-1 PSS Flow Diagram (Sheet 4 of 5)

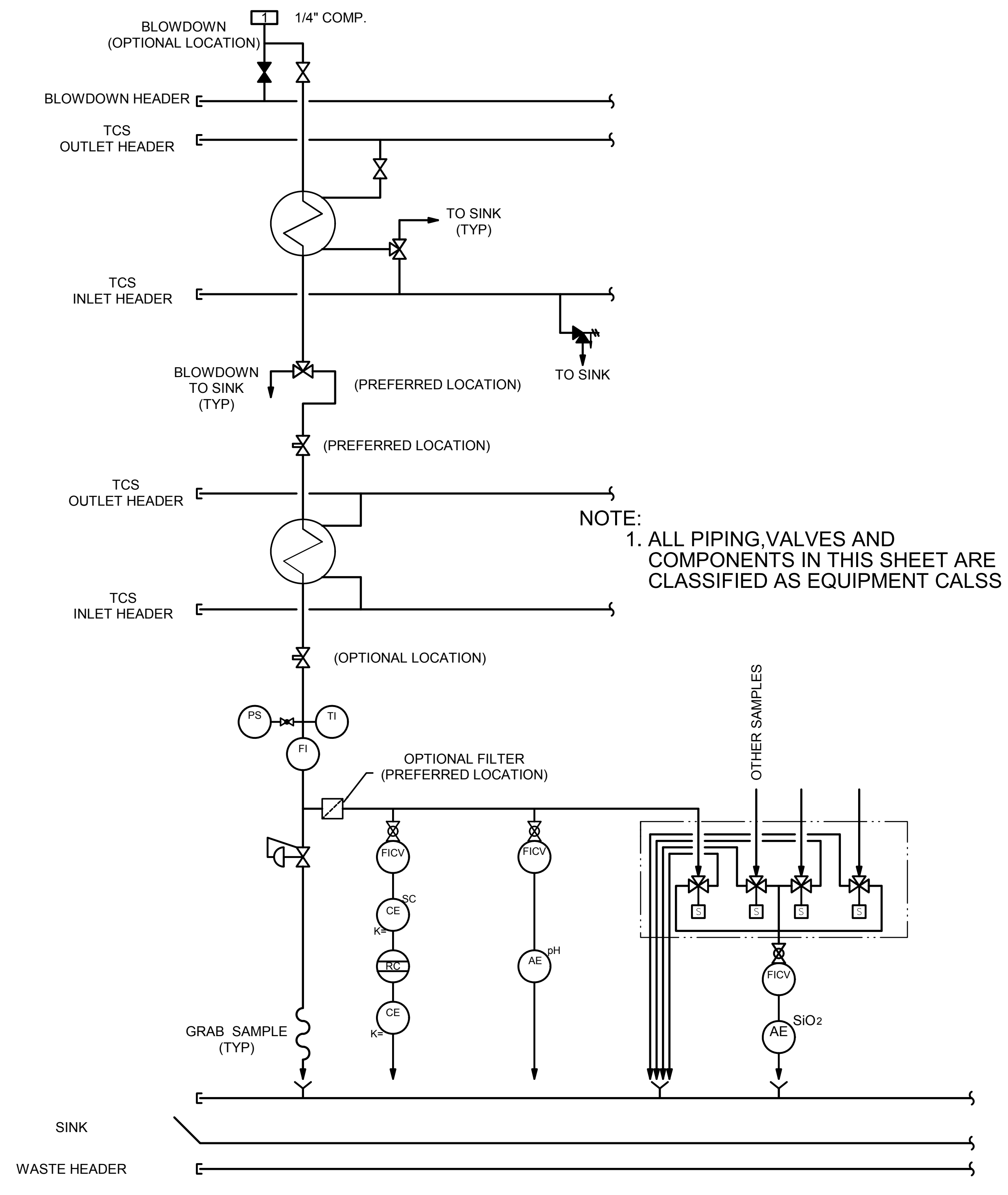


Figure 9.3.2-1 PSS Flow Diagram (Sheet 5 of 5)

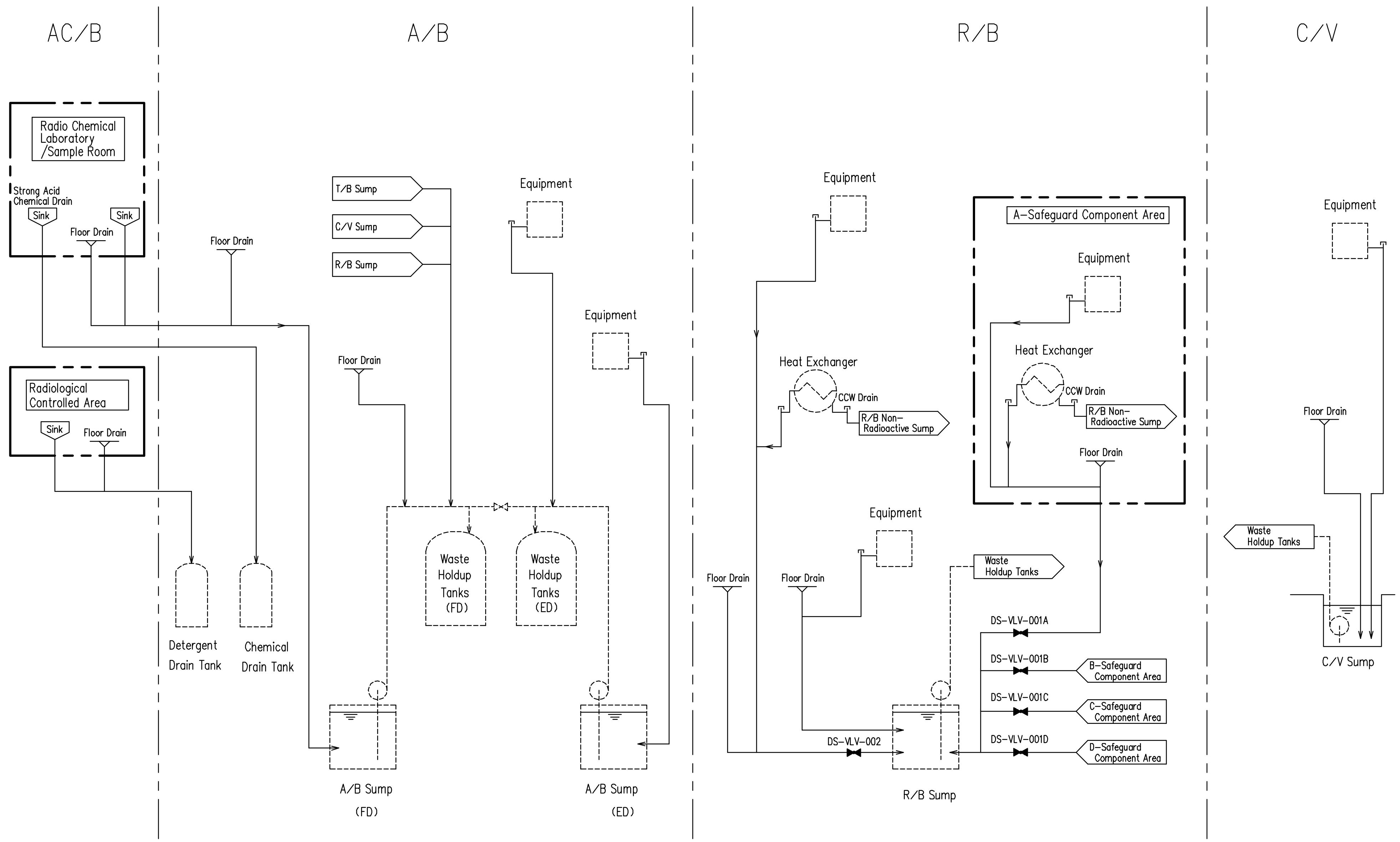


Figure 9.3.3-1 Equipment and Floor Drain System Flow Schematic (Sheet 1 of 2)

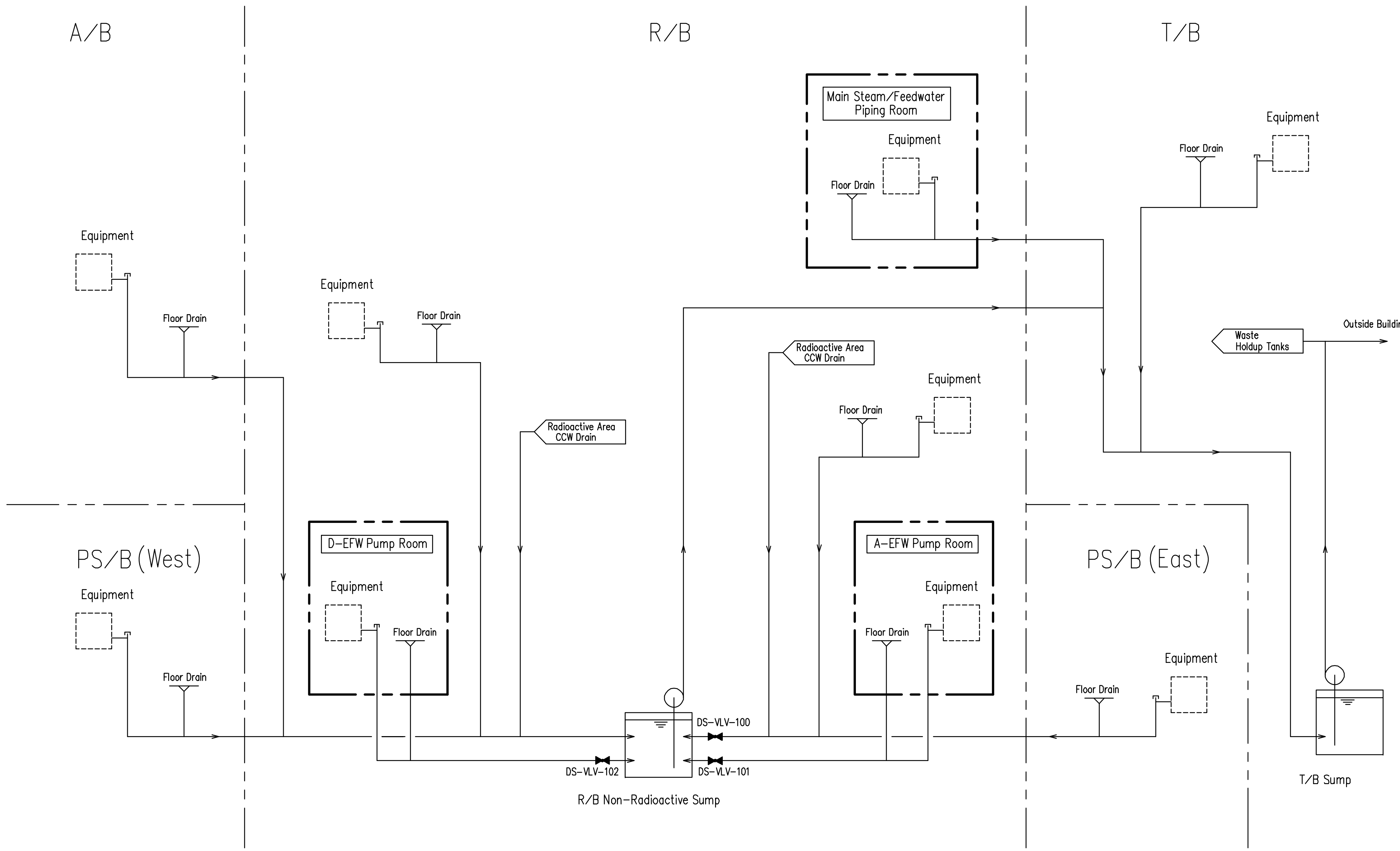


Figure 9.3.3-1 Equipment and Floor Drain System Flow Schematic (Sheet 2 of 2)

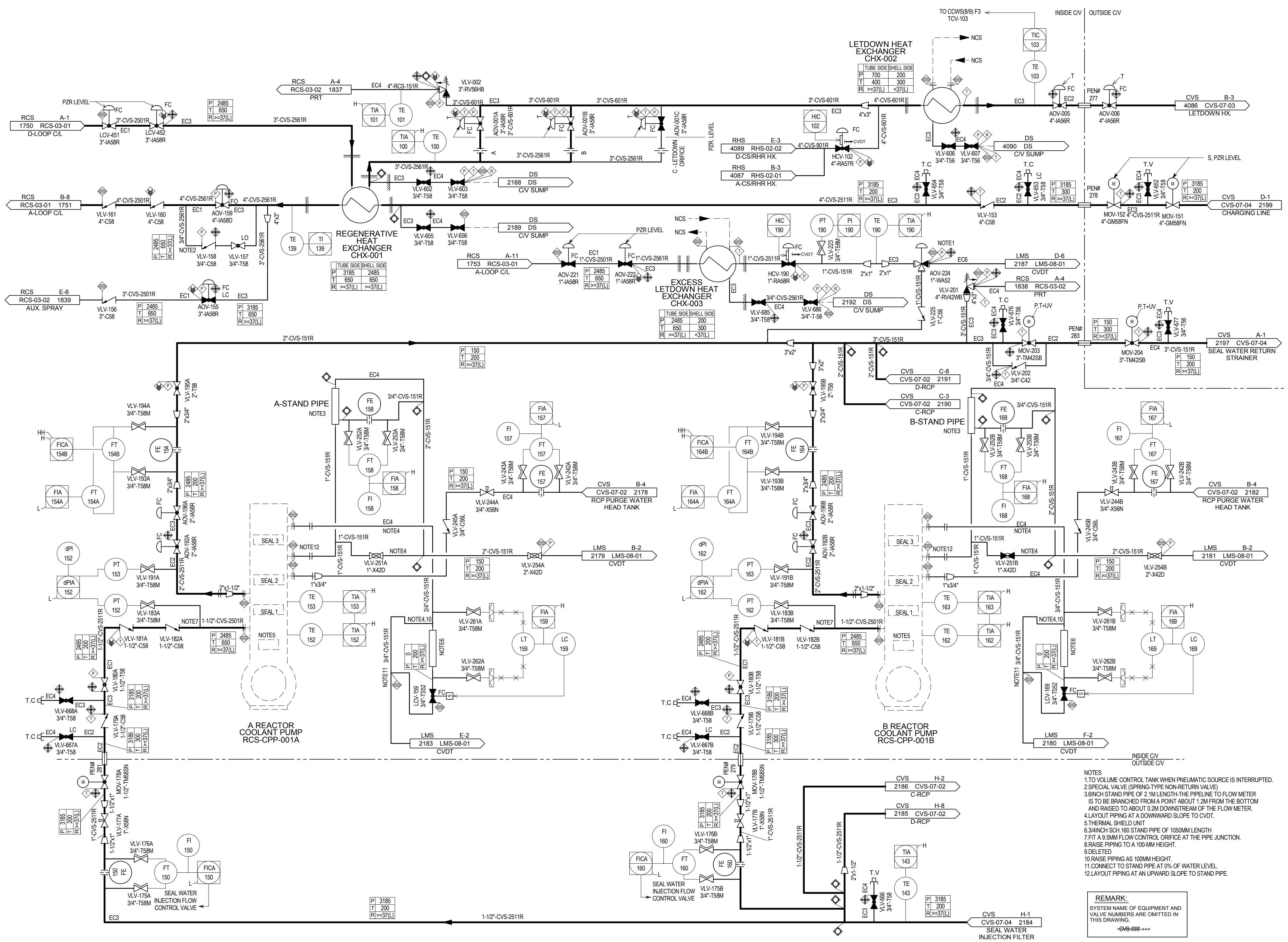


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 1 of 7)

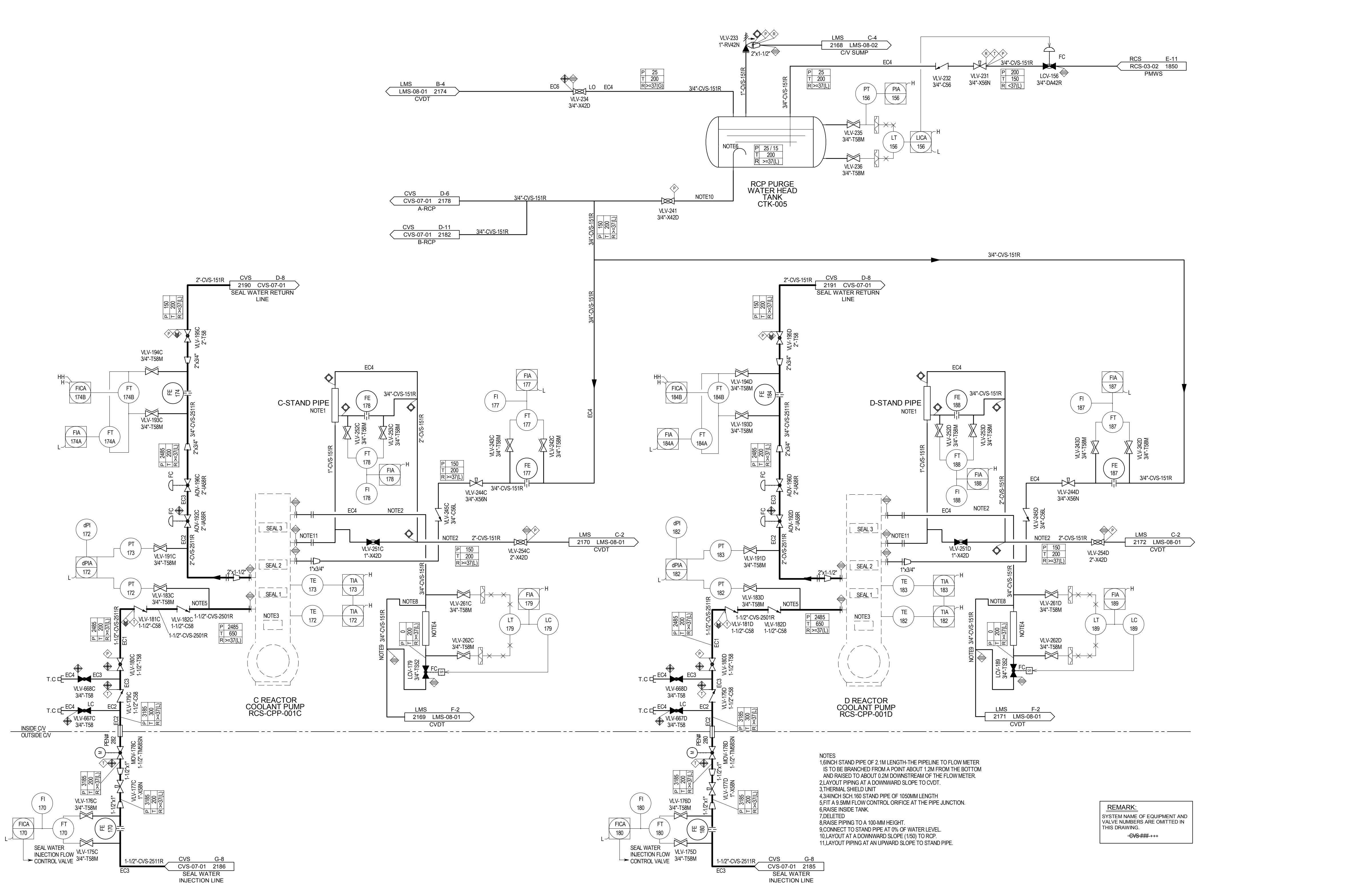


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 2 of 7)

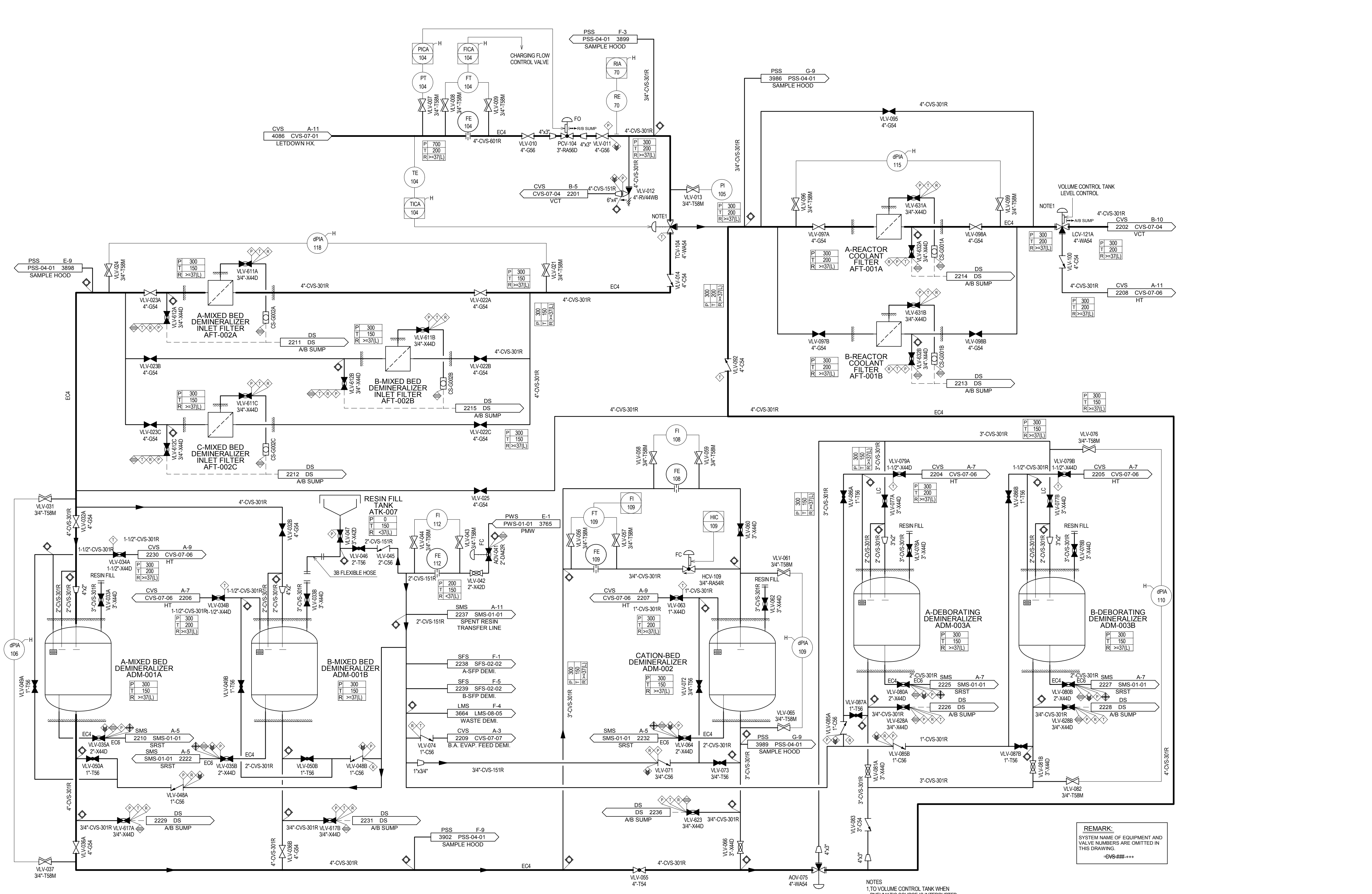


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 3 of 7)

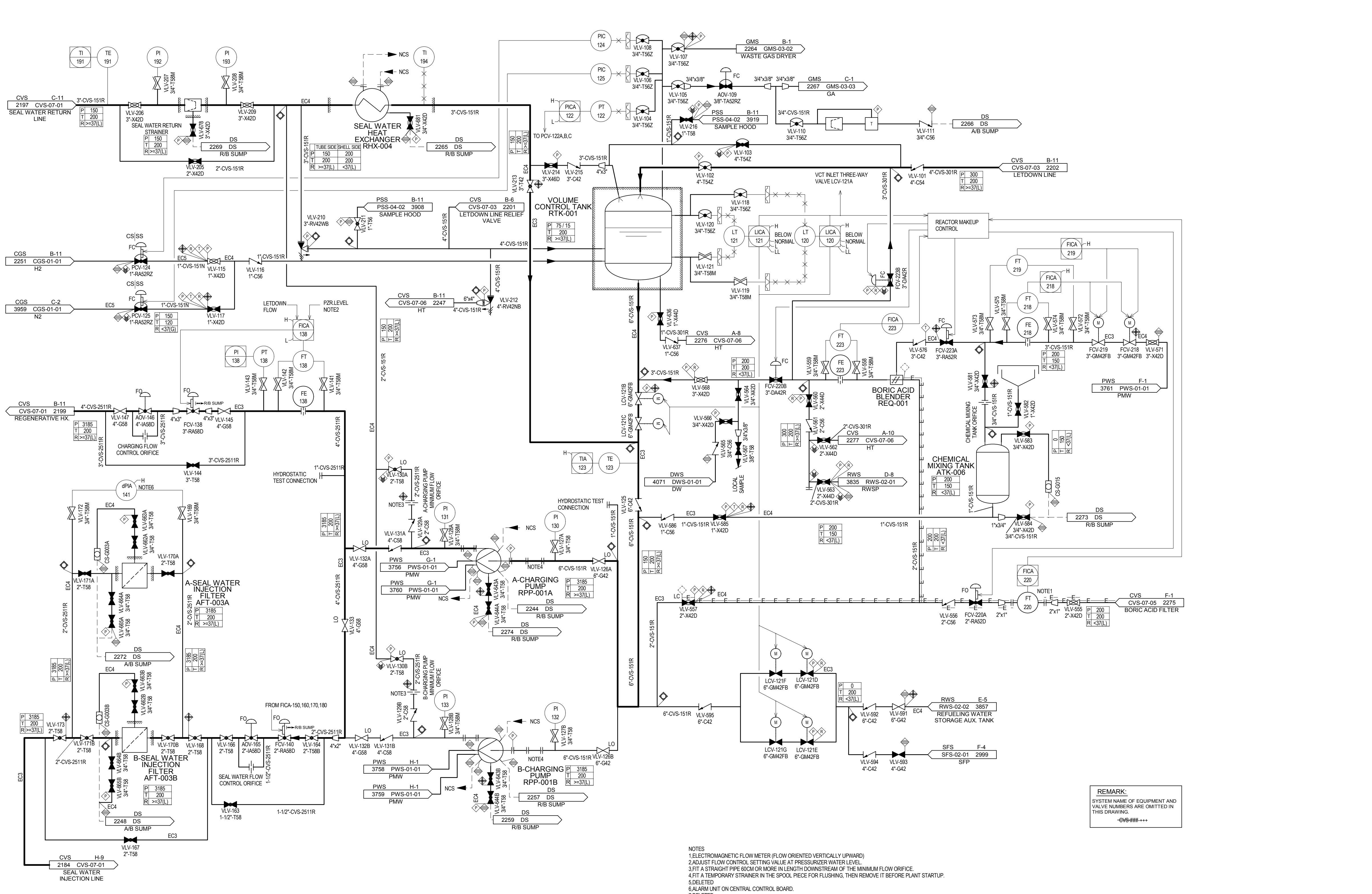


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 4 of 7)

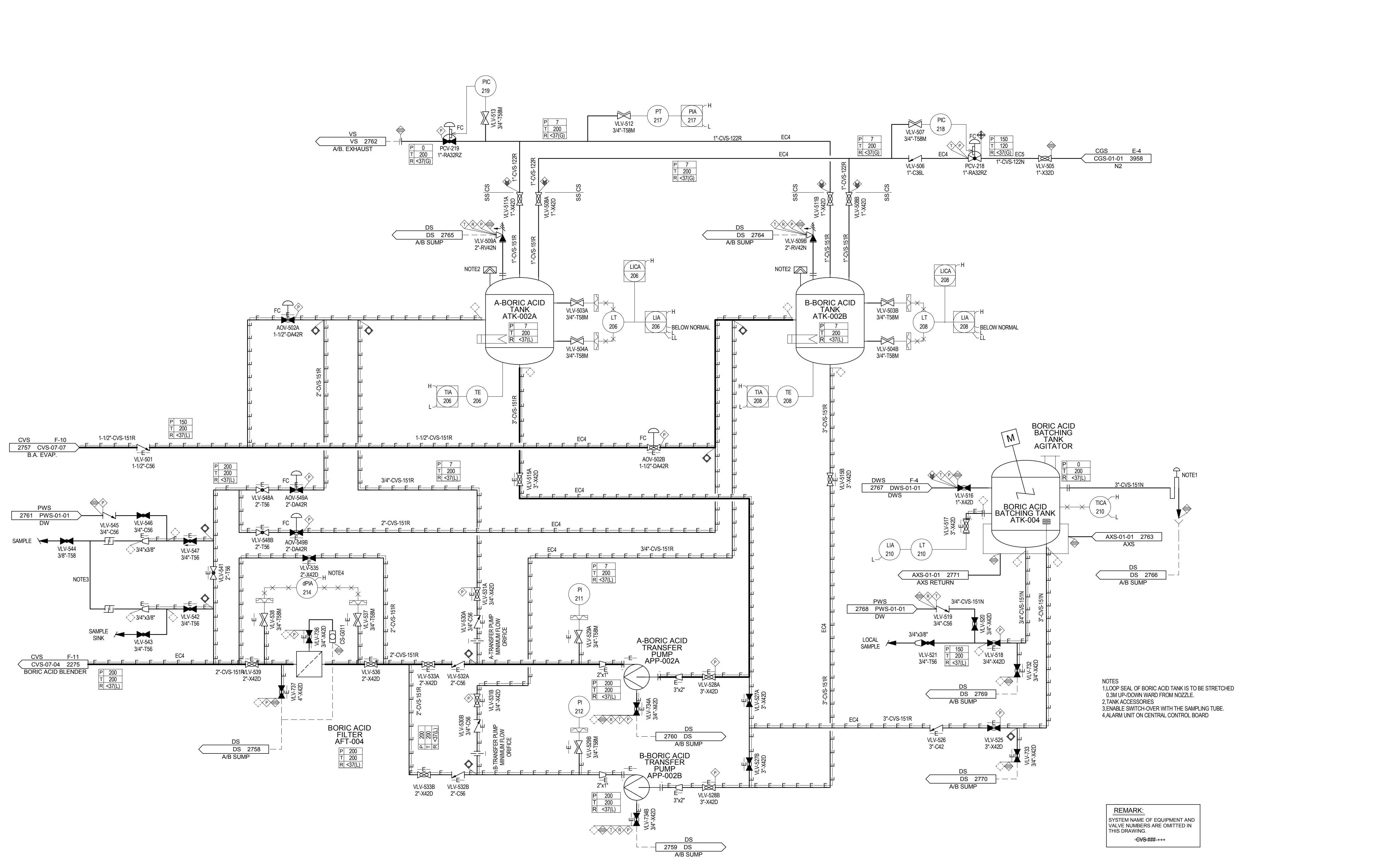


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 5 of 7)

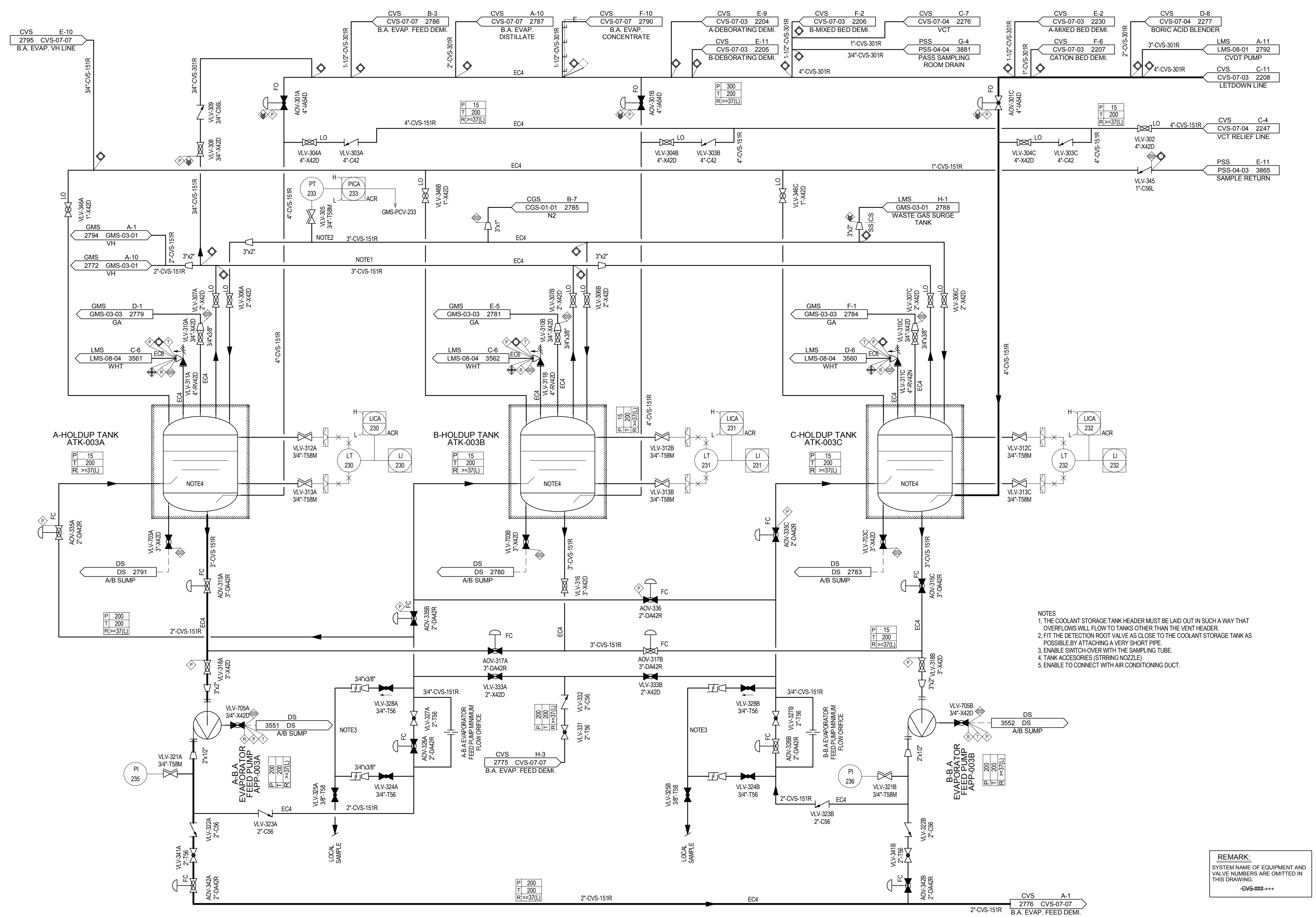


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 6 of 7)

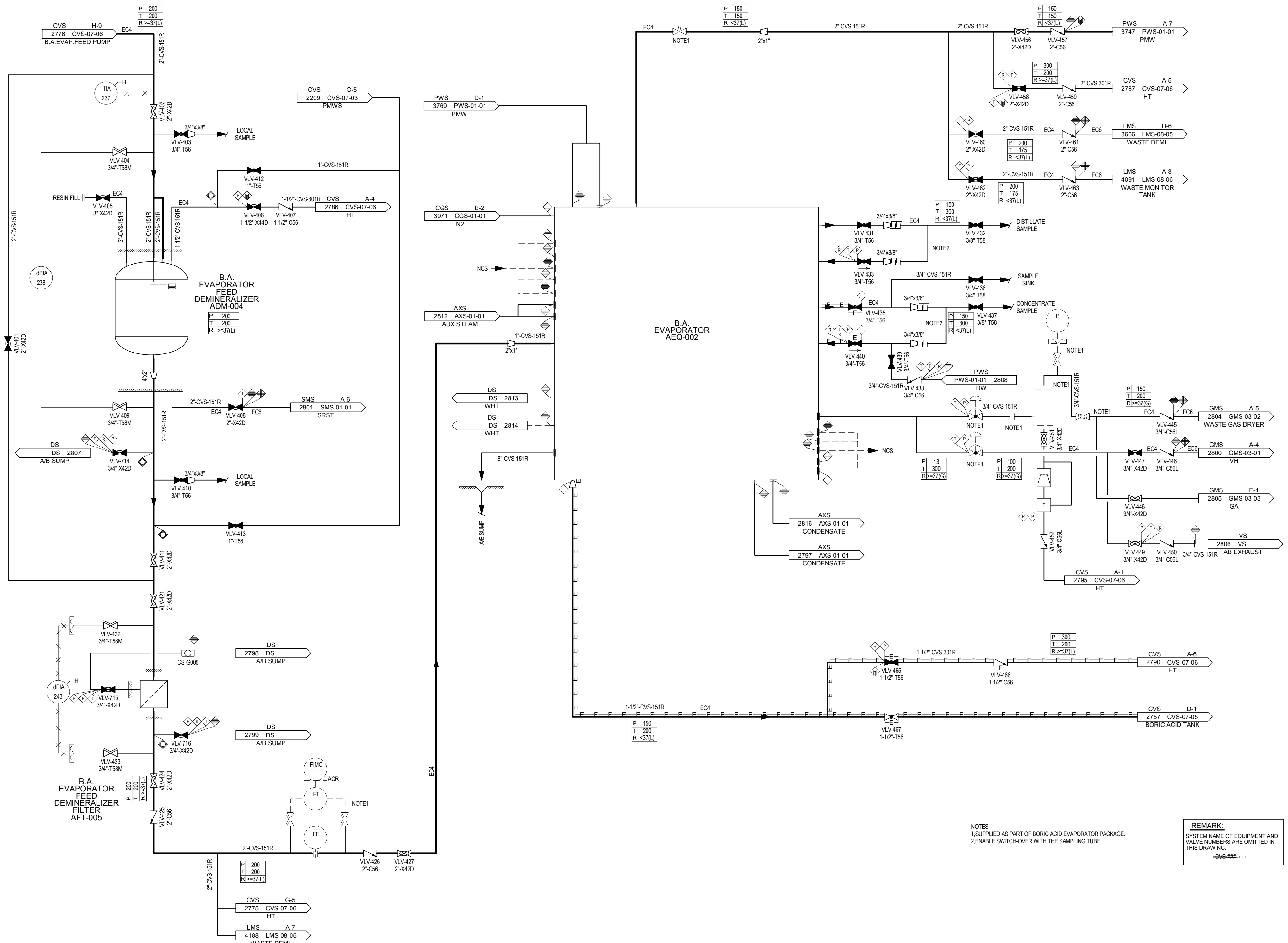


Figure 9.3.4-1 Chemical and Volume Control System Flow Diagram (Sheet 7 of 7)

9.4 Air Conditioning, Heating, Cooling, and Ventilation Systems

This section describes the heating, ventilation and air conditioning (HVAC) systems serving the plant during normal and emergency conditions including SBO. HVAC systems are designed to provide suitable environment for plant equipment and personnel. Ventilation zones, air distribution and airflows migration are configured and arranged so that the ventilation air is drawn from the clean areas to areas of potentially greater radioactive contamination to a final filtration and exhaust systems discharging to the plant vent stack.

The HVAC systems airflow diagrams are shown on Figures 9.4.1-1 through 9.4.6-1. The area temperature and relative humidity during the plant normal and emergency condition are described in Table 9.4-1.

The following are the reference sections where the various HVAC and related systems are covered:

Title	Section
Chilled Water System	9.2.7
Main Control Room HVAC System	9.4.1
Spent Fuel Pool Area Ventilation System	9.4.2
Auxiliary Building Ventilation System	9.4.3
Turbine Building Area Ventilation System	9.4.4
Engineered Safety Feature Ventilation System	9.4.5
Containment Ventilation System	9.4.6

9.4.1 Main Control Room Heating, Ventilation and Air Conditioning System

The MCR HVAC System is designed to provide and control the proper environment in the MCR and other areas within the control room envelope (CRE) as defined in Chapter 6, Section 6.4. The MCR HVAC system complies with:

- 10 CFR 50, Appendix A, GDC 2,3,4,19
- 10 CFR 50.63
- RGs, 1.52, 1.78, 1.155, 1.196, 1.197
- ANSI/ANS 51.1, 59.2
- ASME N509, N510, AG-1
- IEEE 323, 344, 603

9.4.1.1 Design Bases

9.4.1.1.1 Safety Design Bases

The MCR HVAC System is designed to:

- Exclude entry of airborne radioactivity into the CRE and remove radioactive material from the CRE environment such that radiation dose to MCR personnel is within the GDC 19 (10 CFR 50, Appendix A).
- Support and maintain CRE habitability and permit personnel occupancy and proper functioning of instrumentation during normal and design basis accidents, assuming a single active failure.
- Withstand the effects of adverse environmental conditions.
- Withstand the effects of tornadoes and tornado missiles.
- Withstand the effects of seismic events. The MCR HVAC system equipment and the associated ductwork are designed to seismic category I requirements.
- Provide the MCR personnel protection by detecting and preventing the introduction of smoke into the CRE by automatically aligning the system to the emergency isolation mode (Chapter 6, Section 6.4).
- Automatically switch from normal operating mode to emergency pressurization mode upon the MCR isolation signal (Chapter 7).
- Automatically switch from normal operating mode to the emergency isolation mode upon the detection of smoke in the outside air intakes (Chapter 6, Section 6.4).

The emergency filtration units are designed and constructed in accordance with ASME standard N509 (Ref. 9.4.8-1), AG-1 (Ref. 9.4.8-2) and with the recommendations of RG 1.52 (Ref. 9.4.8-3).

Proper MCR personnel protection against toxic gases is described in Chapter 6, Section 6.4.

9.4.1.1.2 Power Generation Design Bases

The MCR HVAC System is designed to:

- Maintain the CRE under proper ambient conditions (Table 9.4-1) to assure personnel comfort during normal operation and to support the continuous operation of the plant control and instrumentation equipment and components.

- Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system components to assure proper equipment function and reliability and system availability.

The MCR HVAC System stops for one hour after SBO occurs until alternate ac gas turbine generator restores power. However, all Class 1E cabinets are designed to keep their integrity during loss of a HVAC system (Chapter 8, Section 8.4).

9.4.1.2 System Description

The MCR HVAC system is shown in Figure 9.4.1-1 and system equipment and components design data are presented in Table 9.4.1-1. The COL Applicant is to determine the capacity of heating coil that are affected by site specific conditions. The MCR HVAC system consists of two redundant 100% emergency filtration units and four 50% capacity air handling units, two 100% toilet/kitchen exhaust fans, one 100% smoke purge fan, ductwork, associated damper and instrumentation and control. The air handling units are connected to a common overhead air distribution ductwork system.

Any two of the four 50% capacity air handling units have the capacity to satisfy the operating requirements of the CRE during normal and design basis accidents. The outside air intakes, exhaust line and smoke purge line are provided with tornado missile protection grids and tornado depressurization protection dampers. The CRE is also served by two 100% capacity toilet/kitchen exhaust fans and one smoke purge fan. Non-safety related electric in-duct heaters are located in the duct branches leading to the MCR.

Each of the 50% capacity air handling units is classified as equipment class 3, seismic category I and consists of, in the direction of airflow, a low efficiency pre-filter, a high efficiency filter, an electric heating coil, an ASME Section III chilled water cooling coil, and a supply fan. Each air-handling unit is provided with isolation dampers, MCR air handling unit inlet and outlet damper, at the inlet and outlet.

Each of the 100% capacity emergency filtration units is classified as equipment class 3, seismic category I and consists of, in the direction of airflow, a high efficiency filter, an electric heating coil, a HEPA filter, a charcoal adsorber, a high efficiency filter and a supply fan. Each emergency filtration unit is provided with isolation dampers, MCR emergency filtration air intake, air return and fan outlet damper, at the inlet and outlet.

Upon the MCR high temperature, the chilled water control valve for the activated air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon the electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

Redundant leak-tight dampers, MCR air intake, toilet/kitchen exhaust line and smoke purge line isolation damper, are located in series in the outside air intake line and in each duct serving non-safety related systems such as the toilet/kitchen exhaust system and the smoke purge system that penetrates through the CRE boundary to provide CRE isolation during design basis accidents.

All duct penetrations in fire walls are protected by fire dampers to prevent the spread of fire from an affected area to the adjacent redundant component areas.

9.4.1.2.1 Normal Operation Mode

During the normal operation mode, the MCR HVAC system is operated without the operation of the emergency filtration units. Two of the four 50% capacity air handling units operate, while the other two units are kept in standby. Upon energizing the selected air handling units the following is to take place:

- The MCR outside air intake isolation dampers open.
- Selected air handling units inlet and outlet dampers open and their supply air fans start.
- The MCR toilet/kitchen exhaust line isolation dampers open and the associated non-safety toilet/kitchen exhaust fan starts.
- During the normal operation mode, the selected air handling units run on a fixed outside airflow sufficient to provide make-up to maintain CRE at a slightly positive pressure with regard to the adjacent area.
- Each air handling unit discharge air temperature is controlled by the MCR air handling unit inlet temperature controller that modulates the position of the chilled water control valve.
- The electric heating coil in each air handling unit is controlled by the MCR air handling unit inlet air temperature controller that modulates the electric heating coil output. The heating coil is automatically de-energized upon air handling unit loss of airflow.
- Non-safety electric in-duct heaters are energized upon sensing airflow and a call for heating from the local room thermostat.
- Low airflow condition in any one of the activated air handling units alarms in the MCR.
- High differential pressure across the filter bank in the activated air handling units annunciates an alarm, alerting the plant personnel to a dirty filter that needs to be replaced.
- When air handling units are stopped all dampers and chilled water control valves revert to their fail position.

9.4.1.2.2 Emergency Operation Mode

9.4.1.2.2.1 Pressurization Mode

Upon receipt of the MCR isolation signal (Chapter 7), the MCR HVAC system is to automatically switch to pressurization mode by initiating the following control functions:

- The toilet/kitchen exhaust line and smoke purge line isolation dampers revert to the close position.
- The toilet/kitchen exhaust fans and smoke purge fan automatically shut down or remain in the shutdown status.
- The operating air handling units continue to run and the standby air handling units will start.
- All return air dampers of all air handling units remain in the open position allowing recirculation.
- Both emergency filtration units automatically start, their isolation dampers open, and their Class 1E electric heating coils are energized so that the air entering the charcoal adsorber has a relative humidity below 70%, which assures adsorption efficiency.
- The energized emergency filtration units continue to run to remove the airborne radioactivity from the CRE ambient air prior to circulation back to the CRE through the operating air handling units.
- Following automatic initiation of the emergency operation, two of the air handling units and one of the emergency filtration units may be manually de-energized and placed on standby status.

9.4.1.2.2.2 Isolation Mode

If the smoke detectors located in the outside air intake detect the presence of the smoke, they activate an alarm in the MCR. The MCR HVAC system will be automatically switched to the isolation mode and the following is to take place:

- MCR outside air intake isolation dampers, toilet/kitchen exhaust line isolation dampers and smoke purge line isolation dampers revert to the close position.
- The toilet/kitchen exhaust fans and smoke purge fan automatically shut down or remain in the shutdown status.
- The operating air handling units continue to run and the standby air handling units will start.

- Following automatic initiation of emergency isolation operation, two of the air handling units may be manually de-energized and placed on standby status.

9.4.1.2.3 Smoke Purge Operation Mode

If the smoke detectors located in the supply and return air ducts and the area smoke detectors in the CRE detect the presence of smoke, the air handling units automatically shut down and an alarm is annunciated in the MCR. The MCR operator manually initiates the smoke purge operation to line up the selected air handling units for once through operation and starts the smoke purge fan. Smoke purge operation can only be used, when the emergency operation mode is not in effect. During smoke purge operation, the emergency filtration units do not operate and their isolation dampers remain closed. At the initiation of the smoke purge operation, the following is to take place:

- The activated air handling units are lined-up for 100% outside air and their temperature control system is overridden.
- The redundant air intake isolation dampers open to allow for 100% outside airflow.
- The smoke purge line isolation dampers open and the smoke purge fan start.
- The chilled water cooling coil for the activated air handling units is automatically positioned for full chilled water flow to avoid the possibility of freeze-up during low outdoor ambient temperatures.

9.4.1.3 Safety Evaluation

The continuous operation of the MCR HVAC system is assured by the physical separation of the redundant air handling units and components. All system equipment and components, with the exception of the toilet/kitchen exhaust and smoke purge fans and the in-duct heater electric heating coils, are classified as equipment class 3, seismic category I.

In the event of a design basis accident coincident with a LOOP, the air handling units and emergency filtration units are powered from their respective Class 1E power supplies to ensure system operation.

Redundant equipment and components are powered by separate Class 1E buses. The air handling units are served by the essential chilled water system. Failure of a single active component in one air handling unit cannot result in complete loss of heating or cooling of the CRE.

The MCR HVAC system is capable of maintaining the CRE air temperature and relative humidity within the specified limits (Table 9.4-1) under abnormal plant operation.

Each of the two redundant safety-related emergency filtration units is sized to assure that the MCR operator's radiological dose shall not exceed the limits set by GDC 19. The MCR operator doses are calculated in accordance with the methodology and accidents identified in RG 1.195 (Ref. 9.4.8-4) or 1.183 (Ref. 9.4.8-5) and inleakage value as determined using RG 1.197 (Ref. 9.4.8-6).

The MCR emergency filtration units are engineered safety features that are designed as a part of the fission product removal system.

Redundant safety-related Class 1E radiation monitors are located in the outside air intake duct to automatically switch the MCR HVAC system from the normal operation mode to the emergency pressurization mode upon detection of a radiological level higher than a predetermined value. The habitability of the MCR following design basis accidents is further described in Chapter 6, Section 6.4.

In the event of fire and smoke presence in the CRE, smoke detectors alarms in the MCR. If required, the operator can initiate the smoke purge mode when the emergency mode is not in effect.

System's air supply and exhaust fan housings are designed to resist penetration of internally generated missiles in the event of a fan rotor failure.

The MCR HVAC system equipment and components are protected from tornado-generated missiles by their location inside a seismic category I structure.

The MCR HVAC system's outside air intakes and exhaust outlets are protected from tornado-generated missiles by specially designed protective gratings.

The adverse effects associated with tornado depressurization of the outside air intakes and exhaust outlets are prevented by the specially designed tornado dampers located at the outside air intakes and exhaust outlets.

9.4.1.4 Testing and Inspection Requirements

The MCR HVAC system is provided with adequate instrumentation, temperature, flows, and differential pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

Preoperational testing of the MCR HVAC system is performed as described in Chapter 14, Verification Programs, to verify that system is installed in accordance with applicable programs and specifications. The air handling unit airflows are balanced to provide proper air mixing and uniform temperature throughout the CRE.

During normal operation, the standby air handling units are periodically tested for operability or, alternatively, placed in service in place of the train which had been operating.

During normal operation, the filtration units are periodically tested for operability.

The MCR HVAC system equipment and components are provided with proper access for initial and periodic inspections and maintenance during normal operation.

Air handling units are factory tested in accordance with Air Movement and Control Association standards. Air filters are tested in accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers standards. Cooling coils are hydrostatically tested in accordance with ASME Section III (Ref. 9.4.8-7) and their performance is rated in accordance with the Air Conditioning and Refrigeration Institute standards.

Air distribution ductwork is leak-tested in accordance with the Sheet Metal and Air Conditioning Contractors' National Association and American Society of Mechanical Engineers, ASME N510 (Ref. 9.4.8-8).

Emergency flirtation units are factory tested for housing leakage, filter bypass leakage and airflow performance. Periodically and subsequent to each filter or adsorber material replacement, the unit is inspected and tested in-place in accordance with the requirements of RG 1.52 (Ref. 9.4.8-3), ASME N510 and ASME AG-1 (Ref. 9.4.8-2). The HEPA filters are checked periodically and alarmed in the MCR on high differential pressure. Charcoal adsorber samples are tested for efficiency in an independent laboratory in accordance with RG 1.52 and ASTM D 3803 (Ref. 9.4.8-9).

Inservice test program requirements, including inleakage testing, are described in Chapter 16, "Technical Specifications".

The isolation dampers will be inspected periodically and the damper seats are replaced as required.

9.4.1.5 Instrumentation Requirements

Instrumentation for controlling and monitoring the MCR HVAC system, including the emergency filtration unit, meets the requirements of RG 1.52, ANSI/ANS 51.1 (Ref. 9.4.8-10), IEEE Std. 603 (Ref. 9.4.8-11), IEEE Std. 323 (Ref. 9.4.8-12), and IEEE Std. 344 (Ref. 9.4.8-13).

The following instrumentation is available in the MCR.

- Indication of the status of air handling and emergency filtration units.
- Indication of the status of MCR air intake, toilet/kitchen exhaust line and smoke purge line isolation dampers.
- Indication of the MCR envelope differential pressure.
- Indication of the MCR emergency filtration unit electric heating coil outlet temperature and high temperature alarm.
- Indication of the MCR emergency filtration unit charcoal adsorber outlet air temperature and high, high-high temperature alarm.
- MCR air handling unit electric heating coil outlet high temperature alarm.

- MCR high temperature alarm.
- MCR emergency filtration unit total differential pressure alarm.
- MCR emergency filtration unit HEAP filter differential pressure alarm.
- MCR emergency filtration unit outlet airflow rate low and high alarm.
- MCR air handling unit outlet airflow rate low alarm.
- Smoke detection.
- Alarm on airborne radioactivity detection at the outside air intake.

9.4.2 Spent Fuel Pool Area Ventilation System

Ventilation for the spent fuel pool area and other areas is addressed in Section 9.4.3.

9.4.3 Auxiliary Building Ventilation System

The auxiliary building ventilation system is designed to provide proper environmental conditions during normal plant operation throughout all areas of the A/B, R/B, PS/B and AC/B, except for the CRE, and Class 1E electrical rooms.

Other HVAC systems serving areas in the R/B are discussed in other sections; The MCR HVAC system is discussed in Section 9.4.1 and the Class 1E electrical room HVAC system is discussed in Section 9.4.5.

During design basis accidents, HVAC systems serving safeguard components, emergency feedwater pump and safety-related component areas are discussed in Section 9.4.5.

The auxiliary building ventilation system includes:

- Auxiliary building HVAC system
- Non-Class 1E electrical room HVAC system
- Main steam/feedwater piping area HVAC system
- Technical support center (TSC) HVAC system

9.4.3.1 Design Bases

The auxiliary building ventilation system is classified as a non-safety related, non-seismic category I system, with the exception of isolation damper assemblies. However, required ductwork will be supported to prevent adverse interaction with other safety-related systems during a seismic event.

9.4.3.1.1 Safety Design Bases

9.4.3.1.1.1 Auxiliary Building HVAC System

The auxiliary building HVAC system is designed to satisfy the following design bases.

- The auxiliary building HVAC system has the capability to close the safety-related, seismic category I isolation dampers during a design basis accident.

- The safety-related isolation damper assemblies isolate the penetration and the safeguard component areas, and the vent stack from the auxiliary building HVAC system.

- The isolation damper assemblies are connected to separate electrical safety buses that satisfy the single active failure criteria.

- During a design basis accident, the penetration and the safeguard component areas are isolated in order that operation of the annulus emergency exhaust system maintains a negative pressure and mitigates the release of airborne fission product to the atmosphere (Section 9.4.5).

- During a design basis accident, the auxiliary building HVAC system discharge duct is isolated in order to prevent backflow of discharge air from the annulus emergency exhaust system into the auxiliary building HVAC system.

- The isolation damper assemblies are designed to withstand the effect of adverse environmental conditions.

9.4.3.1.1.2 Non-Class 1E Electrical Room HVAC System

There are no safety design bases for the non-Class 1E electrical room HVAC system.

9.4.3.1.1.3 Main Steam/Feedwater Piping Area HVAC System

There are no safety design bases for the main steam/feedwater piping area HVAC system. However, required ductwork will be supported to prevent adverse interaction with other safety-related systems during a seismic event.

9.4.3.1.1.4 Technical Support Center (TSC) HVAC System

There are no safety design bases for the TSC HVAC system.

9.4.3.1.2 Power Generation Design Bases

9.4.3.1.2.1 Auxiliary Building HVAC system

The auxiliary building HVAC system is designed to satisfy the following design bases:

- Provide and maintain proper operating environment within the required temperature range (Table 9.4-1) for areas housing mechanical and electrical equipment within the A/B, R/B, PS/B and AC/B during normal plant operation.

- Keep dose levels due to the airborne radioactivity below the allowable values set by 10 CFR 20 by supplying and exhausting sufficient airflow.

- Control exhaust fan airflow continuously and automatically at a predetermined value to maintain a slightly negative pressure in the controlled areas relative to the outside atmosphere and minimize exfiltration from the radiological controlled areas during normal plant operation.

- Maintain airflow from areas of low radioactivity to areas of potentially higher radioactivity.

- Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system's equipment and components to assure proper equipment function and reliability and system availability.

9.4.3.1.2.2 Non-Class 1E Electrical Room HVAC System

The non-Class 1E electrical room HVAC system is designed to satisfy the following design bases:

- Provide and maintain the room ambient conditions within the required temperature range (Table 9.4-1) to support the continuous operation of the electrical equipment and components.

- Maintain the hydrogen concentration below 2% by volume of battery room.

- Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system equipment and components to assure proper equipment function, reliability and system availability.

9.4.3.1.2.3 Main Steam/Feedwater Piping Area HVAC System

The main steam/feedwater piping area HVAC system is designed to satisfy the following design bases:

- Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) suitable to support the operation and assure the reliability of the electrical and mechanical components.

- Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system equipment and components to assure proper equipment function and reliability and system availability.

9.4.3.1.2.4 Technical Support Center (TSC) HVAC System

The TSC HVAC system is designed to satisfy the following design bases:

- Exclude entry of airborne radioactivity into the TSC envelope and remove radioactive material from the TSC envelope environment such that radiation doses to personnel are within the requirements of GDC 19 (10 CFR 50, Appendix A).
- Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) to assure personnel comfort and to support the operation of the control and instrumentation equipment and components.
- Support and maintain TSC habitability and permit personnel occupancy following plant emergency conditions.
- Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system components to assure proper equipment function and reliability and system availability.

9.4.3.2 System Description

9.4.3.2.1 Auxiliary Building HVAC System

The auxiliary building HVAC system is shown in Figure 9.4.3-1 and equipment and design data for the system are presented in Table 9.4.3-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. The auxiliary building HVAC system does not serve any safety function, with the exception of the safety-related isolation dampers such as penetration area supply and exhaust line isolation dampers, safeguard component area supply and exhaust isolation dampers and auxiliary building exhaust line isolation dampers. Therefore, the auxiliary building HVAC system is not safety-related or seismic category I qualified except for these damper assemblies.

The system is of a once through type, and consists of supply and exhaust air systems. The supply air system includes two auxiliary building air handling units, each is sized for 50% of the total system airflow and consists of, in the direction of airflow, a low efficiency pre-filter, a medium efficiency filter, a steam heating coil, a chilled water cooling coil, a supply fan and associated controls. The cooling coil of each air handling unit is supplied with chilled water from the non-essential chilled water system (Section 9.2.7). Both air handling units are connected to a common air distribution ductwork through discharge air isolation dampers.

The exhaust airflows from the served areas are drawn through air ductwork, by three auxiliary building exhaust fans, each sized for 50% of the total system airflow. Each exhaust fan is equipped with an isolation damper and discharge ductwork leading to the vent stack.

The penetration of the penetration and safeguard component area and the discharge duct of the auxiliary building HVAC system are provided with safety-related isolation dampers that automatically close upon receipt of the ECCS actuation signal. The penetration and safeguard component area supply and exhaust line isolation damper assemblies, and the auxiliary building HVAC system exhaust line isolation damper assemblies are equipment class 2, seismic category I.

During normal plant operation, the two air handling units and two exhaust fans are placed into operation. Upon energizing the air handling unit, its isolation dampers automatically open. Upon energizing the two exhaust fans, their airflow is continuously and automatically controlled at a predetermined value to maintain a slightly negative pressure in the controlled areas.

In summer, the outside supply airflow is cooled by the air handling unit's chilled water cooling coil. Upon supply air temperature rise, as sensed by thermostats located in the supply air duct, the air handling unit's chilled water control valves allow for an increase in the chilled water flow through the cooling coils.

In winter, the supply air is heated by the air handling unit steam heating coil to maintain the supply air temperature at the design set point. Supplemental heating with local unit heaters or in-duct heaters is provided in areas with higher heat loss, due to their proximity to exterior walls.

Airborne radioactivity is monitored inside the exhaust air duct from the fuel handling area, penetration and safeguard component area, R/B controlled area, A/B controlled area, and sampling/laboratory area (AC/B controlled area). An alarm will be actuated in the MCR when the radiation levels exceed a predetermined value. If the high airborne radioactivity is detected, the supply and exhaust duct isolation dampers of high airborne radioactivity detected area are manually closed.

Smoke detectors located in the supply and exhaust air ducts detect the presence of smoke and activate an alarm in the MCR. If the smoke is detected in the supply or exhaust ducts, the auxiliary building HVAC system is manually shutdown.

9.4.3.2.2 Non-Class 1E Electrical Room HVAC System

The non-Class 1E electrical room HVAC system is shown in Figure 9.4.3-2 and equipment design data is presented in Table 9.4.3-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. The non-Class 1E electrical room HVAC system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The non-Class 1E electrical room HVAC system includes two 50% capacity air handling units, two 50% capacity return air fans, and two 100% capacity battery room exhaust fans. Each air handling unit consists of, in the direction of airflow, a low efficiency pre-filter, a high efficiency filter, a steam heating coil, a chilled water cooling coil, a supply fan, and associated controls. The cooling coil of the air handling unit is supplied with chilled water from the non-essential chilled water system (Section 9.2.7). Return air from the electrical room is drawn through the return air ductwork by the system's return air fans. Both air handling units are connected to a common air distribution ductwork through their discharge air isolation dampers.

Upon a supply air temperature rise, the temperature controller modulates the chilled water control valve to maintain the supply air design temperature. The steam heating coil maintains the room temperature within the design range (Table 9.4-1). Supplemental heating with unit heaters or in-duct heaters is provided in rooms with higher heat loss.

Smoke detectors located in the supply and return air ducts detect the presence of smoke and automatically shut down the system and activate an alarm in the MCR.

Upon detection of smoke, the MCR operator manually initiates the smoke purge operation. At the initiation of the smoke purge operation, the system is lined-up for 100% outside air and their normal temperature control system is overridden. The chilled water control valve of the air handling unit cooling coil is automatically positioned for full chilled water flow to avoid the possibility of freeze-up during low outdoor ambient temperatures.

The volume of the air exhausted from the battery room by the battery room exhaust fans is sufficient to maintain the hydrogen concentration well below 2% by volume of battery room.

During normal plant operation coincident with a LOOP, the non-Class 1E electrical room HVAC system is served by the alternate ac power source.

9.4.3.2.3 Main Steam/Feedwater Piping Area HVAC System

The main steam/feedwater piping area HVAC system is shown in Figures 9.4.3-3 and equipment design data is presented in Table 9.4.3-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. The system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The main steam/feedwater piping area HVAC system includes four 50% capacity air handling units, each pair of the four 50% capacity air handling units services one of two main steam/feedwater piping areas. Each air handling unit consists of, in the direction of airflow, a low efficiency filter, an electric heating coil, a chilled water cooling coil, a supply fan, and associated controls. The cooling coil of the air handling unit is supplied with chilled water from the non-essential chilled water system (Section 9.2.7). A temperature controller modulates the respective chilled water control valve to maintain the area's design temperature.

9.4.3.2.4 Technical Support Center (TSC) HVAC System

The TSC HVAC system is shown in Figure 9.4.3-4 and equipment design data is presented in Table 9.4.3-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. The system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The TSC HVAC system consists of one 100% capacity TSC air handling unit and one 100% capacity TSC emergency filtration unit, both connected to a common air distribution ductwork system. A 100% capacity TSC toilet/kitchen exhaust fan is provided to exhaust air from the TSC toilet/kitchen facilities.

The air handling unit consists of, in the direction of airflow, a low efficiency filter, a high efficiency filter, an electric heating coil, a chilled water cooling coil, a supply fan, and associated controls. The cooling coil of the air handling unit is supplied with chilled water from the non-essential chilled water system (Section 9.2.7).

The emergency filtration unit consists of, in the direction of airflow, a high efficiency filter, an electric heating coil, a HEPA filter, a charcoal adsorber, a high efficiency filter, a supply fan, and associated controls.

During normal operation, the TSC HVAC system is operating without the operation of the emergency filtration unit. The TSC HVAC system runs on a fixed outside air flow, sufficient to provide make-up air to prevent TSC envelope infiltration leakage.

A temperature controller modulates the chilled water control valve or the electric heater to maintain the room design temperature. Smoke detection in the ductwork automatically shuts down the system and set off an alarm in the MCR.

The TSC HVAC system automatically switches to emergency operation upon detection of radioactivity in the outside air intake. The outside air to the air handling unit is isolated and the emergency filtration unit automatically starts. The emergency filtration unit isolation dampers open and its electric heating coil is energized to reduce the relative humidity of the air entering the charcoal adsorber to below 70%.

The emergency filtration unit will continue to run to remove the airborne radioactivity from the TSC ambient air prior to circulation back to the TSC through the air handling unit.

TSC pressurization is automatically established and maintained by diverting and introducing the minimum outside airflow to the TSC envelope through the emergency filtration unit.

During normal plant operation coincident with a LOOP, the TSC HVAC system is served by the alternate ac power source.

9.4.3.3 Safety Evaluation

9.4.3.3.1 Auxiliary Building HVAC System

Other than the safety-related seismic category I isolation damper assemblies of penetration and safeguard component area supply and exhaust line and auxiliary building HVAC system exhaust line, the auxiliary building HVAC system has no safety-related function and therefore requires no safety evaluation.

Upon receipt of the ECCS actuation signal, the penetration and the safeguard component areas are automatically isolated by the equipment class 2, seismic category I isolation dampers in order that operation of the annulus emergency exhaust system maintains a negative pressure and mitigates the release of airborne fission products to the atmosphere.

Upon receipt of the ECCS actuation signal, the auxiliary building HVAC system discharge duct is automatically isolated by the equipment class 2, seismic category I isolation dampers in order to prevent backflow of discharge air from the annulus emergency exhaust system into the auxiliary building HVAC system.

9.4.3.3.2 Non-Class 1E Electrical Room HVAC System

The non-Class 1E electrical room HVAC system has no safety-related function and therefore requires no safety evaluation.

The battery room is ventilated with sufficient supply and exhaust airflow during all modes of operation to limit the hydrogen concentration below 2% by volume of battery room. A buck up battery exhaust fan starts automatically upon detection of the running fan's airflow failure.

9.4.3.3.3 Main Steam/Feedwater Piping Area HVAC System

The main steam/feedwater piping area HVAC system has no safety-related function and therefore requires no safety evaluation.

9.4.3.3.4 Technical Support Center (TSC) HVAC System

The TSC HVAC system has no safety-related function and therefore requires no safety evaluation.

9.4.3.4 Inspection and Testing Requirements

The auxiliary building ventilation system is designed to facilitate in-service inspections, and on-line testing of components and controls in accordance with the following:

The system is provided with adequate instrumentation, temperature, flows, and differential pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

Preoperational testing of the auxiliary building ventilation system is performed as described in Chapter 14, Verification Programs, to verify that system is installed in accordance with applicable programs and specifications. All HVAC system airflows are balanced in conformance with the design flow, path flow capacity, and proper air mixing temperature throughout the A/B, R/B, PS/B, and AC/B.

The system equipment and components are provided with proper access for initial and periodic inspection and maintenance during normal operation.

Air handling units are factory-tested in accordance with Air Movement and Control Association Standards. Air filters are tested in accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers Standards. Cooling coils are hydrostatically tested in accordance with ASME, Section VIII (Ref. 9.4-14) and their performance is rated in accordance with the Air Conditioning and Refrigeration Institute Standards.

Air distribution ductwork is leak-tested in accordance with the Sheet Metal Air Conditioning Contractors' National Association.

System instruments are periodically calibrated and automatic controls are tested for activation at the design setpoints, in conformance with the design sequence of operation at all system operating modes.

9.4.3.4.1 Auxiliary Building HVAC System

In addition to the general requirements in Subsection 9.4.3.4, the auxiliary building HVAC system safety-related isolation dampers are inspected periodically and the damper seats are replaced as required.

9.4.3.4.2 Non-Class 1E Electrical Room HVAC System

In addition to the general requirements in Subsection 9.4.3.4, battery fan operation is tested to insure automatic operation of the standby fan upon the airflow failure of the activated fan.

9.4.3.4.3 Main Steam/Feedwater Piping Area HVAC System

The general requirements of Subsection 9.4.3.4 apply.

9.4.3.4.4 Technical Support Center (TSC) HVAC System

In addition to the general requirements in Subsection 9.4.3.4, the emergency flirtation unit is factory-tested for housing leakage, filter bypass leakage, and airflow performance. Periodically and subsequent to each filter or adsorber material replacement, the unit is inspected and tested in-place in accordance with the requirements of RG 1.140 (Ref. 9.4.8-15), ASME N510 (Ref. 9.4.8-8) and ASME AG-1 (Ref. 9.4.8-2). The HEPA filter is checked periodically. Charcoal adsorber samples are tested for efficiency in an independent laboratory in accordance with RG 1.140 and ASTM D 3803 (Ref. 9.4.8-9).

9.4.3.5 Instrumentation Requirements

9.4.3.5.1 Auxiliary Building HVAC System

The instrumentation serving the auxiliary building HVAC system includes:

- Indication of outlet airflow of air handling units and exhaust fan, and airflow failure alarms.
- Alarm on high radioactivity in the exhaust duct.
- Alarm on smoke detection in supply and exhaust duct.

- Indication of differential pressure across a filter bank in the air handling units.
- Indication of air handling unit inlet and outlet air temperature.

9.4.3.5.2 Non-Class 1E Electrical Room HVAC System

The instrumentation serving the non-Class 1E electrical room HVAC system includes:

- Indication of outlet airflow of air handling units and battery room exhaust fans and airflow failure alarms.
- Alarm on smoke detection in supply and return duct.
- Indication of differential pressure across a filter bank in the air handling units.
- Indication of air handling unit inlet and outlet air temperature.

9.4.3.5.3 Main Steam/Feedwater Piping Area HVAC System

The following instrumentation serving the main steam/feedwater piping area HVAC System includes:

- Indication of outlet airflow of air handling units and low airflow alarm.
- Indication of differential pressure across a filter bank in the air handling units.
- Indication of air handling unit inlet and outlet air temperature.
- Alarm on air handling unit electric heating coil outlet temperature.

9.4.3.5.4 Technical Support Center (TSC) HVAC System

The following instrumentation is available in the MCR.

- Indication of the status of air handling and emergency filtration units.
- Indication of the status of TSC air intake, toilet/kitchen exhaust line isolation dampers.
- Indication of the TSC envelope differential pressure.
- Indication of the TSC emergency filtration unit electric heating coil outlet temperature and high temperature alarm.
- Indication of the TSC emergency filtration unit charcoal adsorber outlet air temperature and high, high-high temperature alarm.
- TSC air handling unit electric heating coil outlet high temperature alarm.

- TSC high temperature alarm.
- TSC emergency filtration unit total differential pressure alarm.
- TSC emergency filtration unit HEAP filter differential pressure alarm.
- TSC emergency filtration unit outlet airflow rate low and high alarm.
- TSC air handling unit outlet airflow rate low alarm.
- Alarm on smoke detection.
- Alarm on airborne radioactivity detection at the outside air intake.

9.4.4 Turbine Building Area Ventilation System

The turbine building area ventilation system maintain a suitable environment for the operation of equipment in turbine building. This system includes the following:

- General mechanical areas ventilation system
- Electrical equipment areas heating, ventilation, and air conditioning (HVAC) system

9.4.4.1 Design Basis

9.4.4.1.1 Safety Design Bases

The turbine building area is not expected to include airborne radioactive contamination. Safety-related equipment is not located in this area. Therefore, the turbine building area ventilation system does not serve any safety-related function, and thus, has no safety design bases.

9.4.4.1.2 Non-safety Power Generation Design Bases

The turbine building area ventilation systems has following design bases:

- The general mechanical areas ventilation system is design to maintains a suitable environment in the general mechanical areas during normal operating condition.
- In the event of the presence of smoke, the general mechanical areas ventilation system purges the smoke in the general mechanical areas.
- The electrical equipment areas HVAC system maintains a suitable environment in the electrical equipment areas during normal operating, loss of offsite power and SBO conditions.

- In the event of the presence of smoke, the electrical equipment areas HVAC system purges the smoke in electrical equipment areas.
- The electrical equipment areas HVAC system maintains the hydrogen concentration well below 2% by volume in battery room.

Refer to the design temperature and relative humidity for the turbine building area in Table 9.4-1.

9.4.4.2 System Description

The turbine building area ventilation system is shown on Figure 9.4.4-1. Design data for the principal systems components are presented in Table 9.4.4-1.

9.4.4.2.1 General Mechanical Areas Ventilation System

The general mechanical areas ventilation system consists of turbine building roof ventilation fans, basement area supply fan, basement area exhaust/circulating fan, wall louvers and sampling room HVAC system. This system is once through using outdoor air for cooling.

The system is thermostatically controlled by area temperature controllers to start or stop the roof fans and open or close the wall louver dampers to maintain the design temperature limits. Within the turbine building are areas with exterior walls.

In the event of the presence of smoke, selected roof fans are actuated to purge the smoke.

A supply air louver is not installed in the basement area. Therefore, outdoor air is to be provided to this area by a basement area supply fan with associated distribution ductwork, to maintain the proper design temperature limits. This area has a local thermostat and temperature controller to adjust airflow by controlling the fan in response to the area temperature. A basement area exhaust/circulating fan is provided between the basement and the first floor to keep air circulating and to exhaust hot air from the basement.

The sampling room is a stand-alone area in the general mechanical areas and room temperatures is be maintained by split unit type sampling room HVAC system.

9.4.4.2.2 Electrical Equipment Areas HVAC System

The electrical equipment areas HVAC system consists of two 100% non-Class 1E electrical room air handling units and non-Class 1E battery rooms common exhaust system.

This HVAC system serves to the electrical equipment area. This area is divided in two floors(1FL and 2FL). Each floor consists of non-Class 1E battery room and non-Class 1E electrical room. Electrical room including permanent bus backed up by the alternate ac power source.

Each floor is served by an electrical equipment air handling unit. The air handling unit consists of an air intake low efficiency pre-filter, high efficiency final filter, electric heating coil, chilled water cooling coil, supply fan, return air fan, and associated controls. The cooling coil of each air handling unit is supplied with chilled water from the non-essential chilled water system (Subsection 9.2.7.2). The air handling unit automatically uses outside air or chilled water cooling coil or the electric heating coil to maintain room temperatures within the design temperature limits.

The battery rooms common exhaust system has two 100% exhaust fans, with one in standby. This system maintains the hydrogen concentration well below 2% by volume in both battery rooms.

Smoke detectors located in each floor detect the presence of smoke and automatically shutdown the air handling unit and alarm in the main control room. As soon as the source of smoke is determined to be from outside or a fire inside the room and the fire has been extinguished, the system may be manually placed into the smoke purge mode of operation from the control room. The chilled water cooling coil of the air handling units is automatically positioned for full chilled water flow to avoid the possibility of freezing during low outside ambient temperatures.

9.4.4.3 Safety Evaluation

The turbine building area ventilation system dose not serve any safety-related function, and thus, requires no safety evaluation.

9.4.4.4 Inspection and Testing Requirements

Air handling equipment is factory tested in accordance with Air Movement and Control Association Standard. Air filters are tested in accordance with American Society of Heating, Refrigerating, and Air Conditioning Engineers Standard. Cooling coils are tested in accordance with Air Conditioning and Refrigeration Institute Standard.

- Each component in the turbine building area ventilation system is provided with proper access for initial and periodic testing and inspection during normal operation.

- Each system and component is operated and adjusted to design operating conditions during the plant preoperational test program.

- System airflows are to be balanced to obtain design airflows that will maintain the design temperature limits throughout the served areas.

- Air handling equipment is factory tested in accordance with Air Movement and Control Association Standard (Ref. 9.4.8-16, Ref. 9.4.8-17, Ref. 9.4.8-18). Air filters are tested in accordance with American Society of Heating, Refrigerating, and Air Conditioning Engineers Standard (Ref. 9.4.8-19, Ref. 9.4.8-20). Cooling coils are tested in accordance with Air Conditioning and Refrigeration Institute Standard (Ref. 9.4.8-21, Ref. 9.4.8-22).

- System instruments and automatic controls are to be calibrated to insure proper set points and confirm proper sequence of operation at all system operating modes.

- The system is operated and tested initially with regard to flow paths, flow capacity and component operability.

9.4.4.5 Instrumentation Requirements

The turbine building area ventilation system is provided with a non-safety monitoring and indication system to annunciate abnormal operating conditions such as loss of airflow, high temperature return air, low temperature of return air, high filter differential pressure, operating status of fans. Malfunctions of the system and detection of the smoke are alarmed in MCR.

9.4.5 Engineered Safety Feature Ventilation System

The engineered safety feature (ESF) ventilation system is designed to provide the proper environmental conditions within plant areas that house engineered safety feature equipment. The system function is to support and assure the safe and continuous operation of the ESF equipment during normal and emergency operating conditions. The ESF ventilation system complies with 10 CFR 50, Appendix A, GDC 2, 4, and 60.

The ESF ventilation system includes:

- Annulus Emergency Exhaust System

- Class 1E Electrical Room HVAC System

- Safeguard Component Area HVAC System

- Emergency Feedwater Pump Area HVAC System

- Safety Related Component Area HVAC System

The COL Applicant is to provide a system information and flow diagram of ESW pump area ventilation system if the ESW pump area requires the ventilation system.

9.4.5.1 Design Bases

9.4.5.1.1 Safety Design Bases

The ESF ventilation system is designed to satisfy the following design bases.

- The ESF ventilation system is classified as a safety-related and seismic category I system.

- Redundant ventilation systems are powered by separate safety related buses so that a failure of a single active component cannot result in loss of cooling for the served areas.

- The system is capable of performing the intended design functions assuming a single active component failure coincident with a LOOP.

- The system can withstand the effects of adverse environmental conditions.

- The system can withstand the effects of tornado depressurization and tornado-generated missiles.

9.4.5.1.1.1 Annulus Emergency Exhaust System

The annulus emergency exhaust system is designed to satisfy the following design basis.

- The emergency exhaust filtration units are designed and constructed in accordance with ASME standard N509 (Ref. 9.4.8-1), AG-1 (Ref. 9.4.8-2) and with the recommendations of RG 1.52 (Ref. 9.4.8-3).

- The system is designed to mitigate the consequences of postulated accidents by removing the airborne radioactive material that may leak from containment.

- The system remains functional during and after a design basis accident and have the capability to retain radioactive material after the system is taken out of service.

- The system maintains a negative pressure in the penetration and safeguard comportment areas relative to the adjacent areas (Chapter 6, Section 6.5.1).

9.4.5.1.1.2 Class 1E Electrical Room HVAC System

The Class 1E electrical room HVAC system is designed to satisfy the following design basis.

- Maintain proper operating environmental conditions within the Class 1E electrical rooms (Table 9.4-1) during normal and design basis accident.

- Maintain the hydrogen concentration below 2% by volume of Class 1E battery room.

9.4.5.1.1.3 Safeguard Component Area HVAC system

During normal plant operation, the safeguard component areas are served by the auxiliary building HVAC system (Section 9.4.3). During a design basis accident or LOOP, the safety-related redundant isolation dampers automatically isolate the supply and exhaust line of the auxiliary building HVAC system. The safeguard component area HVAC system is designed to satisfy the following design basis:

- Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) to support the operation of the control and instrumentation equipment and components in the individual safeguard component areas during a design basis accident or LOOP.

9.4.5.1.1.4 Emergency Feedwater Pump Area HVAC System

During normal plant operation, the emergency feedwater pump (motor-driven) areas are served by the auxiliary building HVAC system (Section 9.4.3), while the emergency feedwater pump (turbine-driven) areas are served by the emergency feedwater pump (turbine-driven) area air handling unit. The emergency feedwater pump area HVAC system is designed to satisfy the following design basis:

- Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) to support the operation of the control and instrumentation equipment and components in the individual emergency feedwater pump areas during a design basis accident or LOOP.

9.4.5.1.1.5 Safety Related Component Area HVAC System

During normal plant operation, the safety-related component areas are served by the auxiliary building HVAC system (Section 9.4.3). The safety-related component area HVAC system is designed to satisfy the following design basis:

- Provide and maintain proper environmental conditions within the required temperature range (Table 9.4-1) to support the operation of the control and instrumentation equipment and components in the individual safety related component areas during a design basis accident or LOOP.

9.4.5.1.2 Power Generation Design Basis

The ESF ventilation system is designed to satisfy the following design basis:

- Provide accessibility for adjustment and periodic inspection, maintenance and testing of the system equipment and components.

The Class 1E electrical room HVAC system stops within one hour after SBO occurs until alternate ac gas turbine generator restores power. However, all Class 1E cabinets are designed to keep their integrity during loss of a HVAC system (Chapter 8, Section 8.4).

9.4.5.2 System Description

9.4.5.2.1 Annulus Emergency Exhaust System

The annulus emergency exhaust system is an ESF system designed for fission product removal and retention. The system is shown in Figure 9.4.5-1 and the system equipment design data is presented in Table 9.4.5-1. The annulus emergency exhaust system consists of two redundant divisions, each sized to satisfy 100% capacity.

Each annulus emergency exhaust filtration unit consists of, in the direction of airflow, a high efficiency filter, a HEPA filter and a fan.

In the event of a LOCA, both trains are energized by the ECCS actuation signal. The annulus emergency exhaust system draws down the pressure of the penetration and safeguard component areas to a negative pressure of 0.25 in. wg with regard to the adjacent areas. Exhaust air is filtered and discharged into the vent stack and the penetration and safeguard component areas remains isolated from the auxiliary building HVAC system (Section 9.4.3).

9.4.5.2.2 Class 1E Electrical Room HVAC System

The Class 1E electrical room HVAC system is shown in Figure 9.4.5-2 and system equipment design data is presented in Table 9.4.5-1. The COL Applicant is to determine the capacity of heating coils that are affected by site specific conditions. The system consists of four redundant trains, each is sized to satisfy 100% of the cooling and heating demand of two trains, i.e., train A or B can provide cooling and heating for both trains A & B, and train C or D can provide cooling and heating for both trains C & D.

Each system includes a Class 1E electrical room air handling unit, a Class 1E electrical room return air fan, a Class 1E battery room exhaust fan, an outside air intake and exhaust outlets with a tornado missile protection grid and a tornado depressurization protection damper. All components are qualified as equipment class 3, seismic category I. The air handling unit of each system consists of, in the direction of airflow, a low efficiency filter, a high efficiency filter, an electric heating coil, an ASME Section III chilled water cooling coil, a supply fan, and associated controls. The cooling coil of each system's air handling unit is supplied with chilled water from the corresponding essential chilled water system (Section 9.2.7). Return air from the electrical room is drawn through the return air ductwork by the system's return air fans. Both air handling units are connected to a common air distribution duct through their discharge air isolation dampers.

Train pair A&B and train pair C&D, each is connected to a single air distribution system. The air distribution system is qualified in accordance with seismic category I requirements. Conditioned air is distributed to the following areas:

- Class 1E instrumentation and control (I&C) rooms
- Class 1E electrical rooms
- Class 1E uninterruptible power supply (UPS) rooms
- Class 1E Battery and battery charger rooms
- MCR/Class 1E electrical HVAC equipment rooms
- Remote shutdown console room
- Control rod drive mechanism (CRDM) cabinet room (non-safety)

- M-G set and M-G set panel rooms (non-safety)
- Leakage rate testing (LRT) room (non-safety)
- Reactor trip breaker room

The return air from these areas is drawn by the corresponding HVAC train through the seismic category I ductwork.

The volume of the air exhausted from battery rooms by the corresponding battery exhaust fans is sufficient to maintain the hydrogen concentration well below 2% by volume of battery room.

Rooms with high heat loss during the cold season are provided with non safety-related unit heaters or in-duct electric heaters in their supply air branches.

Upon the Class 1E electrical room high temperature, the chilled water control valve for the served air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon the electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

9.4.5.2.2.1 Normal Operation Mode

During normal plant operation, two of the Class 1E electrical room HVAC system trains are energized, while the other redundant equipments are placed on standby. Upon energizing the selected trains the following will take place:

- The selected train outside air intake isolation dampers, air handling unit outlet dampers, and return air fan inlet dampers open, and supply and return air fans start.
- The air temperature controller controls the design supply air temperature by modulating the electric heating coil capacity or the chilled water control valve.
- The in-duct electric heaters are energized upon sensing airflow and a demand for heating from the local room thermostat.
- When any HVAC train is de-energized all of its dampers and valves revert to their failsafe position.

9.4.5.2.2.2 Smoke Purge Operation

Upon detection of smoke, the smoke detectors located in the supply and return air ducts automatically shutdown the corresponding train and activate alarms in the MCR. The operator will manually initiate the smoke purge operation to line up the selected train for once through operation. At the initiation of the smoke purge operation the following is to take place:

- The activated trains line up for 100% outside air and their normal temperature control system is overridden.

- The chilled water cooling coil of the activated air handling unit is automatically positioned for full chilled water flow to avoid possibility of freeze-up during low outside ambient temperatures.

9.4.5.2.2.3 Emergency Operation Mode

Upon receipt of the ECCS actuation signal, the Class 1E electrical room HVAC system automatically switchs to emergency operation by initiating the following control functions:

- The operating trains continue to run and the standby trains start.

- The operating battery exhaust fans continue and the standby fans start.

- Following automatic initiation of emergency operation, two of the HVAC trains and two of the battery exhaust fans may be manually de-energized and placed on standby status.

9.4.5.2.3 Safeguard Component Area HVAC system

During normal plant operation, safeguard component areas are served by the auxiliary building HVAC system (Section 9.4.3). During a design basis accident or LOOP, the safeguard component areas are cooled by individual safeguard component area air handling units upon receipt of the high temperature signal.

Each air handling unit consists of, in the direction of airflow, an electric heating coil, a cooling coil, a supply fan and associated controls. The safeguard component area HVAC system is shown in Figure 9.4.5-3 and the equipment design data is presented in Table 9.4.5-1. The COL Applicant is to determine the capacity of heating coils that are affected by site specific conditions. The cooling coils are supplied with chilled water from the essential chilled water system (Section 9.2.7).

Upon safeguard component area high temperature, the chilled water cooling coil control valve for the corresponding air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

The air handling unit trains A, B, C and D provide 100% of the heating and cooling requirements of their associated equipment room.

9.4.5.2.4 Emergency Feedwater Pump Area HVAC System

During normal plant operation, emergency feedwater pump (motor-driven) areas are served by the auxiliary building HVAC system (Section 9.4.3). During a design basis accident or LOOP, the emergency feedwater pump (turbine-driven) areas are cooled by individual air handling units upon receipt of the high temperature signal. The turbine-driven emergency feedwater pump areas are cooled during normal plant operation and design basis accident by an independent air handling unit.

The emergency feedwater pump (motor-driven) area air handling unit consists of, in the direction of airflow, an electric heating coil, a cooling coil, a supply fan, and associated controls. The emergency feedwater pump (turbine-driven) area air handling unit consists of, in the direction of airflow, a low efficiency filter, an electric heating coil, a cooling coil, a supply fan, and associated controls. The emergency feedwater pump area HVAC system is shown in Figure 9.4.5-4 and the equipment design data is presented in Table 9.4.5-1. The COL Applicant is to determine the capacity of heating coils that are affected by site specific conditions. The cooling coils of the emergency feedwater pump area air handling units are supplied with chilled water from the essential chilled water system (Section 9.2.7).

Each of the air handling units provides 100% of the heating and cooling requirements of the associated equipment room.

Upon the emergency feedwater pump area high temperature, the chilled water control valve for the corresponding air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon the electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

9.4.5.2.5 Safety Related Component Area HVAC System

During normal plant operation ESF equipment areas are served by the auxiliary building HVAC system (Section 9.4.3). During a design basis accident or LOOP, the areas are cooled by individual air handling units upon the receipt of the high temperature signal.

Each of the air handling units, each consists of, in the direction of airflow, an electric heating coil, a cooling coil, a supply fan, and associated controls. The safety-related component area HVAC system is shown in Figure 9.4.5-1 and 9.4.5-5 and the equipment design data is presented in Table 9.4.5-1. The COL Applicant is to determine the capacity of heating coils that are affected by site specific conditions. The cooling coils are supplied with chilled water from the essential chilled water system (Section 9.2.7).

Each of the air handling units provides 100% of the heating and cooling requirements of the associated equipment room.

Upon safety related component area high temperature, the chilled water control valve for the corresponding air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

9.4.5.3 Safety Evaluation

9.4.5.3.1 Annulus Emergency Exhaust System

- This system has two 100% capacity emergency exhaust filtration units, each capable of performing its safety function under all associated design basis accidents coincident with a LOOP.
- The safety function of the annulus emergency exhaust filtration units are assured by the physical separation of its redundant trains and components. All system equipment and components are classified as equipment class 2, seismic category I.
- The redundant units are powered by separate Class 1E buses. Failure of a single active component in one of the annulus emergency exhaust filtration units cannot result in a loss of the system's safety function.
- The annulus emergency exhaust system equipment and components are protected from tornado generated missiles by their location inside a seismic category I structure.
- The adverse effects associated with the tornado depressurization of the air exhaust line are prevented by the specially designed tornado damper in the exhaust line.

9.4.5.3.2 Class 1E Electrical Room HVAC System

- The continuous operation of the Class 1E electrical rooms HVAC system is assured by the physical separation of its redundant trains and components. All system equipment and components are classified as equipment class 3, seismic category I.
- Redundant equipment and components are powered from separate Class 1E buses. The air handling units are served by the essential chilled water system. Failure of a single active component in one air handling unit cannot result in complete loss of heating or cooling of the class 1E electrical rooms.
- The battery rooms are ventilated with sufficient supply and exhaust airflow during all modes of operation in order to limit the hydrogen concentration below 2% percent by volume of battery. A back up battery fun starts automatically upon detection of the running fan airflow failure.
- All duct penetrations in fire walls are protected by fire dampers to prevent the spread of fire from the affected area to the adjacent redundant component areas.
- Systems air supply, return and exhaust fan housings are designed to resist penetration of internally generated missiles in the event of fan rotor failure.

- The Class 1E electrical room HVAC system equipment and components are protected from tornado-generated missiles by their location inside a seismic category I structure.

- The system's outside air intakes and exhaust outlets are protected from the externally tornado generated missiles by specially designed protective gratings.

- The adverse effects associated with the tornado depressurization of the outside air intakes and exhaust openings are prevented by the specially designed tornado dampers located at the outside air intakes and exhaust opening.

9.4.5.3.3 Safeguard Component Area HVAC System

- The operation of the safeguard component area HVAC system is assured by the physical separation of its redundant equipment and components. All system equipment and components are classified as equipment class 3, seismic category I.

- In the event of a design basis accident coincident with a LOOP, the safety-related air handling units receive emergency power from the corresponding safety buses to ensure the availability of cooling of the safeguard component areas.

- Air handling unit fan housings are designed to resist penetration of internally generated missiles in the event of fan rotor failure.

9.4.5.3.4 Emergency Feedwater Pump Area HVAC System

- The operation of the emergency feedwater pump area HVAC system is assured by the physical separation of its redundant equipment and components. All system equipment and components are classified as equipment class 3, seismic category I.

- In the event of a design basis accident, coincident with a LOOP, the safety-related air handling units receive emergency power from the corresponding safety buses to ensure the availability of cooling of the emergency feedwater pump areas.

- Air handling unit fan housings are designed to resist penetration of internally generated missiles in the event of fan rotor failure.

9.4.5.3.5 Safety Related Component Area HVAC System

- The operation of the safety related component HVAC system is assured by the physical separation of its redundant equipment and components. All system equipment and components are classified as equipment class 3, seismic category I.

- In the event of a design basis accident coincident with a LOOP, the safety-related air handling units receive emergency power from the corresponding safety buses to ensure the availability of cooling of the safety-related component areas.
- Air handling unit fan housings are designed to resist penetration of internally generated missiles in the event of fan rotor failure.

9.4.5.4 Inspection and Testing Requirements

The ESF ventilation system is provided with adequate instrumentation, temperature, flows, and differential pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

Preoperational testing of the ESF ventilation system is performed as described in Chapter 14, Verification Programs, to verify that the system is installed in accordance with applicable programs and specifications. The air handling units airflows are balanced to provided proper air mixing throughout the served areas.

During normal operation, the standby trains are periodically tested for operability or, alternatively, placed in service in place of the train which had been operating.

The ESF ventilation system equipment and components are provided with proper access for initial and periodic inspection and maintenance during normal operation.

Air handling units are factory tested in accordance with Air Movement and Control Association Standard. Air filters are tested in accordance with the American Society of Heating, Refrigerating and Air Conditioning Engineers Standard. Cooling coils are hydrostatically tested in accordance with ASME, Section III (Ref. 9.4.8-7) and their performance is rated in accordance with the Air Conditioning and Refrigeration Institute Standard.

Air distribution ductwork is leak tested in accordance with the Sheet Metal American Contractors' National Association.

System instruments are calibrated and automatic controls are tested for activation at the design set points in conformance with the design sequence of operation at all system operating modes.

9.4.5.4.1 Annulus Emergency Exhaust System

In addition to the general requirements in Subsection 9.4.5.4, emergency filtration units are factory-tested for housing leakage, filter bypass leakage and airflow performance. Periodically and subsequent to each filter material replacement, the unit is inspected and tested in-place in accordance with the requirements of RG 1.52 (Ref. 9.4.8-3), ASME N510 (Ref. 9.4.8-8) and ASME AG-1 (Ref. 9.4.8-2). The HEPA filters are checked periodically and alarmed in the MCR on high differential pressure. Inservice test program requirements are described in Chapter 16, "Technical Specifications".

9.4.5.4.2 Class 1E Electrical Room HVAC System

In addition to the general requirements in Subsection 9.4.5.4, battery fan operation is tested to insure automatic operation of the standby fan upon the airflow failure of the activated fan.

9.4.5.4.3 Safeguard Component Area HVAC System

The general requirements in Subsection 9.4.5.4 apply.

9.4.5.4.4 Emergency Feed Water Pump Area HVAC System

The general requirements in Subsection 9.4.5.4 apply.

9.4.5.4.5 Safety Related Components Area HVAC System

The general requirements in Subsection 9.4.5.4 apply.

9.4.5.5 Instrumentation Requirements

Instrumentation for controlling and monitoring the ESF ventilation system meets the requirements of ANSI/ANS 51.1 (Ref. 9.4.8-11), IEEE Std. 603 (Ref. 9.4.8-12) and are qualified in accordance with IEEE Std. 323 (Ref. 9.4.8-13) and IEEE Std. 344 (Ref. 9.4.8-14).

9.4.5.5.1 Annulus Emergency Exhaust Filtration System

The following instrumentation serving the annulus emergency exhaust filtration system include:

- Indication of the status of the emergency filtration units.
- Indication of differential pressure across a filter bank in the emergency filtration unit.
- Indication and recorder of the differential pressure in the penetration and safeguard component areas.
- Indication and recoding of emergency filtration unit outlet airflow and high and low alarm.
- Indication and recorder of penetration area combined exhaust airflow.

9.4.5.5.2 Class 1E Electrical Room HVAC System

The following instrumentation serving the class 1E electrical room HVAC System includes:

- Indication of the status of air handling units, return fans and exhaust fans.
- Indication of air handling unit and exhaust fan outlet airflow and low airflow alarm.

- Indication of differential pressure across a filter bank in the air handling units.
- Indication of air handling unit inlet and outlet temperature.
- Alarm on Class 1E electrical room high temperature.
- Alarm on air handling unit electric heating coil outlet high temperature.
- Alarm on smoke detection.

9.4.5.5.3 Safeguard Component Areas HVAC System

The following instrumentation serving the safeguard component areas includes:

- Indication of the status of the air handling units.
- Indication of air handling unit outlet airflow and low airflow alarm.
- Alarm on high room temperature.

9.4.5.5.4 Emergency Feedwater Pump Area HVAC System

The following instrumentation serving the emergency feedwater pump areas includes:

- Indication of the status mode of the air handling units.
- Indication of room temperature and high temperature alarm.
- Alarm on air handling unit electric heating coil outlet temperature.

9.4.5.5.5 Safety Related Components area HVAC System

The following instrumentation serving the safety related components areas includes:

- Indication of the status of the air handling units.
- Indication of room temperature and high temperature alarm.
- Alarm on air handling unit electric heating coil outlet temperature alarm.

9.4.6 Containment Ventilation System

The containment ventilation system is provided to control and maintain the environment temperature and radioactivity concentration within the containment at a level suitable for the plant equipment operation and to allow the safe access for the operating personnel during inspection and maintenance activities. The containment ventilation system includes safety-related and non-safety related systems.

The safety-related system serving the containment ventilation system consists of the containment penetration isolation assemblies.

The containment ventilation system includes:

- Containment fan cooler system
- Control rod drive mechanism (CRDM) cooling system
- Reactor cavity cooling system
- Containment purge system

9.4.6.1 Design Bases

The containment ventilation system is classified as a non-safety related, non-seismic category I system. However, ductwork is supported, as required, to prevent adverse interaction with safety-related systems during a seismic event.

9.4.6.1.1 Safety Design Bases

The containment ventilation system is designed to satisfy the following design bases:

- The containment purge system has the capability to close the safety-related, seismic category I, containment isolation valves during a design basis accident.
- The safety-related containment isolation valves isolating the containment are connected to separate electrical safety buses that satisfy the single active failure criterion.
- The containment isolation valves assemblies are design to withstand the effect of adverse environment conditions.

9.4.6.1.2 Power Generation Design Bases

9.4.6.1.2.1 Containment Fan Cooler System

The containment fan cooler system is designed to satisfy the following design bases:

- Maintain containment air temperature below 120° F (Table 9.4-1) during normal plant operation and below 150° F during LOOP condition.
- Provide proper air distribution.
- Provide standby for the active containment fan coolers to ensure continuous and reliable performance during normal plant operation.
- During a LOOP condition, the containment fan coolers are served by the alternate ac power source.

9.4.6.1.2.2 Control Rod Drive Mechanism Cooling System

The control rod drive mechanism (CRDM) cooling system is designed to satisfy the following design bases:

- Remove the heat dissipated by the CRDMs.
- Assure the continuity and reliability of operation with 100% standby capacity for system fans.
- During a LOOP condition, the CRDM cooling fans are served by the alternate ac power source.

9.4.6.1.2.3 Reactor Cavity Cooling System

The reactor cavity cooling system is designed to satisfy the following design bases:

- Remove the heat dissipated by the reactor vessel, the reactor vessel support structure, and the gamma radiation and fast neutron bombardment on the primary shield wall.
- Provide local cooling for the reactor vessel support base plates to limit the interface temperature between the plates and the concrete to 200° F or lower to prevent concrete dehydration.
- Provide adequate cooling so that the temperature of the primary shield wall is maintained at or below the 150° F maximum to prevent dehydration of the concrete.
- Assure the continuity and reliability of operation with 100% standby capacity for system fans.
- During a LOOP condition, the reactor cavity cooling fans are served by the alternate ac power source.

9.4.6.1.2.4 Containment Purge System

The containment purge system, with the exception of the safety-related and seismic category I containment isolation valves, is designed to satisfy the following design bases:

- Maintain low concentrations of radioactivity in the containment atmosphere to allow access during maintenance and inspection activities.
- Provide relief from pressure build-up caused by instrument air leakage and containment temperature fluctuations.

9.4.6.2 System Description

9.4.6.2.1 Containment Fan Cooler System

The containment fan cooler system is shown in Figure 9.4.6-1 and the equipment and design data is presented in Table 9.4.6-1. The containment fan cooler system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The system consists of four fan cooler units, each sized for 1/3 of the total containment heat load, dampers, ductwork and associated instrumentation and controls. During normal operation, three units are required to operate while the other unit remains on standby. Each fan cooler unit consists of a cooling coil and an axial fan. There are backdraft dampers located on the discharge ductwork to the header compartment.

The containment air is cooled by the operating containment fan coolers. The cooling coils are supplied with chilled water from the non-essential chilled water system. Air is distributed inside the containment through the header compartment and the distribution ductwork system.

The chilled water control valve of each unit is controlled by an area temperature controller that modulates the chilled water flow to maintain the average containment air temperature below 120° F (Table 9.4-1).

During the LOOP condition, containment fan cooler system is powered from the alternate ac power source and maintains the average containment air temperature below 150° F.

In addition, the containment fan cooler units provide the cooling to mitigate the consequence of accident by natural circulation under the severe accident condition. Since the chilled water cannot be supplied under the severe accident condition, the cooling water system is switched form the non-essential chilled water system to CCW system to supply the cooling water to the containment fan cooler units.

9.4.6.2.2 Control Rod Drive Mechanism Cooling System

The CRDM cooling system is shown in Figure 9.4.6-1 and the equipment design data is presented in Table 9.4.6-1. The CRDM cooling system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The CRDM cooling system is sized to remove the heat dissipated by the CRDM and transfer the heat borne by the exhausted air to the non-essential chilled water system without imposing additional thermal loads on the containment fan coolers system discussed in Subsection 9.4.6.2.1.

The system consists of a chilled water cooling coil, backdraft dampers, and two centrifugal fans. Each fan is driven by an independent motor and is sized for 100% capacity. One fan is required for operation and the other is placed on standby. Containment air is drawn through the CRDM shroud, over the CRDM, through the leak-tight ductwork, through the cooling coil and then discharged by the fan to the containment atmosphere. The CRDM cooling unit cooling coil is supplied with chilled water from the non-essential chilled water system.

The system has a provision to assure the continuity of operation through an electrical interlock between both fans so that if the operating fan fails, the standby fan is automatically energized.

During the LOOP condition, the CRDM cooling system is powered from the alternate ac power source.

9.4.6.2.3 Reactor Cavity Cooling System

The reactor cavity cooling system is shown in Figure 9.4.6-1 and the equipment design data is presented in Table 9.4.6-1. The reactor cavity cooling system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The system consists of two supply air fans, each sized for 100% capacity, a backdraft damper, ductwork and associated instrumentation and control. One fan is required for operation, while the other fan is placed on standby.

The system has a provision to assure the continuity of operation through an electrical interlock between both fans so that if the operating fan fails, the standby fan is automatically energized.

During the LOOP condition, reactor cavity cooling system is powered from the alternate ac power source.

9.4.6.2.4 Containment Purge System

The containment purge system consists of the following systems:

- Containment low volume purge system
- Containment high volume purge system

9.4.6.2.4.1 Containment Low Volume Purge System

The containment low volume purge system is shown in Figure 9.4.6-1 and the equipment design data is presented in Table 9.4.6-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. With the exception of the containment isolation valves that are safety-related and seismic category I, the containment low volume purge system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The containment low volume purge system consists of two containment low volume purge air handling units and two exhaust filtration units, isolation valves, dampers, ductwork and associated instrumentation and controls.

Each air handling unit consists of, in the direction of airflow, a low efficiency filter, a high efficiency filter, an electric heating coil, a chilled water cooling coil, and a supply fan. Each unit is sized for 100% capacity. Outside air is drawn and conditioned by the air handing unit and discharged into the containment through the containment low volume purge system penetration.

Each exhaust filtration unit consists of, in the direction of airflow, a high efficiency filter, an electric heating coil, a HEPA filter, a charcoal adsorber, a high efficiency filter, and an exhaust fan. Each unit is sized for 100% capacity. The containment air is drawn through the containment low volume purge system penetration by the exhaust filtration unit and discharged to the atmosphere through the plant vent stack.

The capacity of the containment low volume purge system is sized to maintain acceptably low levels of radioactivity, including noble gases, during normal plant operation.

9.4.6.2.4.2 Containment High volume Purge System

The containment high volume purge system is shown in Figure 9.4.6-1 and the equipment design data is presented in Table 9.4.6-1. The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions. With the exception of the containment isolation valves, that are safety related and seismic category I, the containment high volume purge system does not serve any safety function. Therefore, it is not safety-related or seismic category I qualified.

The containment high volume purge system consists of a containment high volume purge air handling unit and an exhaust filtration unit.

The air handling unit consists of, in the direction of airflow, a low efficiency filter, a high efficiency filter, an electric heating coil, a chilled water cooling coil, and a supply fan. Outside air is drawn and conditioned by the air handing unit and discharged into the containment through the containment high volume purge system penetration.

The exhaust filtration unit consists of, in the direction of airflow, a high efficiency filter, a HEPA filter, and an exhaust fan. The containment air is drawn through the containment high volume purge system penetration by the exhaust filtration unit and discharged to the atmosphere through the plant vent stack.

The capacity of the containment high volume purge system is sized to maintain acceptably low levels of radioactivity, including noble gases, during refueling operations.

9.4.6.3 Safety Evaluation

9.4.6.3.1 Containment Fan Cooler System

The containment fan cooler system has no safety-related function and therefore requires no safety evaluation. However, a part of ductwork in the containment serving the containment fan cooler system are supported in accordance with seismic category II requirements so as to remain in place during the SSE and preclude damage to any safety-related structures, systems, or components located in the vicinity of the piping or the ductwork.

9.4.6.3.2 Control Rod Drive Mechanism Cooling System

The CRDM cooling system has no safety-related function and therefore requires no safety evaluation. However, a part of ductwork in the containment serving the CRDM cooling system are supported in accordance with seismic category II requirements so as to remain in place during the SSE and preclude damage to any safety-related structures, systems, or components located in the vicinity of the piping or the ductwork.

9.4.6.3.3 Reactor Cavity Cooling System

The reactor cavity cooling system has no safety-related function and therefore requires no safety evaluation. However, a part of ductwork in the containment is supported in accordance with seismic category II requirements so as to remain in place during the SSE to preclude damage to any safety-related structures, systems, or components located in the vicinity of the ductwork.

9.4.6.3.4 Containment Purge System

Other than the safety-related seismic category I containment isolation valves, the containment purge system has no safety-related function and therefore requires no safety evaluation.

The containment low volume purge system's penetration is sized so that the calculated exposures for post-LOCA conditions do not exceed 10 CFR 50.34 limitations.

The containment high volume purge system containment isolation valves remain in the closed position during normal operation, since the purge operation is initiated only after plant shutdown and during refueling operations.

The containment isolation valves for the containment purge system will close within five seconds upon initiation of the containment purge isolation signal (Chapter 7, Section 7.3).

9.4.6.4 Inspection and Testing Requirements

The containment ventilation system is designed to facilitate in-service inspections and on-line testing of components and controls in accordance with the following:

The system is provided with adequate instrumentation, temperature, flows, and differential pressure indicating devices to facilitate testing and verification of equipment heat transfer capability and flow blockage.

Preoperational testing of the system is performed as described in Chapter 14, Verification Programs, to verify that system is installed in accordance with applicable programs and specifications. All HVAC system airflows are balanced in conformance with the design flow, path flow capacity, and proper air mixing throughout the containment.

The system equipment and components are provided with proper access for initial and periodic inspection and maintenance during normal operation.

Air handling units are factory tested in accordance with the Air Movement and Control Association Standards. Air filters are tested in accordance with the American Society of

Heating, Refrigerating and Air Conditioning Engineers Standards. Cooling coils are hydrostatically tested in accordance with ASME, Section VIII and their performance is rated in accordance with the Air Conditioning and Refrigeration Institute Standard.

System instruments are periodically calibrated and automatic controls are tested for activation at the design set points in conformance with the design sequence of operation at all system operating modes.

9.4.6.4.1 Containment Fan Cooler System

The general requirements of Subsection 9.4.6.4 apply.

9.4.6.4.2 Control Rod Drive Mechanism Cooling System

The general requirements of Subsection 9.4.6.4 apply.

9.4.6.4.3 Reactor Cavity Cooling System

The general requirements of Subsection 9.4.6.4 apply.

9.4.6.4.4 Containment Purge System

In addition to the general requirements in Subsection 9.4.6.4, the containment purge system safety related containment isolation valves are periodically inspected and tested (Chapter 6).

9.4.6.4.4.1 Containment Low Volume Purge System

In addition to the general requirements in Subsections 9.4.6.4 and 9.4.6.4.4, the exhaust filtration unit is factory-tested for housing leakage, filter bypass leakage, and airflow performance. Periodically and subsequent to each filter or adsorber material replacement, the unit is inspected and tested in-place in accordance with the requirements of RG 1.140 (Ref. 9.4.8-15), ASME N510 (Ref. 9.4.8-8) and ASME AG-1 (Ref. 9.4.8-2). The HEPA filter is checked periodically. Charcoal adsorber samples are tested for efficiency in an independent laboratory in accordance with RG 1.140 and ASTM D 3803 (Ref.9.4.8-9).

9.4.6.4.4.2 Containment High Volume Purge System

In addition to the general requirements in Subsections 9.4.6.4 and 9.4.6.4.4, the exhaust filtration unit is factory-tested for housing leakage, filter bypass leakage, and airflow performance. Periodically and subsequent to each filter replacement, the unit is inspected and tested in-place in accordance with the requirements of RG 1.140 (Ref. 9.4.8-15), ASME N510 (Ref. 9.4.8-8) and ASME AG-1 (Ref. 9.4.8-2). The HEPA filter is checked periodically.

9.4.6.5 Instrumentation Requirements

9.4.6.5.1 Containment Fan Cooler System

The instrumentation serving the containment fan cooler system includes:

- Recorder of the fan cooler unit inlet air temperature and high temperature alarm.
- Recorder of the fan cooler unit outlet air temperature and high and low temperature alarm.
- Alarm on low airflow.
- Alarm on motor winding temperature.

9.4.6.5.2 Control Rod Drive Mechanism Cooing System

The instrumentation serving the CRDM cooling system includes:

- Recorder of the CRDM inlet and outlet air temperature and high temperature alarm.
- Alarm on low airflow.
- Alarm on motor winding temperature.

9.4.6.5.3 Reactor Cavity Cooling System

The instrumentation serving the reactor cavity cooling system includes:

- Alarm on low airflow.
- Recorder of concrete temperature and the nuclear instrumentation system.

9.4.6.5.4 Containment Purge Systems

9.4.6.5.4.1 Containment Low Volume Purge System

The instrumentation serving the containment low volume purge system includes:

- Alarm on low airflow.
- Indication of differential pressure across the filters and differential pressure high alarm.
- Indication of the filtration unit charcoal adsorber outlet air temperature and high, high-high temperature alarm.
- Alarm high radiation for the containment purge air.
- Containment pressure monitoring with low and high alarm.

9.4.6.5.4.2 Containment High Volume Purge System

The instrumentation and controls serving the containment high volume purge system includes:

- Alarm on low airflow.
- Indication of differential pressure across the filters and differential pressure high alarm.
- Alarm high radiation for the containment purge air.

9.4.7 Combined License Information

COL 9.4(1) Deleted

COL 9.4(2) Deleted

COL 9.4(3) Deleted

COL 9.4(4) The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions.

COL 9.4(5) Deleted

COL 9.4(6) The COL Applicant is to provide a system information and flow diagram of ESW pump area ventilation system if the ESW pump area requires the heating, ventilating and air conditioning.

9.4.8 References

9.4.8-1 “Nuclear Power Plant Air-Cleaning Units and Components,” ASME N509-1989.

9.4.8-2 “Code on Nuclear Air and Gas Treatment,” ASME AG-1-2003.

9.4.8-3 “Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plans,” Regulatory Guide (RG) 1.52, Revision 3.

9.4.8-4 “Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors,” Regulatory Guide (RG) 1.195.

9.4.8-5 “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors,” Regulatory Guide (RG) 1.183.

9.4.8-6 “Demonstrating Control Room Envelope Integrity at Nuclear Power Reactors,” Regulatory Guide (RG) 1.197.

9.4.8-7 American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section III.

9.4.8-8 “Testing of Nuclear Air-Cleaning Units and Components,” ASME N510-1989.

9.4.8-9 “Standard Test Method for Nuclear-Grade Activated Carbon,” ASTM D 3803-91 (2004).

9.4.8-10 “Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants,” ANSI/ANS-51.1-1988.

9.4.8-11 “IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations,” IEEE Std 603-1998.

9.4.8-12 “IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations,” IEEE Std 323™-2003.

9.4.8-13 “IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations,” IEEE Std 344™-1987.

9.4.8-14 American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VIII.

9.4.8-15 “Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants,” Regulatory Guide (RG) 1.140-2001, Revision2.

9.4.8-16 “Laboratory Methods of Testing Fans for Rating,” ANSI/AMCA 210-2007.

9.4.8-17 “Laboratory Methods of Testing Air Circulator Fans for Rating,” ANSI/AMCA 230-1999.

9.4.8-18 “Industrial Process / Power Generation Fans: Establishing Performance Using Laboratory Models,” ANSI/AMCA 802-2002

9.4.8-19 “Gravimetric and Dust Spot procedures for Testing Cleaning Devices Used in General Ventilation for Removing Particulate Matter,” ASHRAE 52.1-1992.

9.4.8-20 “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size,” ASHRAE 52.2-2007.

9.4.8-21 “Forced-Circulation Air-Cooling and Air-Heating Coils,” ARI 410-2001.

9.4.8-22 “Performance Rating of Room Fan-coils,” ARI 440-2005.

Table 9.4-1 Area Design Temperature and Relative Humidity (Sheet 1 of 4)

Area	Location Note2	Service System Note1		Normal condition				Abnormal Condition Note3			
				Temperature °F		Relative Humidity %		Temperature °F		Relative Humidity %	
		Normal	Abnormal	Min	Max	Min	Max	Min	Max	Min	Max
Containment	PC CV	Containment Fan Cooler System		-	~120°F	-	-	-	~150°F (LOOP)	-	-
		Containment Purge System (b)	-	65°F (Refueling)	85°F (Refueling)	-	-	-	-	-	-
Main Control Room	RB	Main Control Room HVAC System (a)		73°F	78°F	25%RH	60%RH	73°F	78°F	-	-
Class 1E I&C Room	RB	Class 1E Electrical Room HVAC System (a)		68°F	79°F	-	-	68°F	79°F	-	-
Class 1E Electrical Room	RB			50°F	95°F	-	-	50°F	95°F	-	-
Class 1E UPS Room	RB			50°F	95°F	-	-	50°F	95°F	-	-
Emergency Filtration Unit Room	RB			50°F	105°F	-	-	50°F	130°F	-	-
Remote Shutdown Console Room	RB			73°F	78°F	25%RH	60%RH	73°F	78°F	-	-
Class 1E Battery Room	PSB			65°F	77°F	-	-	65°F	77°F	-	-
Class 1E Battery Charger Room	PSB			50°F	95°F	-	-	50°F	95°F	-	-
MCR/Class 1E Electrical Room HVAC equipment Room	RB			50°F	105°F	-	-	50°F	130°F	-	-
CRDM Panel Room	RB			50°F	95°F	-	-	-	-	-	-
M-G Set and M-G Set Panel Room	RB			50°F	95°F	-	-	-	-	-	-
Leak Rate Testing Room	RB			50°F	95°F	-	-	-	-	-	-
Reactor Trip Breaker Room	RB			50°F	95°F	-	-	-	-	-	-

Table 9.4-1 Area Design Temperature and Relative Humidity (Sheet 2 of 4)

Area	Location Note2	Service System Note1		Normal condition				Abnormal Condition Note3			
				Temperature °F		Relative Humidity %		Temperature °F		Relative Humidity %	
		Normal	Abnormal	Min	Max	Min	Max	Min	Max	Min	Max
Penetration Area	RB	Auxiliary Building HVAC System (b)	Safety Related Component Area HVAC System (a)	50°F	105°F	-	-	50°F	130°F	-	-
Safeguard Component Area (CS / RHR Pump Area, SIP Area, CS / RHR Hx Area)	RB	Auxiliary Building HVAC System (b)	Safeguard Component Area HVAC System (a)	50°F	105°F	-	-	50°F	130°F	-	-
B,C-EFW Pump Area	RB	Auxiliary Building HVAC System (b)	Emergency Feed Water Pump (M/D) Area HVAC System (a)	50°F	105°F	-	-	50°F	105°F	-	-
A,D-EFW Pump Area	RB	Emergency Feed Water Pump (T/D) Area HVAC System (a)		50°F	105°F	-	-	50°F	105°F	-	-
Safety Related Component Area (CCW Pump Area, Essential Chiller Unit Area, Charging Pump Area, Annulus Emergency Exhaust Filtration Unit Area, Penetration Area)	RB/ PSB	Auxiliary Building HVAC System (b)	Safety Related Component Area HVAC System (a)	50°F	105°F	-	-	50°F	130°F	-	-
Gas Turbine Area	PSB	Auxiliary Building HVAC System (b)	N/A (Gas-Turbine unit)	50°F (off operation)	105°F (off operation)	-	-	-	-	-	-
Fuel Handling Area	RB	Auxiliary Building HVAC System (b)	-	50°F	105°F	-	-	-	-	-	-
Sampling/Laboratory Room	ACB	Auxiliary Building HVAC System (b)	-	73°F	78°F	35%RH	50%RH	-	-	-	-
Access Control Area	ACB	Auxiliary Building HVAC System(b)	-	73°F	78°F	35%RH	50%RH	-	-	-	-
General Area (R/B, A/B,PS/B,AC/B)	-	Auxiliary Building HVAC System (b)	-	50°F	105°F	-	-	-	-	-	-

Table 9.4-1 Area Design Temperature and Relative Humidity (Sheet 3 of 4)

Area	Location Note2	Service System Note1		Normal condition				Abnormal Condition Note3			
				Temperature °F		Relative Humidity %		Temperature °F		Relative Humidity %	
		Normal	Abnormal	Min	Max	Min	Max	Min	Max	Min	Max
Main Steam/Feedwater Piping Area	RB	Main Steam / Feedwater Piping Area HVAC System (b)	-	50°F	130°F	-	-	-	-	-	-
Computer Room	AB	Non-Class 1E Electrical Room HVAC System(b)		68°F	79°F	-	-	68°F (LOOP)	79°F (LOOP)	-	-
Non Class 1E I&C Room	AB			68°F	79°F	-	-	68°F (LOOP)	79°F (LOOP)	-	-
Non Class 1E Battery Room	AB			65°F	77°F	-	-	65°F (LOOP)	77°F (LOOP)	-	-
Non Class 1E Electrical Room	AB			50°F	95°F	-	-	50°F (LOOP)	95°F (LOOP)	-	-
Communication System Equipment Room	AB			68°F	79°F	-	-	68°F (LOOP)	79°F (LOOP)	-	-
Radwaste Control Room	AB			68°F	79°F	-	-	68°F (LOOP)	79°F (LOOP)	-	-
Technical Support Center	AB	Technical Support Center HVAC System(b)		73°F	78°F	25%RH	60%RH	73°F (LOOP)	78°F (LOOP)	-	-
General Mechanical Area	TB	Turbine Building Area Ventilation System(General Mechanical Areas Ventilation System) (c)	-	50°F	105°F	-	-	-	-	-	-
General Mechanical Area (Sampling Room)	TB	Turbine Building Area Ventilation System (Sampling Room HVAC system) (c)	-	73°F	78°F	35%RH	50%RH	-	-	-	-
Electrical Equipment Area (including electrical room and non Class 1E Battery Room	TB	Turbine Building Area Ventilation System (Electrical Equipment Areas HVAC system) (c)		65°F	85°F	-	-	65°F (SBO and LOOP)	85°F (SBO and LOOP)	-	-

Table 9.4-1 Area Design Temperature and Relative Humidity (Sheet 4 of 4)

Notes

Note1: Outside air ambient design temperature condition is as follows:

(a) 0% exceedance dry bulb and wet bulb temperature of site ambient temperature condition (See Chapter 2)

(b) 1% exceedance dry bulb and wet bulb temperature of site ambient temperature condition (See Chapter 2)

(c) -5^{o}F (minimum) to 95^{o}F dry bulb / 77^{o}F coincident wet bulb (maximum)

Note2: Location: PCCV, Prestressed concrete containment vessel; RB, Reactor building; AB, Auxiliary building; ACB, Access building; PSB, Power source building; TB, Turbine building.

Note3: Smoke purge mode is not required the temperature and humidity condition.

Table 9.4.1-1 Equipment Design Data

Main Control Room Air Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	10,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	341,000
Heating Coil Type	Electrical
Main Control Room Emergency Filtration Unit	
Number of Units	2
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	3,600
Unit Fan Type	Centrifugal
After-Filters Type	High Efficiency
Adsorber Type	Impregnated charcoal
Charcoal Adsorber Radioiodine Efficiency	95% minumum
HEPA Filter Efficiency	99.97%, 0.30 micron particles
Heating Coil Type	Electric
Heating Coil Capacity, kW	18
Main Control Room Toilet/Kitchen Exhaust Fan	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	1,800
Fan Type	Axial
Main Control Room Smoke Purge Fan	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	20,000
Fan Type	Centrifugal

Table 9.4.3-1 Equipment Design Data (Sheet 1 of 2)

Auxiliary Building Air Handling Unit	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	98,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Steam
Auxiliary Building Exhaust Fan	
Number of Fans	3
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow, cfm	108,000
Fan Type	Centrifugal
Non-Class 1E Electrical Room Air Handling Unit	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	40,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Steam
Non-Class 1E Electrical Room Return Air Fan	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	36,250
Fan Type	Vane Axial
Non-Class 1E Battery Room Exhaust Fan	
Number of Fans	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	7,500
Fan Type	Vane Axial

Table 9.4.3-1 Equipment Design Data (Sheet 2 of 2)

Main Steam / Feedwater Piping Areas Air Handling Unit	
Number of Units	4
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	5,500
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Electric
Technical Support Center Air Handling Unit	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	17,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Electric
Technical Support Center Emergency Filtration Unit	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	1,800
Unit Fan Type	Centrifugal
After-Filters Type	High Efficiency
Adsorber Type	Impregnated charcoal
Charcoal Adsorber Radioiodine Efficiency	95% minimum
HEPA Filter Efficiency	99.97%, 0.30 micron particles
Heating Coil Type	Electric
Heating Coil Capacity, kW	9
Technical Support Center Toilet/Kitchen Exhaust Fan	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	1,000
Fan Type	Vane Axial

Table 9.4.4-1 Equipment Design Data

Non-Class 1E Electrical Equipment Area Air Handling Unit	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Air flow capacity, cfm	25,000
Unit Fan Type	Centrifugal
Return Air Fan type	Centrifugal
Cooling coil type	Chilled Water
Heating coil type	Electric
Basement Area Supply Fan	
Number of Fans	1
Equipment Class	5
Seismic Category	Non-Seismic
Fan type	Variable pitch axial
Fan flow, cfm	45,000
Basement Area Exhaust/Circulating Supply Fan	
Number of Fans	1
Equipment Class	5
Seismic Category	Non-Seismic
Fan type	Vane axial
Fan Airflow Capacity, cfm	45,000
Turbine Building Roof Ventilation Fan	
Number of Fans	27
Equipment Class	5
Seismic Category	Non-Seismic
Fan type	Power roof ventilator
Fan Airflow Capacity, cfm	100,000
Non-Class 1E Battery Room Exhaust Fan	
Number of Fans	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan type	Centrifugal
Fan Airflow Capacity, cfm	1,500

Table 9.4.5-1 Equipment Design Data (Sheet 1 of 3)

Class 1E Electrical Room Air Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	40,000 - train A, B 52,000 - train C, D
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	1,830,000 - train A, B 2,370,000 - train C, D
Heating Coil Type	Electric
Heating Coil Capacity, kW	(See COL item 9.4(4))
Class 1E Electrical Room Return Air Fan	
Number of Fans	4
Equipment Class	3
Seismic Category	I
Fan Airflow Capacity, cfm	34,800 - train A, B 46,800 - train C, D
Fan Type	Axial
Class 1E Battery Room Exhaust Fan	
Number of Fans	4
Equipment Class	3
Seismic Category	I
Fan Airflow Capacity, cfm	5,200
Fan Type	Axial
Annulus Emergency Exhaust Filtration Unit	
Number of Units	2
Equipment Class	2
Seismic Category	I
Unit Airflow Capacity, cfm	5,600
Unit Fan Type	Centrifugal
HEPA Filter Efficiency	99.97%, 0.30 micron particles

Table 9.4.5-1 Equipment Design Data (Sheet 2 of 3)

Safeguard Component Area Air Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	5,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	180,000
Heating Coil Type	Electric
Emergency Feedwater Pump (M/D) Area Air Handling Unit	
Number of Units	2
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	2,100
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	110,000
Heating Coil Type	Electric
Emergency Feedwater Pump (T/D) Area Air Handling Unit	
Number of Units	2
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	1,300
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	60,000
Heating Coil Type	Electric
Penetration Area Air Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	5,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	330,000
Heating Coil Type	Electric

Table 9.4.5-1 Equipment Design Data (Sheet 3 of 3)

Annulus Emergency Filtration Unit Area Air Handling Unit	
Number of Units	2
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	1,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	10,000
Heating Coil Type	Electric
Charging Pump Area Air Handling Unit	
Number of Units	2
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	1,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	10,000
Heating Coil Type	Electric
CCW Pump Area Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	1,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	30,000
Heating Coil Type	Electric
Essential Chiller Unit Area Air Handling Unit	
Number of Units	4
Equipment Class	3
Seismic Category	I
Unit Airflow Capacity, cfm	1,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	30,000
Heating Coil Type	Electric

Table 9.4.6-1 Equipment Design Data (Sheet 1 of 2)

Containment Fan Cooler Unit	
Number of Units	4
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	60,000
Unit Fan Type	Vane Axial
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	3,000,000
CRDM Cooling Unit	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	71,000
Cooling Coil Type	Chilled Water
Cooling Coil Capacity, btu/hr	4,000,000
CRDM Cooling Fan	
Number of Fans	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	71,000
Fan Type	Centrifugal
Reactor Cavity Cooling Fan	
Number of Fans	2
Equipment Class	5
Seismic Category	Non-Seismic
Fan Airflow Capacity, cfm	44,000
Fan Type	Vane Axial
Containment Low Volume Purge Air Handling Unit	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	2,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Electric

Table 9.4.6-1 Equipment Design Data (Sheet 2 of 2)

Containment High Volume Purge Air Handling Unit	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	30,000
Unit Fan Type	Centrifugal
Cooling Coil Type	Chilled Water
Heating Coil Type	Electric
Containment Low Volume Purge Exhaust Filtration Unit	
Number of Units	2
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	2,000
Unit Fan Type	Centrifugal
After-Filters Type	High Efficiency
Adsorber Type	Impregnated charcoal
Charcoal Adsorber Radioiodine Efficiency	95% minimum
HEPA Filter Efficiency	99.97%, 0.30 micron particles
Heating Coil Type	Electric
Heating Coil Capacity, kW	10
Containment High Volume Purge Exhaust Filtration Unit	
Number of Units	1
Equipment Class	5
Seismic Category	Non-Seismic
Unit Airflow Capacity, cfm	30,000
Unit Fan Type	Centrifugal
HEPA Filter Efficiency	99.97%, 0.30 micron particles

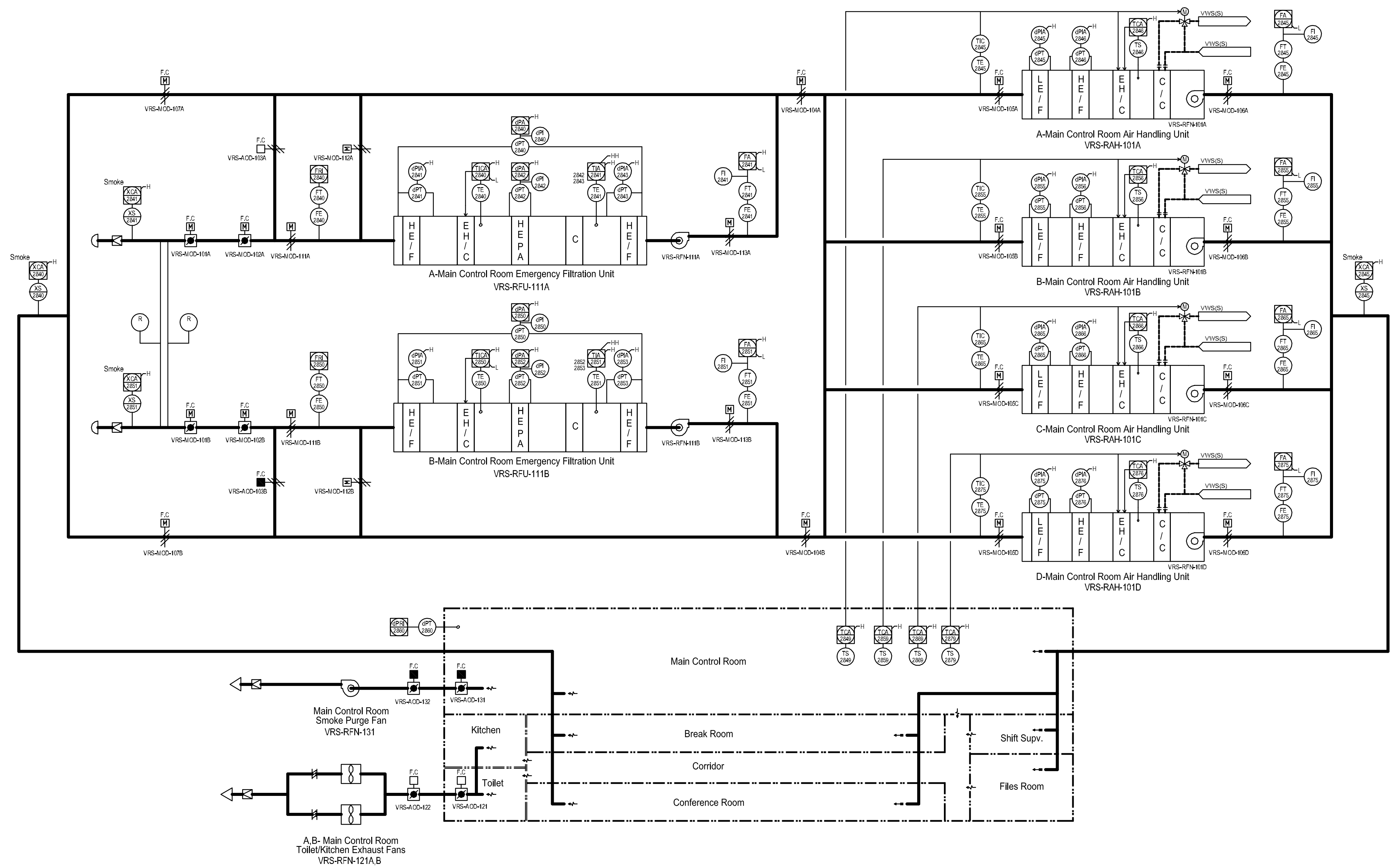


Figure 9.4.1-1 MCR HVAC System Flow Diagram

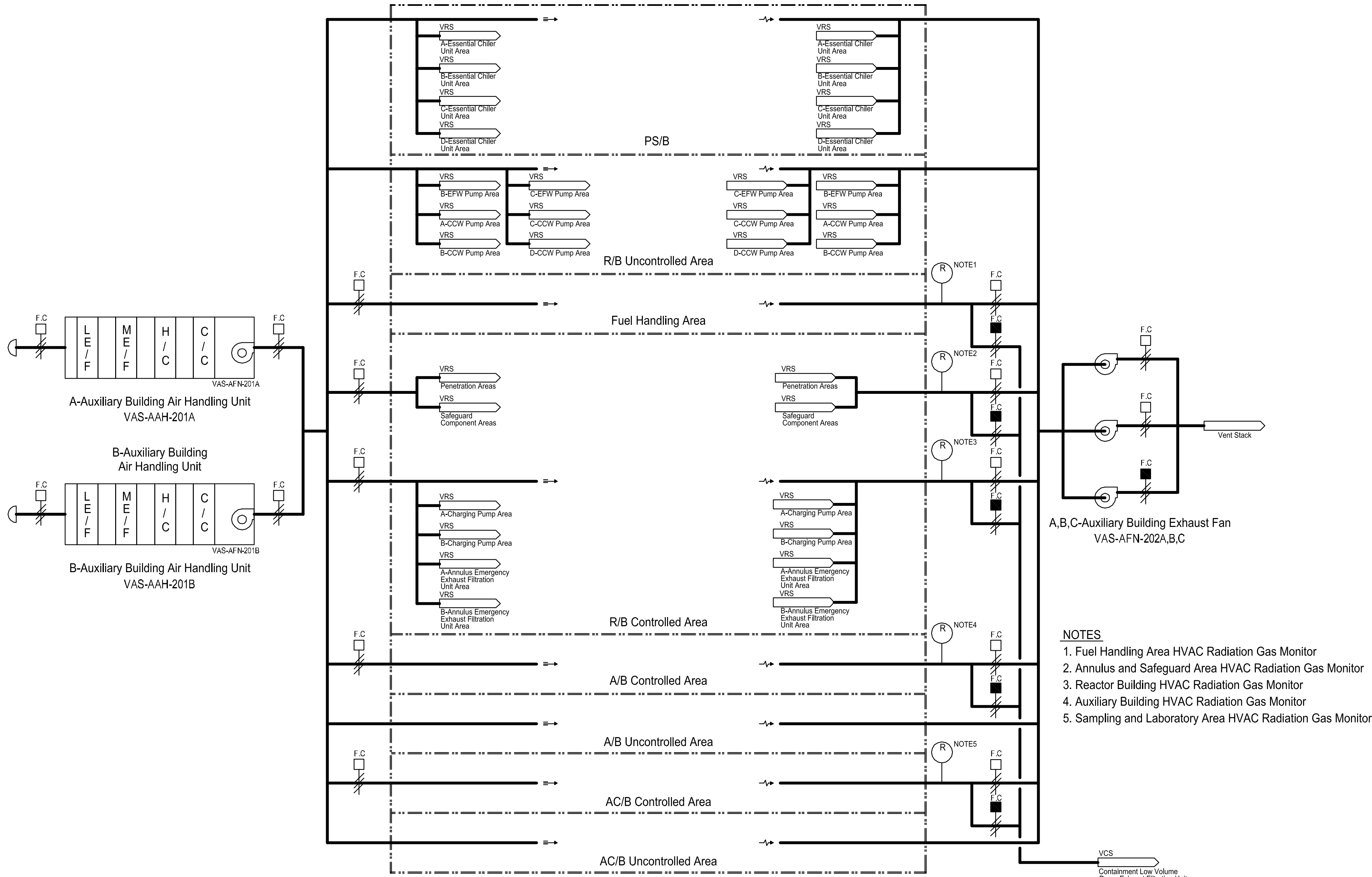


Figure 9.4.3-1 Auxiliary Building HVAC System Flow Diagram

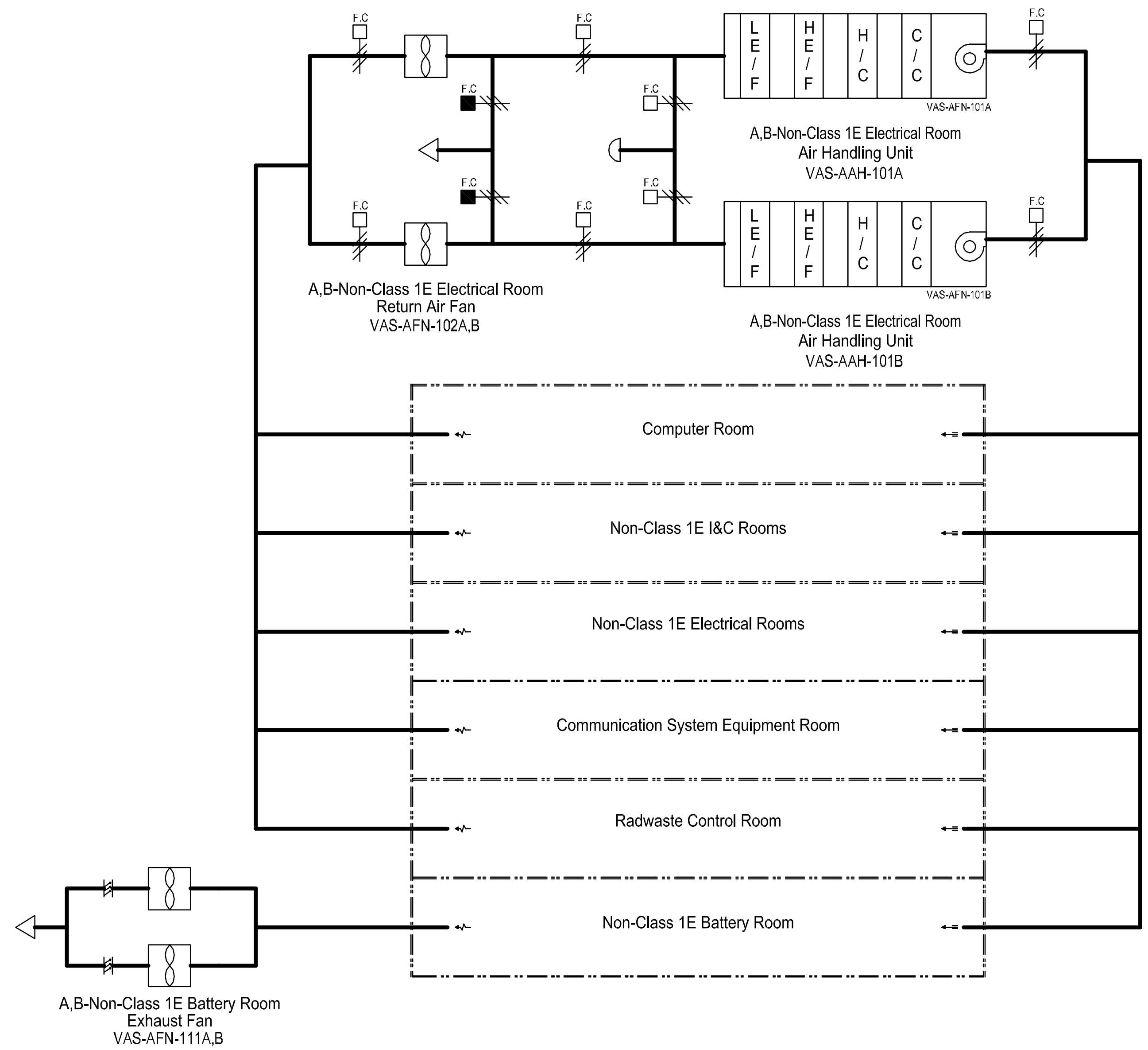


Figure 9.4.3-2 Non-Class 1E Electrical Room HVAC System Flow Diagram

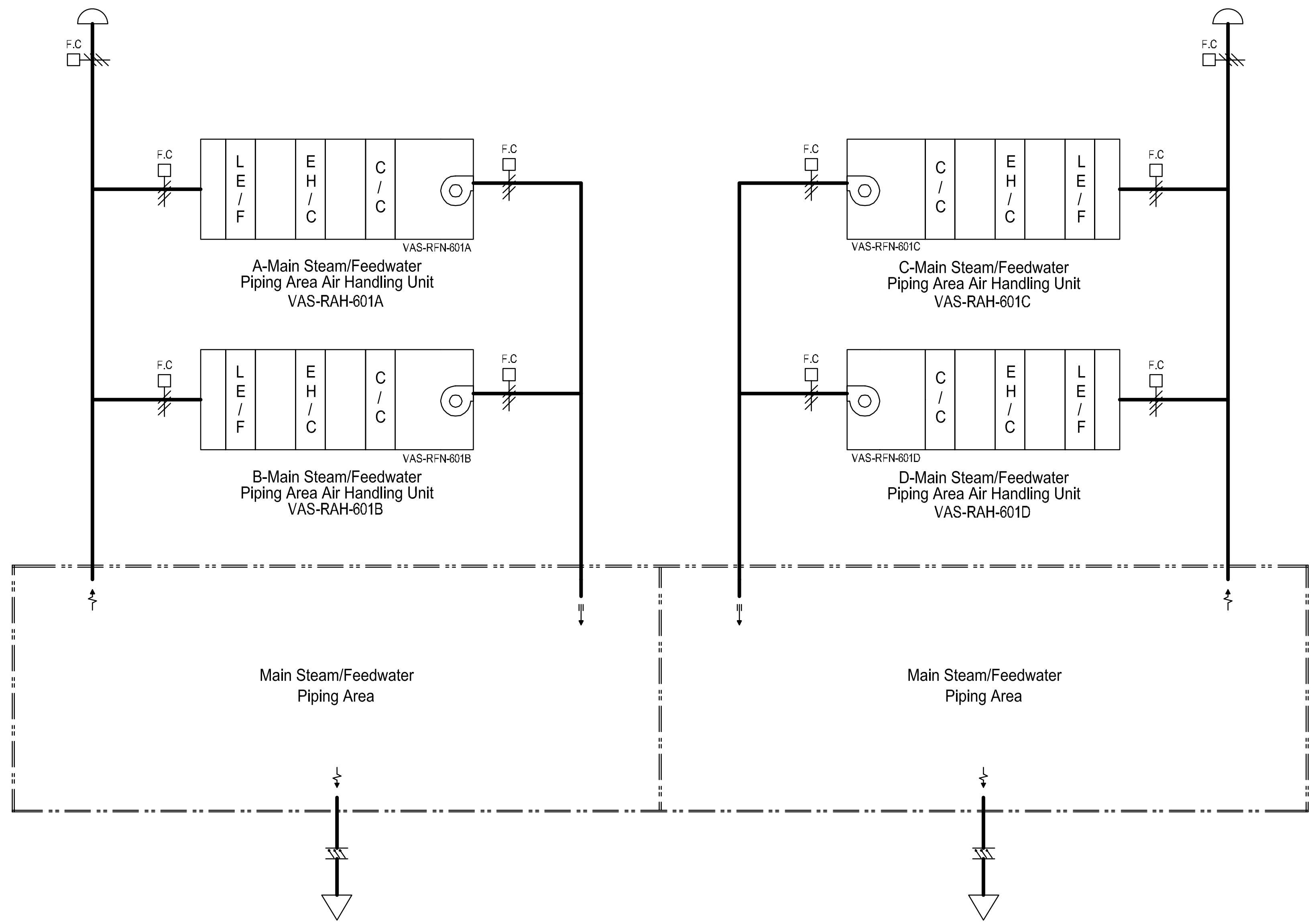


Figure 9.4.3-3 Main Steam/Feedwater Piping Area HVAC System Flow Diagram

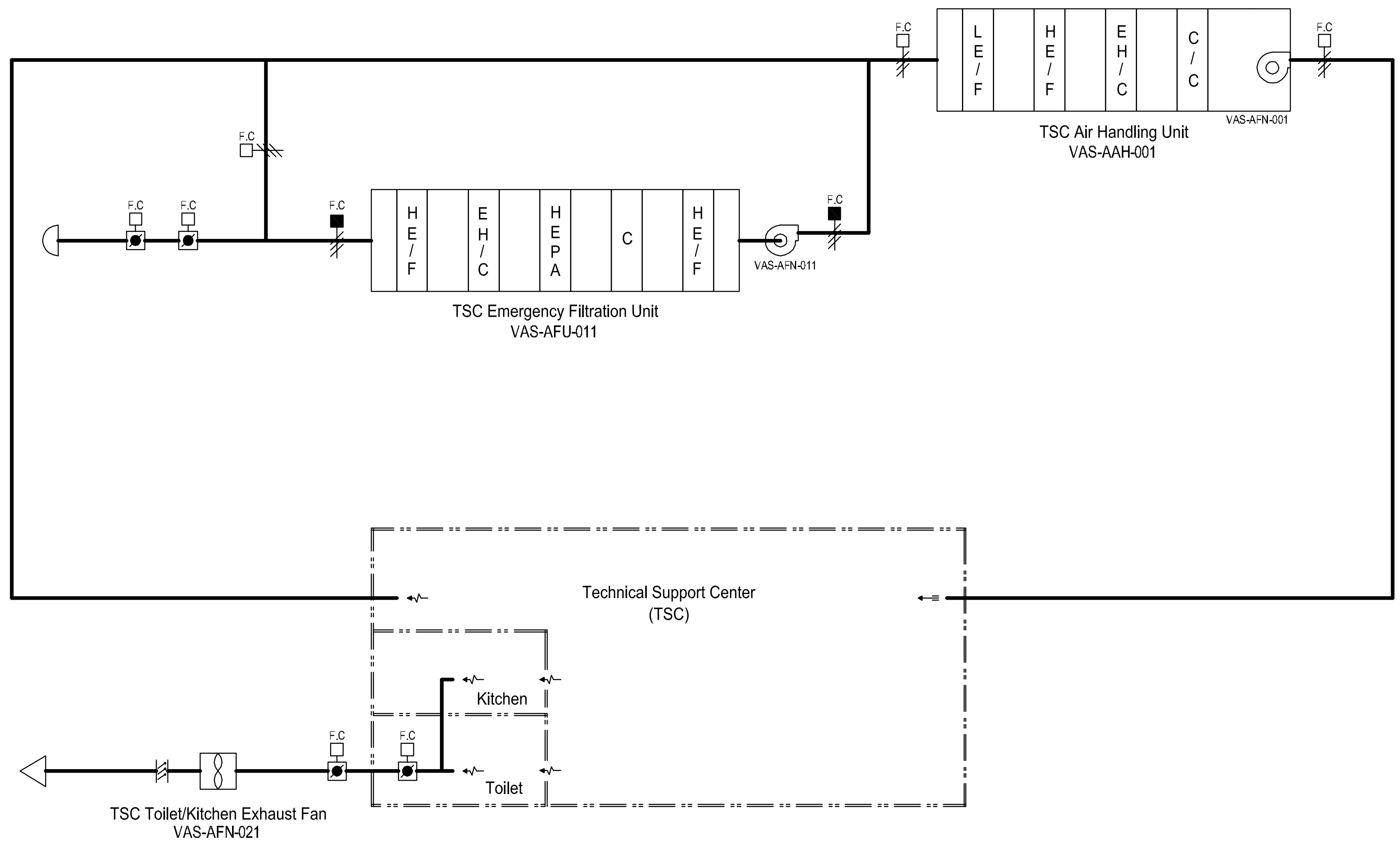


Figure 9.4.3-4 Technical Support Center (TSC) HVAC System Flow Diagram

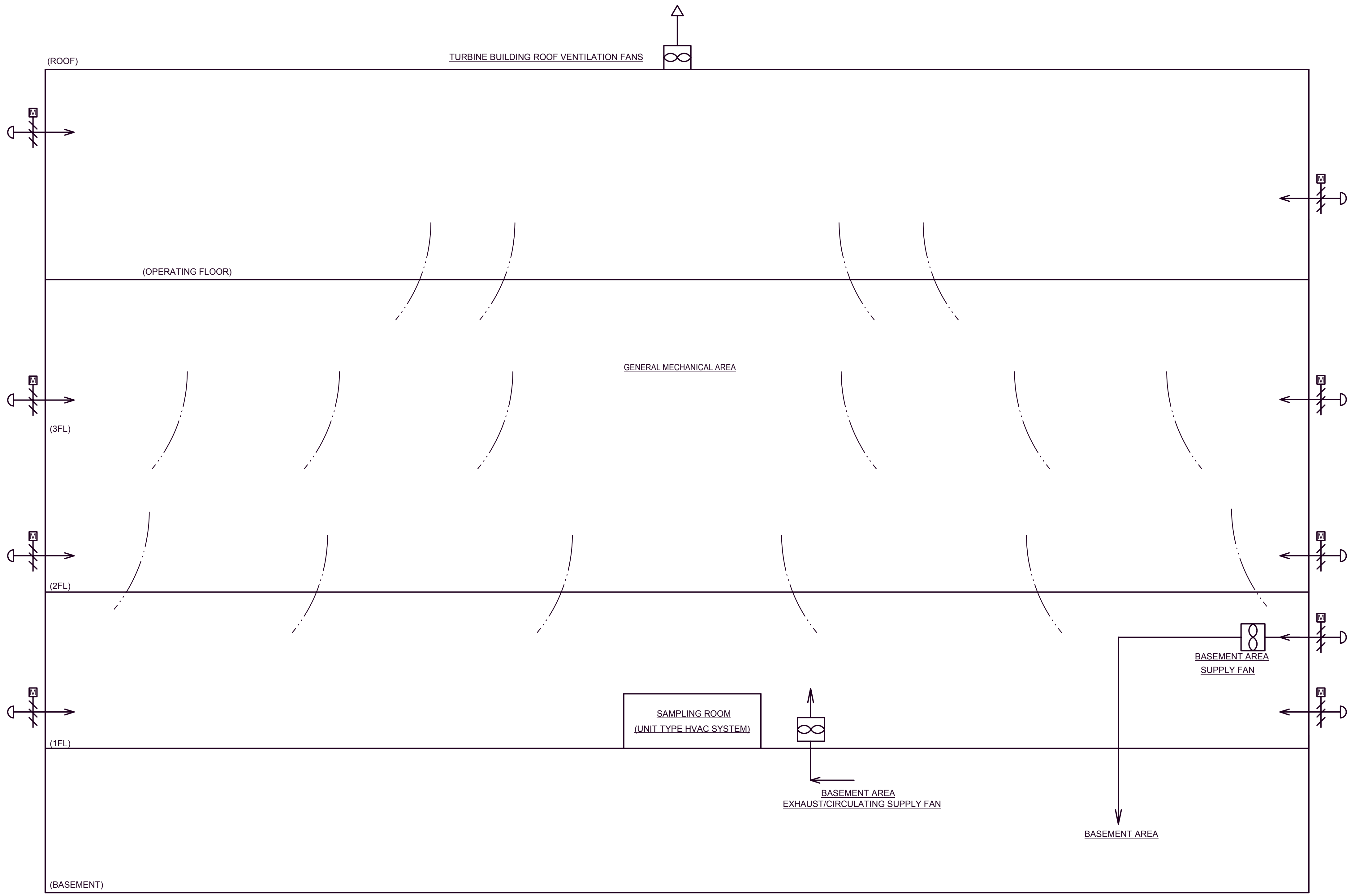


Figure 9.4.4-1 Turbine Building Area Ventilation System Flow Diagram (Sheet 1 of 2)

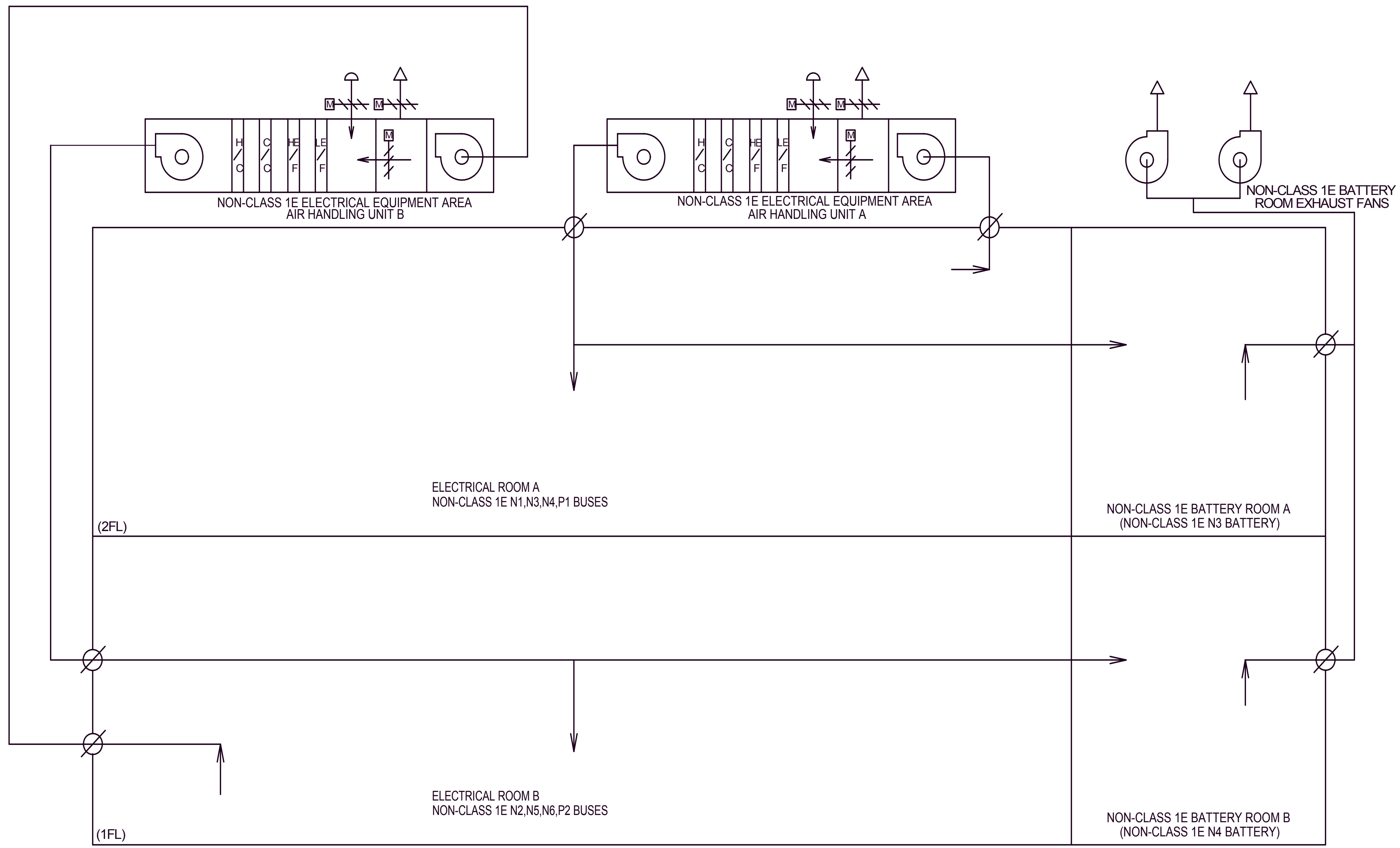


Figure 9.4.4-1 Turbine Building Area Ventilation System Flow Diagram (Sheet 2 of 2)

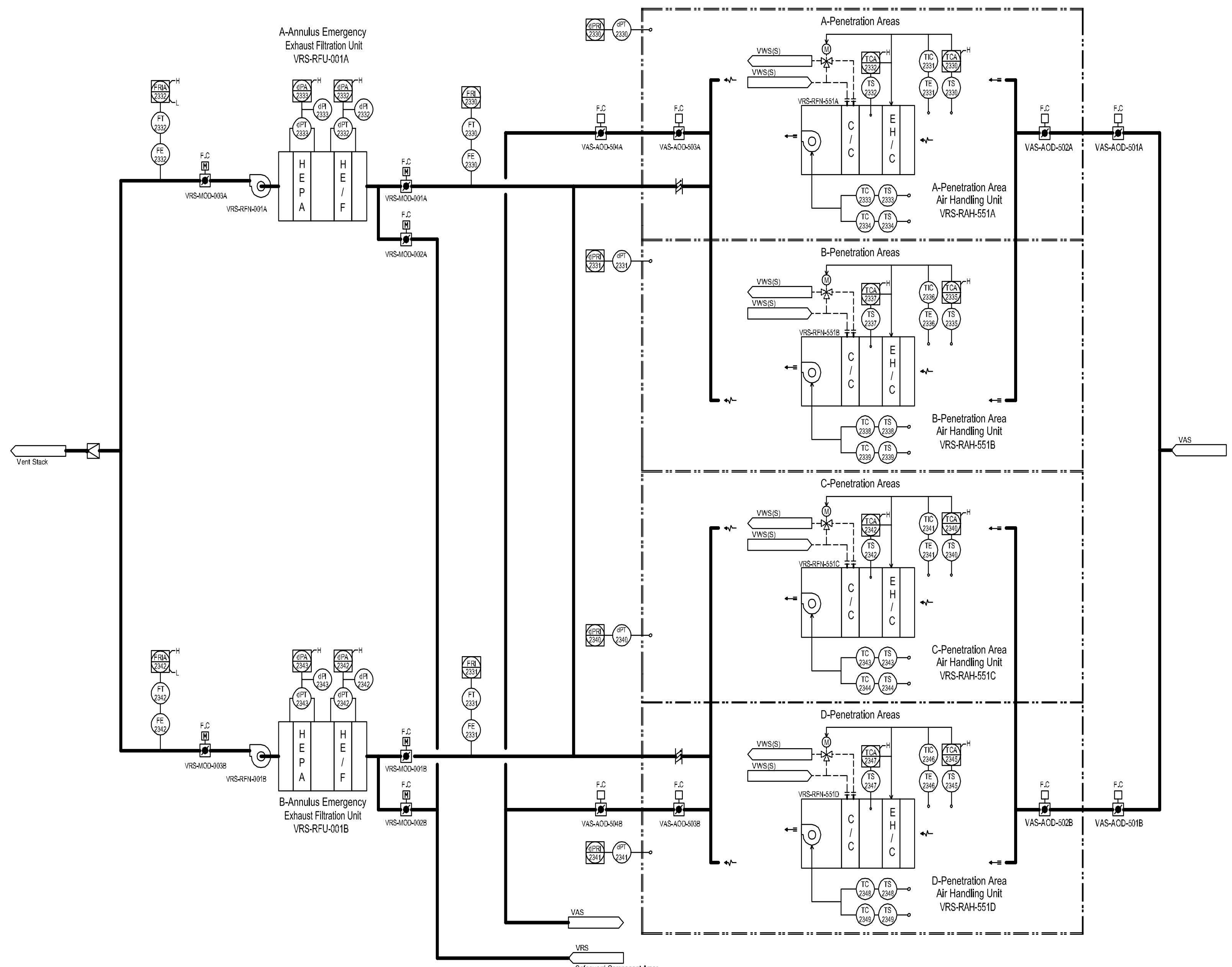


Figure 9.4.5-1 Annulus Emergency Exhaust System Flow Diagram

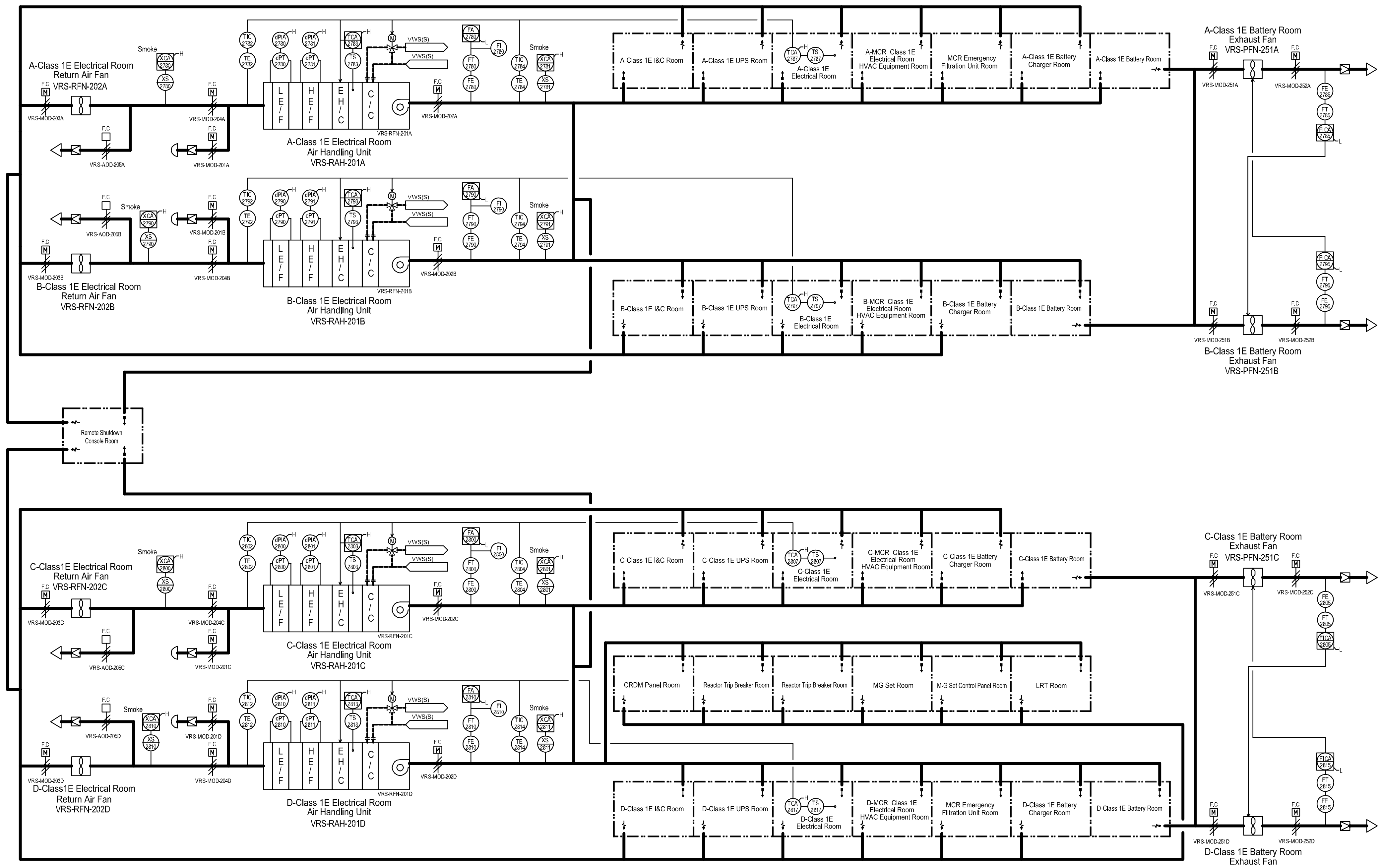


Figure 9.4.5-2 Class 1E Electrical Room HVAC System Flow Diagram

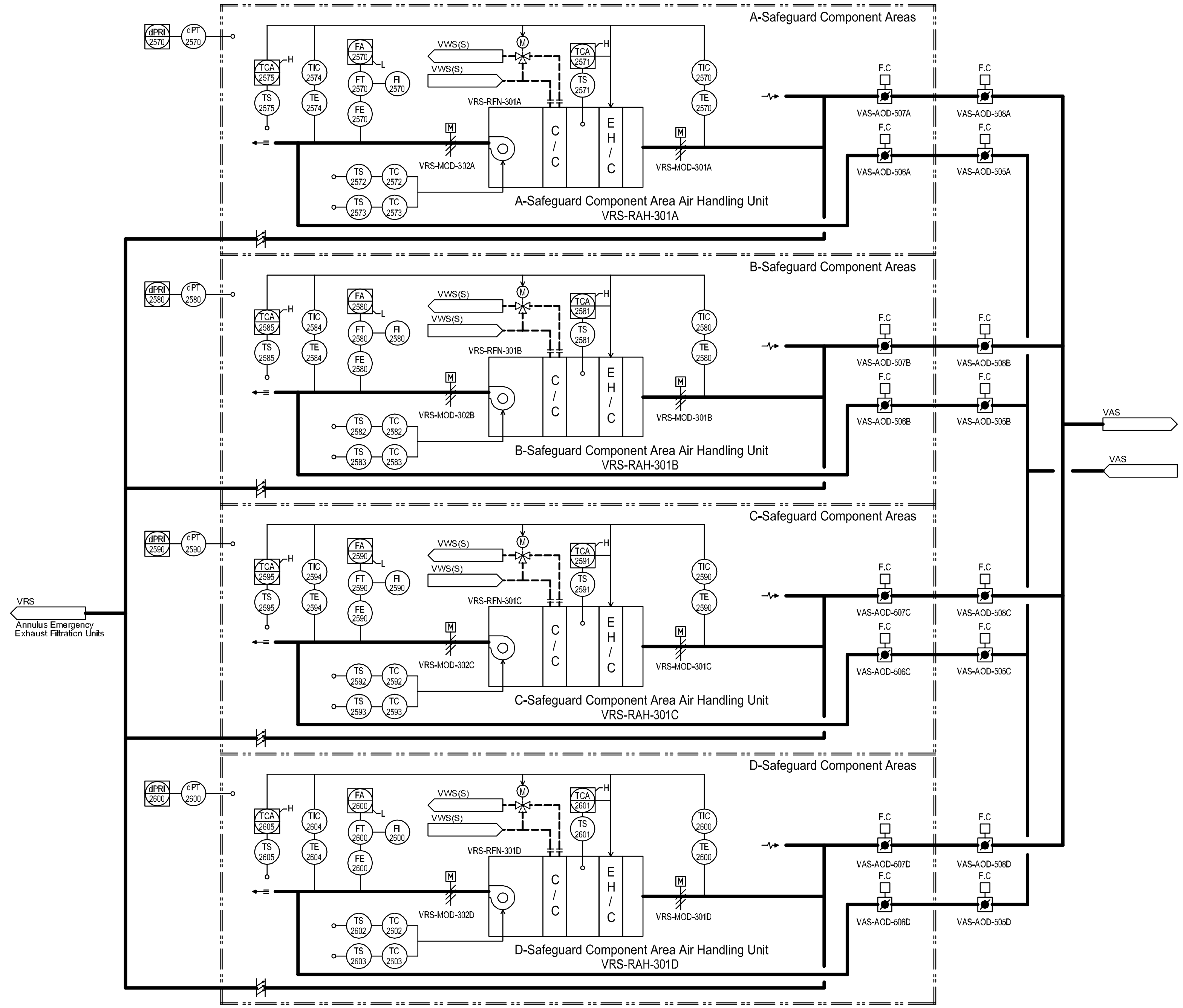


Figure 9.4.5-3 Safeguard Component Area HVAC System Flow Diagram

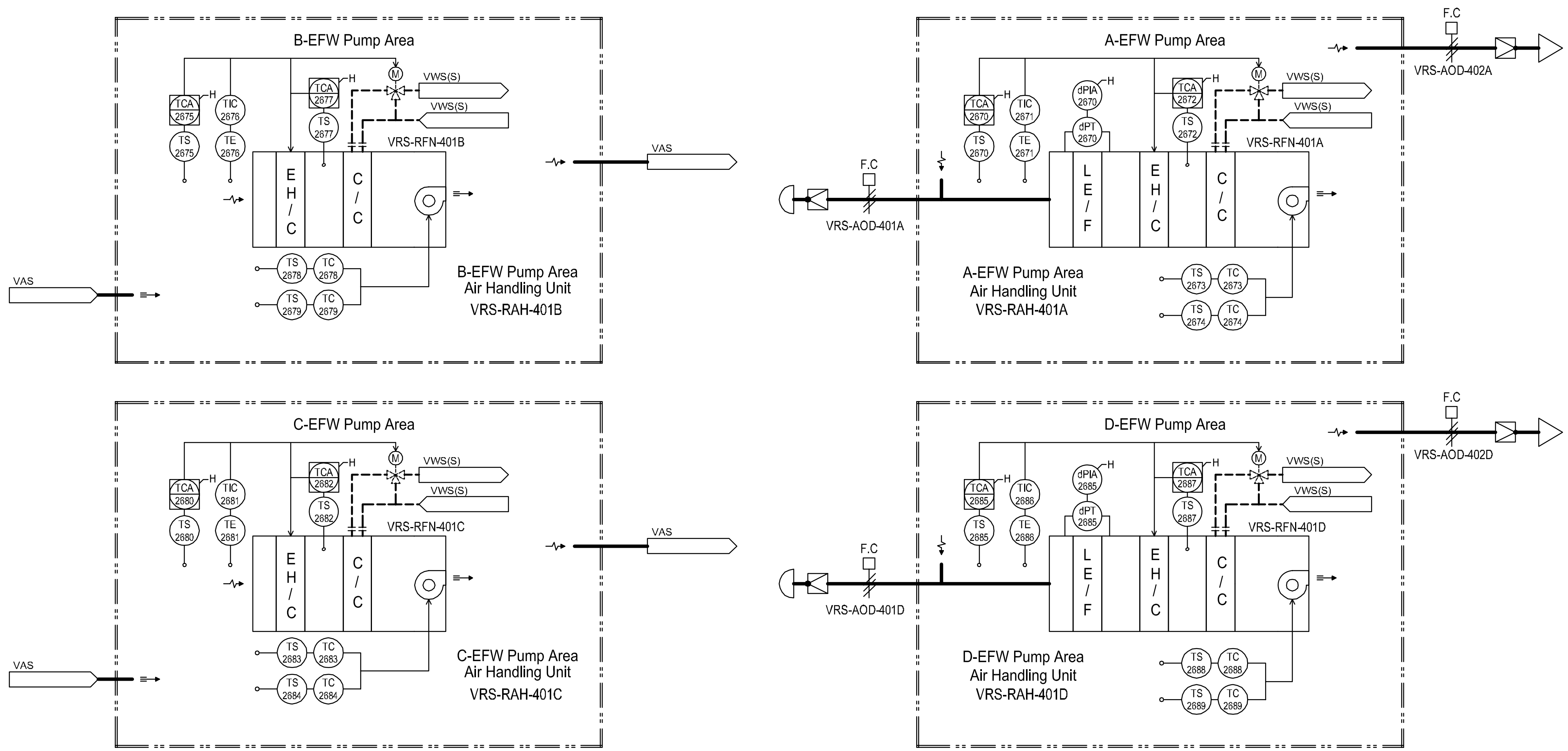


Figure 9.4.5-4 Emergency Feedwater Pump Area HVAC System Flow Diagram

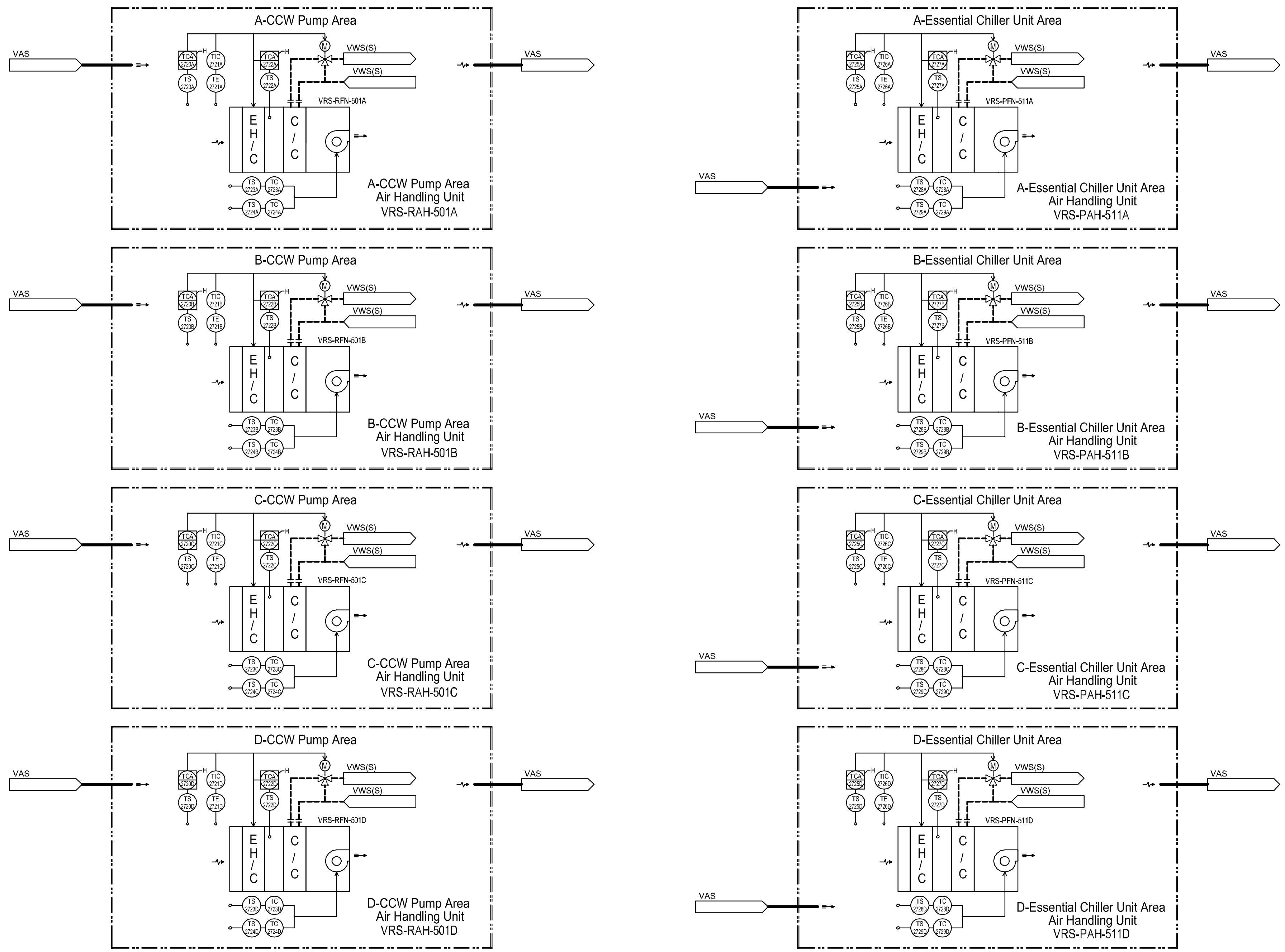


Figure 9.4.5-5 Safety Related Component Area HVAC System Flow Diagram (Sheet 1 of 2)

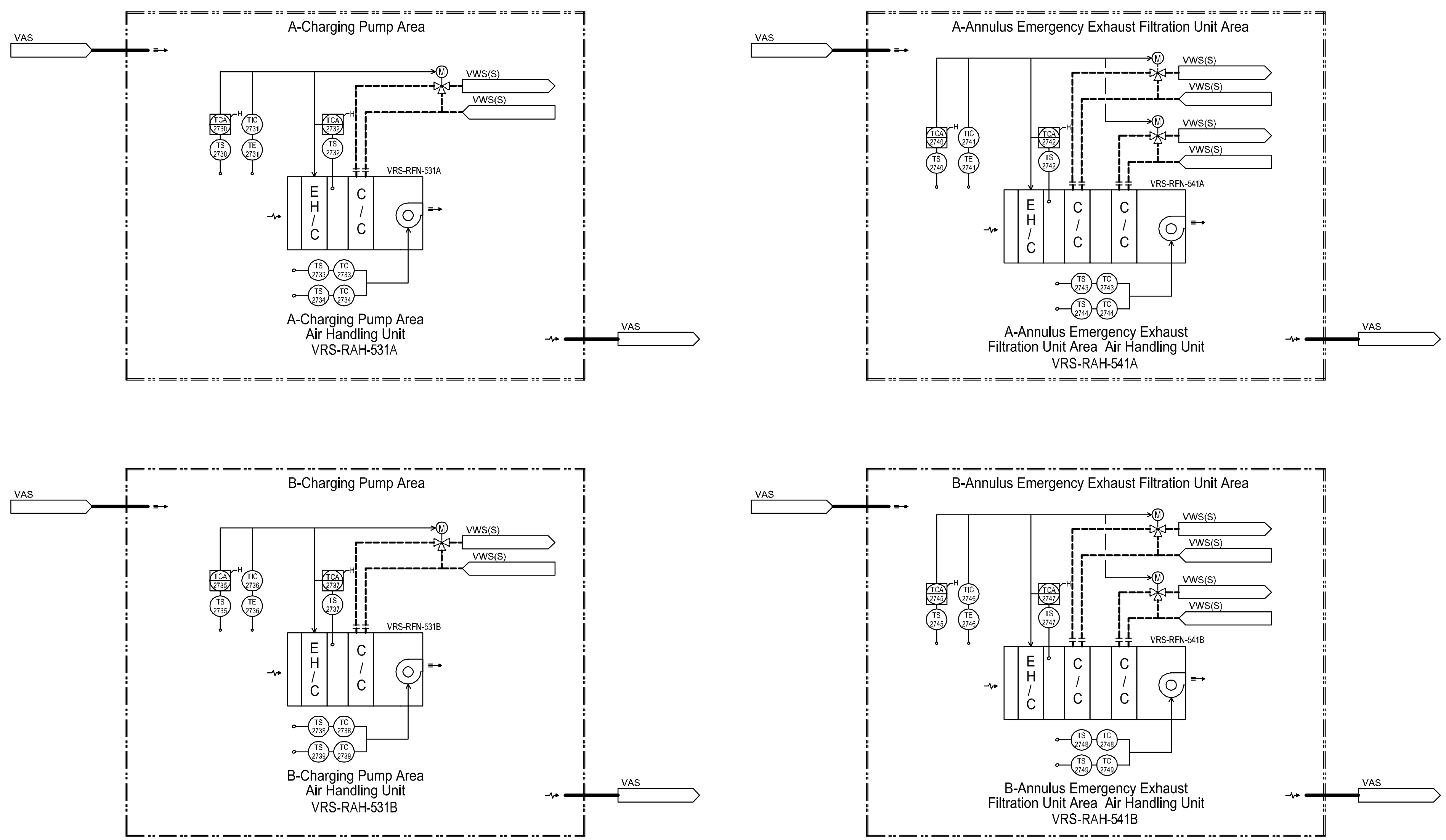


Figure 9.4.5-5 Safety Related Component Area HVAC System Flow Diagram (Sheet 2 of 2)

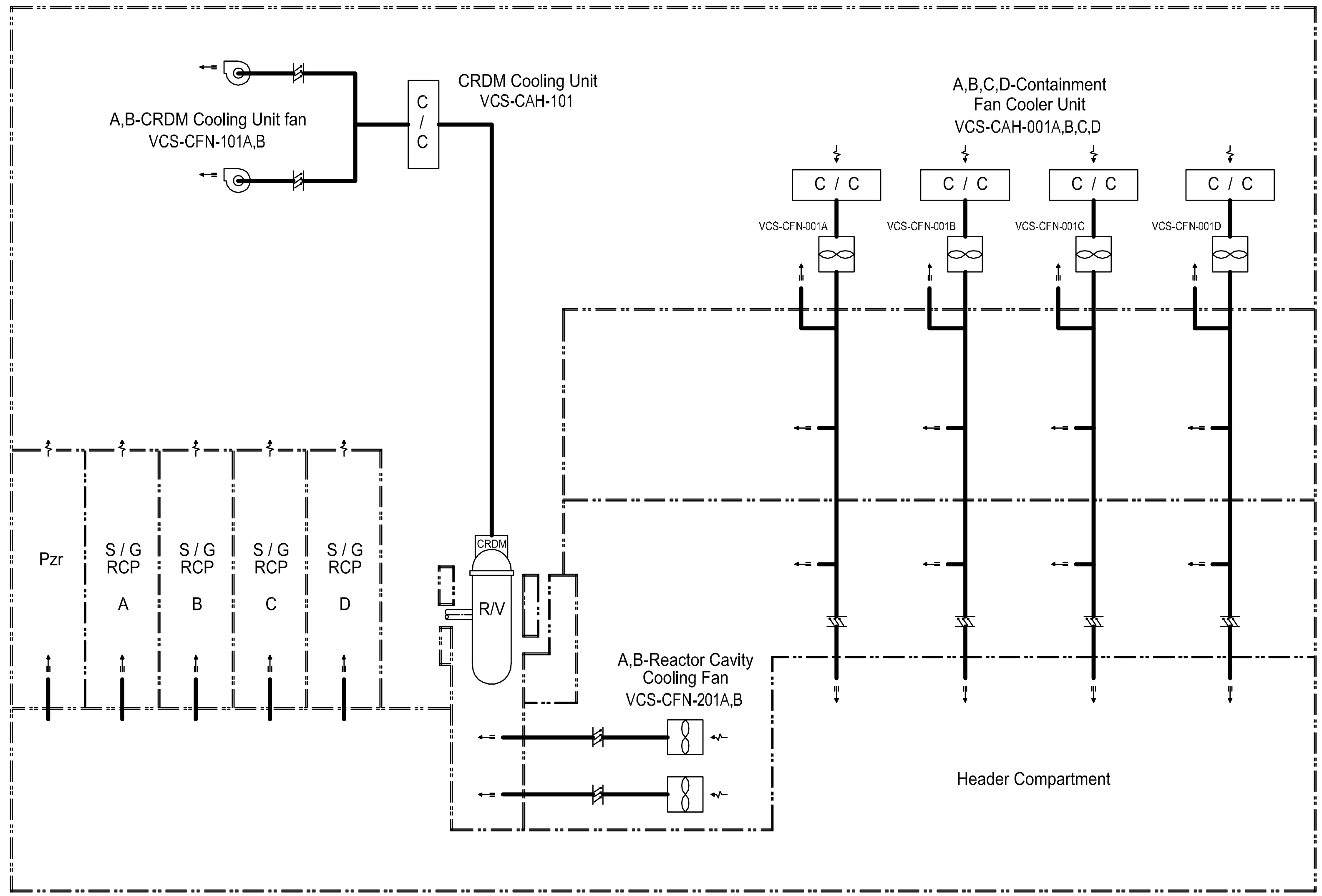


Figure 9.4.6-1 Containment Ventilation System Flow Diagram (1 of 2)

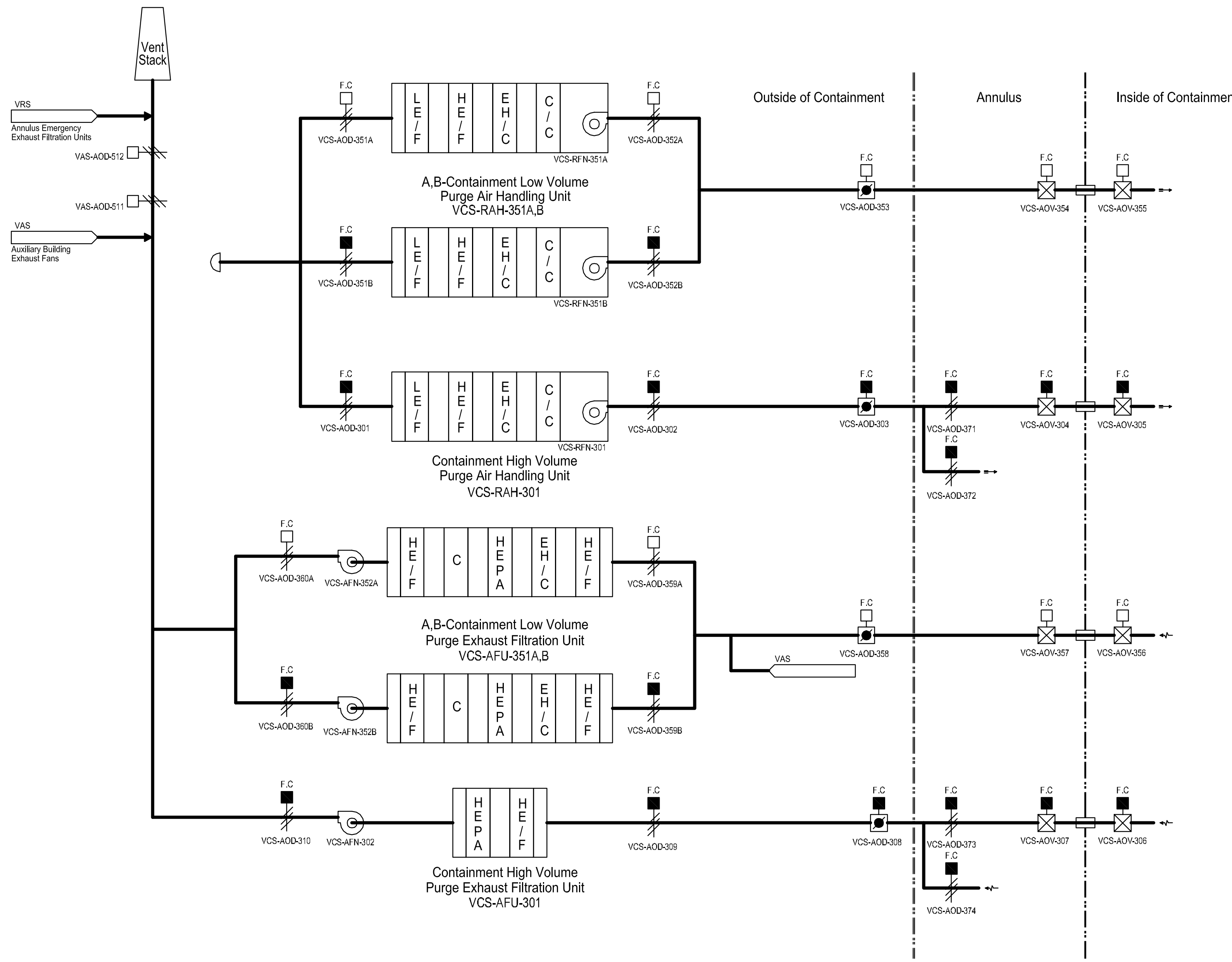


Figure 9.4.6-1 Containment Ventilation System Flow Diagram (2 of 2)

9.5 Other Auxiliary Systems

9.5.1 Fire Protection Program

The primary objectives of the US-APWR fire protection program are: to minimize the potential for fire and explosions to occur; to rapidly detect, control, and extinguish any fire that may occur; and to assure that any fire that may occur will not prevent the performance of necessary safe-shutdown functions and will not significantly increase the risk of radioactive releases to the environment. In addition, the US-APWR fire protection systems are designed such that any system failure or inadvertent operation dose not adversely impact the ability of the structures, systems and components (SSCs) important to safety to perform their safety functions. The US-APWR fire protection program primarily consists of the following elements:

- Comprehensive identification and analysis of fire and explosion hazards.
- Organization and staff positions responsible for management and implementation of the fire protection program.
- Fire prevention program consisting of administrative policy, procedures, and practices for training of general plant personnel; control of fire hazards; inspection, testing and maintenance of fire protection systems and features; interaction with plant design and modification program; control of fire system outages and impairments; and fire protection program quality assurance.
- Automatic fire detection, alarm, and suppression systems, including fire water supply and distribution systems.
- Manual suppression capability including portable fire extinguishers and standpipes, hydrants, hose stations, fire department connections, fire brigade organization, training, qualification, equipment, and drills; emergency plans and procedures; and offsite mutual aid capabilities.
- Building design for fire protection including layout of fire areas, fire barrier design and qualification testing, interior finish, electrical system design, ventilation system design, drainage systems, and other systems and features for minimizing the threat of fire.
- Post-fire safe-shutdown analysis and procedures that demonstrate that the plant can achieve and maintain safe-shutdown in the event of a fire.
- Probabilistic risk assessment (PRA) that identifies relative fire risks and vulnerabilities.

As discussed in SECY-05-0197 (Ref.9.5.1-2), the fire protection program is an operational program with implementation milestones for various individual elements of the program and applicable codes and standards that apply to the program elements. This section addresses features and elements of the fire protection program that are effective from the initiation of original design. The COL Applicant is responsible to provide the specific topics and implementation of program elements such as establishment of the fire brigade, implementation of a combustible and ignition source control program, development of inspection and test procedures and pre-fire plans, and provision of portable extinguishing equipment as elements. (See COL item 9.5(1)).

9.5.1.1 Design Bases

To achieve the high degree of fire safety for a nuclear power plant required to satisfy 10 CFR 50.48, "Fire Protection" (Ref.9.5.1-1), and to satisfy NRC fire protection objectives promulgated in RGs, the US-APWR is designed to:

- Prevent fire initiation by controlling, separating, and limiting the quantities of combustibles and sources of ignition.

- Isolate combustible materials and limit the spread of fire by subdividing plant buildings into fire areas separated by fire barriers and into fire zones or compartments, which are capable of substantially confining fire impact.

- Separate redundant safe-shutdown components and associated electrical divisions by 3-hour rated fire barriers to preserve the capability to safely shut down the plant following a fire.

- Provide the capability to safely shut down the plant using controls external to the main control room (MCR), should a fire require evacuation of the MCR or damage the MCR circuitry for safe-shutdown systems.

- Separate redundant trains of safety-related equipment used to mitigate the consequences of a design basis accident (but not required for safe-shutdown following a fire) so that a fire in one train dose not damage the redundant train and that fire damage to safety-related equipment is minimized. The US-APWR, being a new plant design, is designed to meets the requirements stipulated in RG 1.189, Rev. 1 (Ref.9.5.1-12), which are applicable to new plants. That is, cold shutdown can be achieved without any manual actions in any fire-involved areas or operator entry into those areas.

- Prevent smoke, hot gases, or fire suppressants from migrating from one fire area to another to the extent that they could adversely affect safe-shutdown capabilities, including operator actions.

- Provide confidence that failure or inadvertent operation of the fire protection system cannot prevent plant safety functions from being performed or adversely impact the operation of safety-related equipment required to remain operational.

- Preclude the loss of structural support, due to warping or distortion of building structural members caused by the heat from a fire, to the extent that such a failure could adversely affect safe-shutdown capabilities.

- Assure floor drains (Subsection 9.3.3) are provided in safety-related equipment areas to remove expected fire fighting water flow.

- Provide fire-fighting personnel access and escape routes for each fire area or fire zone/compartment.

- Provide communications (Subsection 9.5.2) and emergency lighting (Subsection 9.5.3) that facilitate safe-shutdown following a fire.

- Minimize exposure to personnel and releases to the environment of radioactivity or hazardous chemicals as a result of a fire.

The fire protection system is classified as a non-safety related, non-seismic system. The fire protection system is not required to remain functional following a plant accident or the most severe natural phenomena. Seismic design requirements are applied to portions of the system located in areas containing equipment required for safe-shutdown following a safe-shutdown earthquake (SSE). In addition, the containment isolation valves and associated piping for the fire protection system are safety-related (Equipment Class 2) and seismic category I.

The fire protection system is designed to perform the following functions:

- Detect and locate fires and provide operator indication of the location.

- Provide the capability to extinguish fires in any plant area, to protect site personnel, limit fire damage, and enhance safe-shutdown capabilities.

- Supply fire suppression water at a flow rate and pressure sufficient to satisfy the demand of any automatic sprinkler system plus 500 gpm for fire hoses, for a minimum of 2-hours, but not less than 300,000gallons.

- Maintain 100% design capacity of fire pump, assuming failure of the largest fire pump or the loss of offsite power (LOOP).

- Following a SSE, provide water to hose stations for manual fire fighting in areas containing safe-shutdown equipment.

In order to accomplish the goals of the fire protection program, appropriate industry codes and standards are consulted in the design, construction, and operation of the US-APWR.

The US-APWR design has four separate and redundant safety trains. Two safety trains can achieve safe-shutdown from the MCR, which eliminates the need for any operator manual actions that would require operators to enter any fire-involved areas. A remote shutdown console electrical isolation from the MCR and can accomplish the necessary shutdown actions should the MCR become unavailable due to fire.

Possible fire induced failures, including multiple spurious actuations, are addressed in post-fire safe-shutdown circuit analysis in accordance with RG 1.189 (Ref.9.5.1-12) and NFPA 804 (Ref.9.5.1-14).

The potential for fire induced multiple spurious equipment actuations is minimized by separating redundant electrical safety circuits from each other by 3-hour fire rated barriers, using digital instrumentation and control circuits, and application of fiber optic cable for control and instrumentation interfaces. The post-fire safe-shutdown circuit analysis ensures that one success path of shutdown SSCs remains free of fire damage. The US-APWR fire prevention, control, detection, and suppression features assure plant and personnel safety in the event of a fire. The US-APWR Fire Hazard Analysis(FHA) (see Appendix 9A) evaluates the adequacy and level of fire protection provided for systems and plant areas important to safety.

9.5.1.2 System Description

The fire protection program and the design of the fire protection system conform to the applicable codes and standards listed in Chapter 3, Section 3.2, and the relevant requirements of the following regulations:

- 10 CFR 50.48, “Fire Protection” (Ref. 9.5.1-1)
- 10 CFR 50, Appendix A, GDC 3, “Fire Protection” (Ref. 9.5.1-3)
- 10 CFR 50, Appendix A, GDC 5, “Sharing of Structures, Systems, and Components” (Ref. 9.5.1-4)
- 10 CFR 50, Appendix A, GDC 19, “MCR” (Ref. 9.5.1-5)
- 10 CFR 50, Appendix A, GDC 23, “Protection System Failure Modes” (Ref. 9.5.1-6)
- 10 CFR 52, “Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants” (Ref 9.5.1-7)
- 10 CFR 52.47(a)(1)(vi), “Contents of Applications”. [requirement for design specific probabilistic risk assessment”] (Ref. 9.5.1-8)
- 10 CFR 52.97(b)(1), “Issuance of Combined Licenses”. [identification of required inspections, test and analyses] (Ref. 9.5.1-9)
- 10 CFR 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste” (Ref. 9.5.1-10)

As documented herein, the US-APWR complies with specific guidance in Section 9.5.1 of the Standard Review Plan (SRP) (NUREG 0800) (Ref. 9.5.1-13) which provides acceptance criteria for meeting the requirements of the NRC regulations identified above.

In accordance with SRP Section 9.5.1, Rev. 5 (Ref.9.5.1-13), the US-APWR fire protection program has been developed using the guidance of Revision 1 of RG 1.189, "Fire Protection for Nuclear Power Plants," (Ref. 9.5.1-12) and as stipulated in RG 1.189, applicable guidance of NFPA 804, "Standard for Fire Protection for Advanced Light-Water Reactor Electric Generating Plants" (Ref. 9.5.1-14).

Table 9.5.1-1 is a point-by-point comparison of the conformance of the US-APWR fire protection program with the guidelines of RG 1.189, Rev. 1 (Ref.9.5.1-12). Table 9.5.1-2 is a point-by-point comparison of the conformance of the US-APWR fire protection program with the guidelines of NFPA 804 (Ref.9.5.1-14).

The fire protection system detects fires and provides the capability to extinguish or control them using fixed automatic and manual suppression systems, manual hose streams, and/or portable fire fighting equipment. The fire protection system consists of a number of fire detection and suppression elements, referred to as systems, including:

- Detection systems for early detection and notification of a fire occurrence.
- A water supply system including the fire pumps, adequate fire water supply source, yard main, and interior distribution piping.
- Fixed automatic fire suppression systems and equipment, including hydrants, standpipes, hose stations and portable fire extinguishers.

The fire protection system normally operates in a standby readiness mode. The fire water supply piping is maintained full and pressurized by operation of a pressure maintenance source to allow immediate startup of a fire pump on demand without creating any concern for water hammer effects within the fire protection piping system. Shutoff valves controlling fire suppression systems are normally aligned in the open position. Fire detection and alarm circuits are normally energized and are constantly monitored for system trouble or loss of power.

When a fire is detected, the fire detection system produces a local area alarm that is both audible and visually identifiable to any personnel that may be in the area. Additionally, both visual and audible alarms in the MCR and security central alarm station are provided by the fire detection system.

Where the fire area is protected by an automatic fire sprinkler system, operation of the suppression system begins when there is sufficient heat from the fire to initiate the operation of one or more sprinklers. In areas where a pre-action system is installed, when sufficient smoke or heat is generated by a fire the fire detection system actuates, charging the fire protection sprinkler system with water. This allows the necessary number of sprinklers to actuate based on the heat from the fire. Where the fire area is protected by manual suppression methods, the fire brigade responds to control and extinguish the fire. The fire brigade also responds when an automatic fire suppression system operates to assure the fire is controlled and suppressed and that the fire systems operation is terminated and reset to the standby readiness state.

A lead fire pump starts automatically on a low-pressure signal in the fire main. This occurs due to a demand for water from automatic or manual suppression systems. If the lead fire pump fails to start, a secondary fire pump starts upon a slightly lower pressure signal. A secondary fire pump also starts on a low-pressure signal during high demand situations when the lead fire pump is not capable of supplying the required flow demand. The fire pumps continue to run until they are manually stopped. The specific design of the fire protection water supply system is described in Subsection 9.5.1.2.2.

Ventilation system fire dampers automatically close on high temperature to limit the spread of fire and combustion products. Smoke is removed from the fire area as described in the FHA (Appendix 9A).

Fire fighting activities continue until the fire is extinguished. Suppression systems are manually stopped. Operator actions are taken to repair and restore affected detection, alarm, and suppression systems to standby readiness status.

9.5.1.2.1 Facility Features for Fire Protection

Architectural and Structural Features

Plant buildings use noncombustible structural materials, primarily reinforced concrete, gypsum, masonry block, structural steel, steel siding, and concrete/steel composite material. Fireproofing of structural steel is not normally required throughout the plant. However, the effects of heat on structural steel are considered in the plant design and localized structural steel fireproofing may be provided, as required, to maintain rated fire capability of any associated barriers.

Buildings outside primary containment generally have two or more enclosed stairways for emergency access. Firefighting personnel access routes and escape routes are provided for each fire area. Stairways serving as escape routes, access routes for fire fighting, or access routes to areas containing equipment necessary for safe-shutdown of the plant are clearly marked and equipped with emergency lighting (Subsection 9.5.3). Such stairwells, and elevator shafts, which penetrate fire barrier floors, are enclosed in towers with fire resistant construction and having a fire rating of minimum 2-hours. Openings in stairways are protected with qualified automatic or self-closing doors having a fire rating of 1.5-hours or more.

The MCR is designed to permit rapid detection and location of fires in the under-floor and allow ready access for manual firefighting. The raised-floor compartment is provided with a very early warning smoke detection system capable of identifying fires in the incipient stage. Should a fire occur in the raised-floor compartment that requires suppression prior to fire brigade intervention, an automatic, clean agent gaseous fire suppression system discharges to prevent any fire in this area from becoming well established and deep-seated. Portable fire extinguishers are provided within the MCR to facilitate incipient fire suppression by MCR operators. The adjacent staff areas are provided with a smoke detection system to provide early fire notification. Should a fire progress to the latter stage of the incipient phase prior to fire brigade response, the adjacent staff areas are provided with a low-pressure water mist fire suppression system capable of extinguishing or controlling a fire until the fire brigade arrives. The MCR envelope is a 3-hour fire rated compartment and provides fire separation from adjacent areas.

Plant Arrangement

The plant is subdivided into distinct fire areas and zones. Fire areas are completely confined by 3-hour fire rated barriers with all penetrations and openings protected with 3-hour rated components. Fire areas are subdivided into fire zones primarily based on maintaining separation of redundant safety trains. Fire zones are capable of substantially confining the adverse impact of potential fires and minimizing the risk of the spread of fire and the resultant consequential damage from corrosive gases, fire suppression agents, smoke, and radioactive contaminants.

The subdivision of fire zones within a fire area is facilitated by isolating the zone with interior walls, floor slabs, spatial separation and the location of major equipment within each fire area. Fire zones are not necessarily completely enclosed by fire rated barriers, but the enclosure is sufficient to substantially confine the adverse impact of a fire within the fire zone boundaries.

Fire barriers are provided in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12). 3-hour fire rated barriers are noncombustible and bound fire areas containing safety-related components. The fire resistance of fire barriers in non-safety related areas of the plant may be less than 3-hours, where justified by the FHA (Appendix 9A).

3-hour fire rated barriers provide complete separation of redundant safe-shutdown components, including equipment, electrical cables, instrumentation and controls, except where the need for separation conflicts with other important requirements, specifically:

- Complete fire barrier separation is not provided between redundant safety trains within the MCR fire area because functional requirements make complete separation impractical. The risk of fire in the MCR is minimized by limiting the quantity of electrical cables to only those cables necessary to perform MCR functions. Continuous occupancy provides confidence that fires would be quickly detected and suppressed. The raised-floor detection systems and clean agent suppression system provide defense-in-depth protection and reasonable assurance that a MCR fire is detected and suppressed. Should a fire require evacuation of the MCR, the plant can be safely shut down using independent controls at the remote shutdown console located in a separate fire area on the plant elevation above the MCR.

- The containment is a single fire area. Complete fire barrier separation necessary to define a fire area is not practical throughout the primary containment fire area because of the need to satisfy other design requirements, such as allowing for pressure equalization within the containment following a high energy line break. Fire protection features and equipment arrangement which define fire zones within the containment fire area provide confidence that at least two of four trains of safe-shutdown equipment remain undamaged following a fire in any fire zone. The quantity of combustible materials in the containment is minimized. An oil leakage collection system for the reactor coolant pumps (RCPs) motor lubricating system is provided and collection tanks for accumulation of any oil leakage are provided in the lower levels of the primary containment. The tank for each RCP is sized to hold the total oil leakage volume from its RCP motor plus an additional 10%, and is provided with a flame arrestor on the vent. Redundant trains of safe-shutdown components are separated whenever possible by existing structural walls, or by distance. Selected cables of a safety-related division which pass through a fire zone of an unrelated division may be protected by fire barriers or by noncombustible radiant heat shields having a minimum fire rating of 30 minutes. The fire protection system provides appropriate fire detection and suppression capabilities.

Outside of the primary containment and the MCR, the arrangement of plant equipment and routing of cable are such that should a fire occur in any one fire area, safe-shutdown can be achieved and maintained utilizing components from at least two of the other three available safety trains of equipment, which are independently separated by 3-hour fire rated barriers.

Openings and penetrations through fire barriers are protected in accordance with features providing a fire resistance rating compatible with the fire barrier, rating and proven by appropriate independent laboratory testing (i.e., providing 3-hours fire resistance rating).

The FHA (Appendix 9A) contains a description of plant fire areas, fire zones, fire barriers, and the protection of barrier openings, as well as a description of the separation between redundant safe-shutdown components.

Electrical Cable Design, Routing, and Separation

Electrical cable (including fiber optic cable) and methods of raceway construction are selected in accordance with RG 1.189 guidance (Ref.9.5.1-12). Metal cable trays are used throughout the plant. Rigid metal conduit or other metal raceways are used for selected cable runs. Flexible metallic tubing may be used in short lengths for equipment connections.

The insulating and jacketing material for electrical cables are selected to meet the fire and flame test requirements of IEEE Standard 1202 (Ref. 9.5.1-19) or IEEE 383 (Ref. 9.5.1-20).

Redundant safety trains are installed in suitable raceways and are generally separated from adjacent safety trains by 3-hour fire rated structural barriers such as reinforced concrete walls with 3-hour fire rated dampers and penetration seals, and 3-hour fire rated doors between compartments. In a limited number of cases, electrical train separation is obtained by enclosing cables trays and conduits within a fire protective envelope such as a fire rated wrap system. In such instances, the cables are appropriately de-rated and the fire wrap system has passed laboratory testing showing that the criteria of RG 1.189, Rev. 1 (Ref.9.5.1-12) and Supplement 1 to NRC Generic Letter 86-10 (Ref.9.5.1-11) are satisfied by the applicable installation. The design, routing, and separation of cables and raceways are further described in Chapter 8.

Control of Combustible Materials

The plant is constructed using noncombustible materials to the extent practicable. The selection of construction materials and the control of combustible materials are in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12) and Section 3.3 of NFPA 804 (Ref. 9.5.1-14).

The storage and use of hydrogen are in accordance with the guidance of NFPA 55 (Ref. 9.5.1-18). Hydrogen lines in safety-related areas are designed to seismic category I requirements.

Ventilation systems are designed to maintain the hydrogen concentrations in the battery rooms below 2% by volume, as described in Subsections 9.4.3 and 9.4.5.

The T/B and the turbine lubrication oil system, located in the T/B, are separated from areas containing safety-related equipment by 3-hour rated fire barriers.

The COL Applicant takes measures to assure that outdoor oil-filled transformers are separated from plant buildings in accordance with the guidance of NFPA 804 (Ref. 9.5.1-14) (See COL item 9.5(2)).

The primary fuel storage for each (4 total) emergency power source gas turbine generator (GTG) and its associated transfer pumps is located in the yard area and is below grade within a substantial concrete vault confinement. Potential fuel leaks or spills from the storage tanks are confined within the compartment surrounding the tanks. Each GTG day tank located within its GTG room is provided with a spill confinement enclosure capable of holding 110% of the day tank capacity.

Quantities and locations of other combustible materials are identified in the FHA (see Appendix 9A).

Control of Radioactive Materials

As described in the FHA (Appendix 9A), materials that collect or contain radioactivity, such as spent ion exchange resins and filters, are protected and stored in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12).

9.5.1.2.2 Fire Protection Water Supply System

The fire water supply system is designed in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12) and the applicable NFPA codes and standards. The fire protection water supply system is sized such that it contains sufficient water for two hours operation of the largest US-APWR sprinkler system plus a 500 gpm manual hose stream allowance to support fire suppression activities. Redundant water supply capability is provided. In addition to fire suppression activities, the fire protection water supply system may also supply water for severe accident prevention, for alternative component cooling water, and for severe accident mitigation for the containment spray system and water injection to the reactor cavity, if it is available.

As discussed in Subsection 9.5.1.2, the fire pump arrangement provides one diesel or electric fire pump to be the lead fire pump and another fire pumps for secondary service. Each pump is capable of providing 100% of the system flow requirements. This provides complete redundancy and allows one pump to be out of service for maintenance. An electric-motor driven jockey pump (or acceptable pressure source) is used to keep the fire water system full of water and pressurized, as required. Piping between the fire water sources and the fire pumps is in accordance with the guidance of NFPA 20 (Ref. 9.5.1-15). A failure in one water source or its piping cannot cause both water sources to be unavailable.

The COL Applicant is responsible to designate a specific fire protection water supply system that complies with the guidance of RG 1.189 (Ref. 9.5.1-12) and the applicable NFPA codes and standards (See COL item 9.5(2)).

9.5.1.2.3 Fire Water Supply Piping, Yard Piping, and Yard Hydrants

Fire protection water is distributed by an underground yard main loop, designed in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). The yard main also includes a building interior header that distributes water to suppression systems within the main plant buildings. Post-indicator valves provide sectionalized control and permit isolation of portions of the yard main for maintenance or repair. A post-indicator valve also separates the individual fire pump connections to the yard main.

Sprinkler and standpipe systems are supplied by connections from the fire main. Where plant areas, other than the containment and outlying buildings, are protected by both sprinkler systems and standpipe systems, the connections from the fire main are arranged so that a single active failure or crack in a moderate energy line (such as fire protection) cannot impair both systems.

Manual valves for sectionalized control of the fire main or for shutoff of the water supply to suppression systems are electrically supervised.

Hydrants are provided on the yard main in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). They are located at intervals of up to 250 feet in accordance with NFPA 804(Ref.9.5.1-14). They provide hose stream protection for every part of each building and two hose streams for every part of the interior of each building not covered by standpipe protection. The lateral connection to each hydrant is controlled by an underground isolation valve. Curb boxes are provided for each hydrant isolation valve.

Hose houses are provided in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). They are located at intervals of not more than 1000 feet along the yard main in accordance with NFPA 804 (Ref.9.5.1-14).

Outdoor fire water piping and water suppression systems located in unheated areas of the plant are protected from freezing.

The COL Applicant is responsible to designate a specific design of the fire main system (COL Item 9.5(2)).

9.5.1.2.4 Manual Suppression Means

Manual fire suppression capability is provided in all areas of the plant, including areas that have an automatic fire suppression system. Manual fire suppression capabilities include the yard main hydrants, interior building hose stations, and portable extinguishers.

Standpipe and Hose Systems

Standpipe systems are provided for each building in accordance with the guidance of NFPA 14 (Ref. 9.5.1-17) requirements for Class III service. Wet standpipe systems are used, except inside containment. Individual standpipes are at least 4 inches in diameter for multiple hose connections and at least 2.5 inches in diameter for single hose connections.

The standpipe system for manual firefighting in areas containing equipment required for safe-shutdown is designed and supported so that it can withstand the effects of a SSE and remain functional. That standpipe can be isolated from its normal water source after a SSE and the standpipe can be aligned to an alternate safety-related water source which capacity is at least 18,000 gallons. The COL Applicant is responsible to provide the specific alternate safety-related water source (See COL Item 9.5(2)).

Hose stations are located to facilitate access for manual fire fighting, as described in the FHA. Areas that present, or could present, a fire exposure risk to safety-related equipment are within reach of at least one effective hose stream. Alternative hose stations are provided for any area where the fire could block access to a single hose station serving that area. To the maximum extent practical, hose stations are located outside of high radiation areas.

Each hose station has less than 100 feet of 1 ½ inch woven jacket lined fire hose. Appropriate nozzles for fire fighting within an electric generating plant with energized equipment are provided at each station.

Portable Fire Extinguishers

Portable fire extinguishers are provided throughout the plant. Portable extinguishers are readily accessible for use in high radiation areas but are not located within those areas unless the FHA indicates that a specific requirement exists.

9.5.1.2.5 Automatic Extinguishing Systems

Automatic fire protection systems are provided in accordance with recommended coverage areas in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12), the FHA, and the applicable NFPA codes and standards, with consideration of the unique aspects of each application, including building characteristics, material of construction, environmental conditions, fire area contents, and adjacent structures.

The selection of automatic suppression systems for each plant area is in accordance with the guidance of NFPA 804 (Ref. 9.5.1-14). Water systems are preferred, but the use of automatic water-based suppression systems for fire fighting in radiation areas is minimized because of the possible spread of contamination. Halon and carbon dioxide total flooding systems are not used; however, a clean agent gaseous fire suppression agent in conjunction with very early warning fire detection is used for selected areas with heavy cable fire loading.

The FHA describes the fire suppression systems provided for each area.

Automatic Water Suppression Systems

Automatic sprinkler and water spray systems are provided in accordance with the requirements of NFPA 13 (Ref. 9.5.1-21) and NFPA 15 (Ref. 9.5.1-22). Water mist systems are installed in accordance with NFPA 750 (Ref. 9.5.1-24). Each system consists of overhead piping and components from a water supply valve to the point where water discharges from the system. Some systems (pre-action) have a control valve that is actuated automatically by the fire detection system. Each system has a status monitoring device for actuating an alarm when the system is in operation.

Pre-action sprinkler systems are used where leaking or inadvertent actuation of water filled sprinkler systems could produce undesirable consequences, such as water discharge on equipment important to continued plant operation.

Each type of automatic sprinkler and automatic water spray system used for the US-APWR is briefly described below:

- Wet Pipe – A sprinkler system employing closed (fusible link or glass bulb operated) sprinklers attached to a water-filled piping network. Water discharges immediately from those sprinklers where the heat from a fire is sufficient to melt or break the sprinkler's actuation device, allowing system water pressure to open the sprinkler head and discharge a water spray pattern on the fire. System operation is terminated manually by shutting off the water supply valve.

- Pre-action – A sprinkler system employing closed sprinklers attached to a dry piping network with fire detector(s) installed in the same area as the sprinklers. Operation of the fire detection system opens a pre-action valve, which permits water to flow into the sprinkler network and to be discharged from any sprinklers that may have been opened by the fire. System operation is terminated manually by shutting the water supply valve.

- Deluge Sprinkler or Water Spray System – A system employing open sprinklers or spray nozzles (i.e., no fusible link or glass bulb) attached to a dry piping network, with fire detector(s) installed in the same area as the sprinklers/spray nozzles. Operation of the fire detection system opens a deluge valve, which permits water to flow into the sprinkler system network and to be discharged from all the sprinklers or spray nozzles. System operation is terminated manually by shutting the water supply valve.

- Water Mist Fire Suppression System – A water mist system is any fire protection suppression or extinguishing system that relies upon the evaporation of small water droplets to suppress or extinguish a fire. Generally, water mist systems use higher pressure and lower water flow rates than conventional alternatives, but this is not required for classification as a water mist system. Water mist systems as specified for the US-APWR are very similar to traditional sprinklers. Automatic nozzles are used, closed heads are laid out in a manner similar to sprinklers, similar obstruction rules apply, and hydraulic calculations are performed using traditional sprinkler tools. The largest difference is that the water requirements for the mist system are substantially less than the sprinkler system, as much as 90% less. A water mist system is used for MCR staff rooms where excessive water discharge from normal NFPA 13 (Ref.9.5.1-21) or 15 (Ref.9.5.1-22) sprinklers/deluge heads is a concern for safe operation and shutdown of the plant. System operation is terminated manually by shutting the water supply valve.

Automatic Gaseous Suppression Systems

The US-APWR employs several gaseous fire suppression systems in select critical plant areas with heavy fire loading or raised-floor compartments where access for fire fighting may be difficult. For each area where a total flooding gaseous fire suppression system is identified, an environmentally-friendly fire suppression clean agent is used (Novec® 1230 fluid in a 5.6% concentration for cable raised-floor areas, or equal). In conjunction with the gaseous system, an air aspirating, very early warning fire detection system (VESDA® or equal) is used to provide notification of a fire. Such an early notification provides a defense-in-depth fire protection approach for these areas which helps assure adequate fire safety for the areas.

9.5.1.2.6 Fire Detection and Fire Alarm System

Fire detection and alarm systems are provided where required by the FHA, in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12), and NFPA 72 (Ref. 9.5.1-23). Fire detection and alarm systems are generally provided in accordance with the guidance of NFPA 804 (Ref. 9.5.1-14) requirements and guidance as modified by RG 1.189 stipulations (Ref. 9.5.1-12).

Fire detectors respond to smoke, flame, heat, or the products of combustion. The installation of fire detectors is in accordance with the guidance of NFPA 72 (Ref. 9.5.1-23) and the manufacturer's recommendations. The selection and installation of fire detectors also considers the type of hazard, combustible loading, the type of combustion products, and detector response characteristics. The types of detectors and detection system used in each fire area are identified in the FHA (Appendix 9A).

The fire detection system provides audible and visual alarms and system trouble annunciation in the MCR and the security central alarm station. The fire detection systems may also result in actuation of pre-action valves or release gaseous fire suppression agent, as appropriate. Annunciation circuits connecting the zone, main and remote annunciation panels are electrically supervised.

Each fire detection, indicating, and alarm system component is powered with reliable ac electrical power from the non-Class 1E uninterruptible power supply system. This system is described in Chapter 8, Subsection 8.3.2.1.

9.5.1.2.7 Building Ventilation

The heating, ventilation, and air-conditioning (HVAC) systems supply fresh air to personnel working in the plant during normal plant operation, remove radioactive materials, and restrict radioactive releases to the environment (Section 9.4).

Ventilation system fire dampers close automatically against full airflow, if required, on high temperature to limit the spread of fire and combustion products. Fire dampers serving certain safety-related, smoke-sensitive areas are also closed in response to an initiation signal from the fire detection system. In selected areas, the fire alarm system provides interface with the HVAC systems such as to shut down HVAC operation upon a fire alarm signal. Where continued HVAC system operation is deemed necessary for radiological control, the HVAC system incorporates design features to allow operation under fire conditions. Smoke is removed from the fire area as described in the FHA (Appendix 9A).

The MCR ventilation system purges smoke in the event of a fire inside the MCR and isolates the room if smoke is detected in the normal outside air intake ducts.

9.5.1.3 Safety Evaluation

The FHA evaluates the potential for the occurrence of fires within the plant and describes how fires are detected and suppressed. It also confirms that the plant can be safely shut down following a postulated fire. The FHA is included in Appendix 9A.

The FHA includes a set of fire area drawings and a discussion of the analysis methodology. It also provides the following information for each fire area in the plant:

- A description of the fire areas and associated fire zones, fire barriers, as well as fire detection and suppression capabilities.
- Identification of the type, quantity, and location of the in-situ and anticipated transient combustible materials, and combustible loading.
- A description of the maximum severity fire that can be expected for the compartment based on the hazards present.
- A discussion of safety-related mechanical and electrical equipment.
- An evaluation of fire protection system adequacy and the consequences of a fire, including a discussion of the control and removal of smoke and hot gases, and drainage system adequacy.

For fire areas containing safety-related SSCs, the following information is also provided in the FHA.

- An evaluation of fire protection system integrity including an assessment of whether the credible failure of a fire protection system component could cause inadvertent operation of an automatic fire suppression system in the fire area, and the resulting consequences. Also discussed is verification that no potential single impairment of the fire protection system could incapacitate both the automatic suppression system and the backup manual suppression system (generally a hose station), for fire areas where both types of suppression systems are provided.

- A safe-shutdown evaluation confirming the capability to safely shut down the reactor and maintain it in a safe-shutdown condition following a severe fire assuming complete loss of all components, equipment and circuits in the fire origination area.

The safe-shutdown evaluation is based upon all components in a single fire area outside containment or any fire zone inside containment being disabled by fire. Success is based upon the plant being able to achieve safe-shutdown as discussed in the FHA (Appendix 9A).

The systems necessary for safe-shutdown perform two basic functions. First, they provide the necessary reactivity control to maintain the core in a sub-critical condition. Boration capability is provided to compensate for xenon decay and to maintain the required core shutdown margin. Second, these systems provide residual heat removal capability to maintain adequate core cooling.

The reactor protection and the engineered safety features actuation systems are designed to mitigate accident conditions and achieve immediate stable hot shutdown conditions for the plant. Manual controls through the safety visual display units (VDUs) allow operators to maintain longer term hot shutdown conditions and transition to and maintain cold shutdown conditions for the plant. All manual and automatic operation of plant safety systems is via the safety logic system.

The remote shutdown console, located on plant floor level 4F of the R/B outside the MCR fire zone, is installed so that safe-shutdown can be achieved from that location in the event that the operators are required to evacuate the MCR on plant level 2F. Remote shutdown methodology is discussed in Chapter 7, Section 7.4.

9.5.1.4 Inspection and Testing Requirements

The fire protection systems are inspected and tested prior to initial startup. Preoperational testing is described in Chapter 14, Section 14.2.

The fire pumps are initially tested by the manufacturer in accordance with the guidance of NFPA 20 (Ref. 9.5.1-15) to verify pressure integrity and performance. Periodic testing of fire protection systems during plant operation is primarily governed by applicable NFPA codes and standards in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12).

9.5.1.5 Instrumentation Requirements

Pressure sensors start the fire pumps on decreasing fire main water pressure. Pressure indicators confirm adequate pressures for automatic and manual suppression systems, and selected pressure sensors monitor air pressure in fire suppression piping.

Valve position sensors are used to monitor the position of water supply valves (i.e., serve a supervisory function).

The fire water storage tank is monitored for level and temperature. The diesel-driven fire pump fuel storage tank, if a diesel driven fire pump is used, is monitored for level.

The run status of the fire pumps are indicated on the display in MCR.

9.5.2 Communication Systems

The communication systems provide for effective intra-plant and plant-to-offsite communications during normal, transient, fire, accidents, off-normal phenomena (e.g., LOOP), and security-related events. The various plant communication systems provide independent, alternate, redundant communication paths to ensure the ability to communicate with station and offsite agencies during all operating conditions.

Some parts of the facility communication systems, related functions and external interfaces are the responsibility of the licensee and are addressed by the COL applicant. These items include the communications aspects of the licensee’s security and detection systems, the emergency response center (10 CFR 50.34(f)(2) and 10 CFR 50.47(a)(8)), the technical support center, the emergency plan (10 CFR 50 Appendix E) and fire response plans (10 CFR 50, Appendix A, GDC 3) (Ref. 9.5.2-1, 2, 3 and 4).

The plant’s communication systems are not safety-related in that they are not needed to mitigate the consequences of a design basis accident. However, they are important to safety in that they are needed to operate the facility and to provide security for the plant; by enabling each guard, watchman, or armed response individual on duty to maintain continuous communication with security forces and with appropriate agencies (10 CFR 73.55(e) and (f) (Ref. 9.5.2-5). Security communications are discussed in Section 13.6.

9.5.2.1 Design Basis

The principal design criteria in 10 CFR 50, Appendix A, establish the necessary design basis, fabrication, construction, testing, and performance requirements for the US-APWR safety-related structures, systems and components. Adherence to the concepts inherent in these criteria, as they pertain to communication systems, provides reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. The communication systems adhere to the guidance provided in 10 CFR 50, Appendix A, GDC 1, 2, 3, 4, and 19 (Ref. 9.5.2-4).

The communication systems components are qualified to operate in all plant environments. Depending on the specific installed plant location, the selected components are qualified operate in the following environments, as applicable:

a) Extremely noisy locations, up to 115 dB sound pressure level

b) Ambient temperatures ranging from -22 ^{o}F to +158 ^{o}F

c) Humid and oily locations

d) Hazardous areas (10 CFR 50, Appendix A, GDC 4)

e) Outdoors (where indicated)

f) Indoor areas with thick concrete walls or other obstructions

g) With personal wearing protective equipment

h) Areas having constant vibration

The plant communication systems are designed, installed and tested to demonstrate the ability to withstand the effect of natural phenomena appropriate to the respective plant locations. If needed, the plant communication systems can facilitate shutdown of the reactor from outside of the MCR by providing communications between the remote shutdown console and other plant locations.

The plant communication systems are used for conveying verbal information as well as facsimile transmissions and digital based communications. The plant communication systems are arranged in a redundant fashion to provide for a minimum of two verbal communication paths between all plant locations and as well as external communications. For example, if the plant page system were to malfunction, operators can rely on the plant radio or telephone systems for intra-plant communications. If all systems requiring a power source were to fail, the operators can still utilize the sound powered telephone system to communicate between critical plant areas, including the remote shutdown consoles. The communication systems are designed to be used with respiratory equipment consistent with the guidelines provided in Electric Power Research Institute (EPRI) NP-6559, "Voice Communication Systems Compatible with Respiratory Protection" (Ref. 9.5.2-6).

9.5.2.1.1 Communication System Power Basis

The plant communication systems are independent of each other and have either a built-in DC battery power source (e.g., portable radios) or are powered from non safety-related uninterruptible power supply (UPS) systems. The communication systems receive power from non-Class 1E UPS and thus will operate through LOOP or SBO conditions (IEEE Std. 308-2001) (Ref. 9.5.2-7).

9.5.2.1.2 Systems' Interference Basis

The plant communication systems use industrial quality, commercially available parts and components. The systems are listed by a recognized testing agency (e.g., Underwriters Laboratory (UL)) for use in similar industrial settings. Experience has shown these systems to have a high degree of availability. The selection of these systems and components is based on the guidance provided in EPRI NP-5652, "Guidelines for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications" (Ref.

9.5.2-8). The equipment is designed to be isolated or shielded from the adverse effects of electromagnetic interference and radio frequency interference per RG 1.180, “Guidelines for Evaluating Electromagnetic and Radio Frequency Interference in Safety Related Instrumentation and Control Systems” (Ref. 9.5.2-9).

9.5.2.1.3 Design Codes and Standards

9.5.2.1.3.1 General

These codes and standards apply to the US-APWR communication systems design.

9.5.2.1.3.2 National Fire Protection Association (NFPA)

- NFPA 70 National Electric Code
- NFPA 76 Standard for the Fire Protection of Telecommunications Facilities

9.5.2.1.3.3 Underwriters Laboratory (UL)

- UL 464 Audible Signal Appliances
- UL 1604 Electrical Equipment for Use in Class I and II, Division 2 and Class 3 Hazardous Locations
- UL 1638 Visual Signaling Appliances

9.5.2.1.3.4 Telecommunications Industry Association (TIA)

- TIA-470.320-C Telecommunications Telephone Terminal Equipment, Cordless Telephone Operation and Feature Performance Requirements
- EIA/TIA-455-49A FOTP-49 Procedure for Measuring Gamma Irradiation Effects in Optical Fiber and Optical Cables
- ANSI/TIA/EIA-568-B-1/2 Telecommunications Cabling Standards General Requirements
- ANSI/TIA/EIA-569-B Telecommunications Pathways and Spaces Standards
- ANSI/TIA/EIA-598-C Optical Fiber Cable Color Coding

9.5.2.1.3.5 Code of Federal Regulations (CFR)

- 10 CFR 50, Appendix A, GDC 1-4,19
- 10 CFR 73.55 Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage

- 47 CFR (FCC) Telecommunication
- 47 CFR 6 Access to telecommunications services, telecommunications equipment and customer premises equipment by persons with disabilities

9.5.2.1.3.6 Institute of Electrical and Electronic Engineers (IEEE)

- IEEE Std. 1100 IEEE Recommended Practice for Powering and Grounding Electronic Equipment

9.5.2.2 System Description

The following locations within the US-APWR facility contain communication system arrangements:

- R/B and containment structure
- turbine building (T/B)
- power source building (PS/B)
- A/B
- access buildings (AC/B)

The US-APWR communication systems consist of the following physically independent systems:

- Public address system/page (2 way communications, PA/PL)
- Telephone system (on site and offsite communications, PABX)
- Sound powered telephone system (SPTS)
- Plant radio system
- Offsite communication systems, including emergency communication systems
- Plant security communication systems (Section 13.6)

The communications are provided from the MCR, TSC, and EOF to the NRC headquarters and regional office EOCs,(including establishment of the Emergency Response Data System (ERDS).

Environmental conditions including weather, moisture, noise levels and electromagnetic/radio frequency interference that might interfere with effective communication for vital areas is considered in the design and selection of the plant communication systems and components.

Elements of the communication systems are designed for effective operation with respiratory and fire protection gear. The use of separate, redundant systems minimizes the possibility of loss of total plant communication capability due to interference or malfunction.

9.5.2.2.1 Public Address System/Page (2 way communications, PA/PL)

The plant page system with audio messenger consists of an electronic amplification system with microprocessor based mixers/amplifiers, controls, software, siren/tone and audio message generators, a centralized test and distribution cabinet, interfaces to other systems, and associated remote handsets and loudspeakers.

The public address system interfaces with the plant telephone system, the fire alarm system, and the radiation monitoring system. In the event of a fire or radiation alarm, dedicated audio messages and alarm tones are activated. The page system’s primary function is intra-plant communications during plant operations, testing, calibration, startup, and off-normal conditions.

Page equipment located outdoors is designed to automatically limit the outdoor sound volume at night to a pre-set level. Speakers and handsets are installed at the farthest practical distance from noise sources. In rooms where the noise level increases during equipment operation (e.g. pump rooms), handsets are enclosed within a soundproof booth or hoods. Box-type speakers are installed in small rooms where reverberations make hearing difficult. The circuits from the main page equipment to each component junction box are ring-wired to preclude loss of the system function in the event of a single cable failure.

Operation

The system has both page and party line operations utilizing handset stations located throughout the plant. The system has one page line and multiple party lines. The lines are independent of one another. A page can be initiated from any station with the MCR having the ability to override local stations.

Each station is capable of being configured to limit the amount of time allotted for the station’s handset to be off the hook. After reaching this configured time limit, the station is placed electrically on-hook, the page or party connection is broken and a trouble signal is enunciated at the central control unit.

Each party line is designed for two-way communication between zones or handset locations.

9.5.2.2.1.1 Audio Messenger Interface

The audio messenger interface generates audio messages (tones or digitally pre-recorded speech or a combination of both) and broadcasts them over the system speakers during normal or emergency conditions, including evacuation procedures, repeating at preset time periods until cancelled.

The audio messenger interface is connected to the plant radiation monitoring system. Activation of the radiation alarm automatically activates alarm and status messages appropriate to the level/location of the radiation alarm.

The audio messenger interface is connected to the plant's fire alarm system. Activation of the fire alarm automatically activates alarm and status messages appropriate to the level/location of the fire alarm.

The page system includes a telephone system interface that allows for connection to the plant telephone network (intra-plant and external communications), allowing page system users access to the telephone system.

9.5.2.2.2 Private Automatic Branch Telephone Exchange (PABX)

The plant PABX is a digital based multi-node telephone system. The plant PABX is connected to the offsite commercial telephone system and allows for normal and emergency communications. These connections may include offsite commercial telephone systems and the utility's private network, and are described by the COL applicant. Emergency communication lines are connected directly to specific telephones located in critical areas of the plant (e.g., MCR and TSC). The PABX is interfaced to the plant radio system thereby allowing personnel with plant radios the ability to originate telephone communications if necessary.

9.5.2.2.2.1 Standard Telephones

Standard telephones are hardwired to the PABX via outlet points (telephone jacks) and support communications within the plant and offsite. Each telephone consists of a handset and a base. The handset is hardwired to the base or it can be cordless with a short wireless connection to the base.

Standard PABX features include:

- Standard Notification System – Provides a communication link with onsite and offsite personnel.
- Ring down Phone Calling Trees – Provides a method to call and notify multiple parties.
- Standard features found on commercial telephones (speakerphone, message handling, etc.)

9.5.2.2.2.2 Emergency Telephones

Emergency telephones are color-coded, (e.g., red), to distinguish them from normal telephones. These telephones are dedicated and are used for:

- Emergency notification system (ENS - NRC)
- Local/state emergency notification

- Health physics network
- Plant security
- Offsite support center

Communication between the TSC is made using the PABX, station radio system, page and sound powered telephone system (except for the offsite facilities). The PABX telephone system is also used for notification purposes associated with unauthorized or unconfirmed removal of strategic nuclear material pursuant to the requirement addressed in 10 CFR 73.20(a) (Ref. 9.5.2-23).

9.5.2.2.2.3 PABX Power Source

The PABX is powered from the plant non safety-related load group and consists of independent chargers and batteries for each PABX node. The batteries have the capability to operate the plant telephone system for approximately 8 hours following loss of the normal ac. Each node can be switched over to another node’s power source in case of its own power failure or for maintenance. However, the switching mechanism is interlocked such that each node can only be connected to a single source.

9.5.2.2.3 Sound Powered Telephone System (SPTS)

The SPTS is a dedicated means of communication that does not require external power sources. The SPTS is intended for use as a backup communications system, or for use during special, specific plant operations (e.g., testing, refueling). The components are flame retardant, watertight and installed at specific points in the plant to provide a reliable backup communication system. The SPTS uses both fixed and portable sound powered telephone units. It is independent of the PA/PL and PABX systems.

The function of the SPTS is to provide a dedicated communication system between key plant locations including:

a) MCR

b) TSC

c) Reactor refueling areas (inside and outside of containment)

d) Turbine-generator operating deck

e) Remote shutdown console room

f) Gas turbine generator rooms

g) Electrical and mechanical equipment areas

h) Other high maintenance activity areas (e.g. equipment hatch)

i) Security facilities

Simultaneous communication capability is provided by the SPTS between the MCR and all of these plant stations. The SPTS provides a backup communications mechanism during all modes of plant operations. Portable handsets are provided with sufficient cable (and extensions) to allow personnel to use the system at any point within the plant, if needed.

9.5.2.2.4 Plant Radio System

9.5.2.2.4.1 General

The plant radio system provides normal and emergency communications capability independent of the PA/PL, PABX and SPTS. The system consists of a base controller with antenna and individual hand held radio units. Passive and active repeaters are distributed throughout the plant to ensure complete coverage anywhere in the facility.

9.5.2.2.4.2 Operation

Low power portable radios are used with the system to reduce radio frequency interference with control and instrument circuits. The system is designed to permit radio to radio and radio to MCR communications from any location within the facility. Communication consoles are located at select plant locations including the MCR, TSC and remote shutdown consoles.

The radios are equipped with multiple channels typically assigned as follows:

- Emergency (alternate security)
- Fire brigade (alternate security)
- Operations
- Maintenance (alternate operations)
- Management
- Health physics
- Additional channels are assigned by the plant operator as necessary for select plant locations

The radios are equipped with tone-coded squelch capability to ensure that a message cannot be received unless the message contains the proper address code.

9.5.2.2.4.3 Power Source

The non-Class 1E UPS system provides power for the base station and consoles. Portable, hand-held radios have internal, exchangeable, rechargeable batteries.

Non-portable communications equipment remains operable from independent power sources in the event of loss of normal power modes.

9.5.2.2.5 Offsite Communication Systems

9.5.2.2.5.1 General

Plant offsite communications arrangements are site-specific and are described by the COL applicant. The plant will be provided with multiple offsite communications links such as microwave, hardwired (copper), broadband (cable), fiber optic and direct satellite. These links will include both verbal and data communications. A firewall system is provided to protect the plant broadband systems. The use of these alternate links provides access to the nationwide telephone system. They allow the plant to operate and meet regulatory requirements.

9.5.2.2.5.2 Emergency Communications

Effective emergency onsite and plant-to-offsite communications is provided by the onsite PABX and the offsite emergency response center PABX systems. These systems allow for communications during normal as well as off normal situations including design basis accidents, fire, and LOOP.

The offsite communication system is located in the offsite emergency response center identified in 10 CFR 50.47 (b)(8). It is described by the COL applicant. The effectiveness of the over all Emergency Response Plan pursuant to 10 CFR 50.47 (b)(8) (Ref. 9.5.2-2) is addressed by the COL applicant.

The PA/PL, PABX, and plant radio systems are normally used for intra-plant normal and emergency communications with the SPTS providing additional capability and backup.

Radiation and fire alarms have priority over page. When the page system receives alarm inputs from the fire or radiation panels, it automatically provides audible messages and tone annunciation in accordance with specified schedules.

The following radio systems provide both in-plant and plant-to-offsite emergency communications:

- Crisis management radio systems in accordance with the intent of NUREG-0654 (Ref. 9.5.2-24)
- Fire brigade radio system, in accordance with BTP SPLB 9.5-1, position C.5.g(4) (Ref. 9.5.2-25)

The emergency offsite communication system, including the crisis management radio system, is addressed by the COL applicant. The fire brigade radio system is site-specific, consisting of a base unit, mobile units, and portable units, also is addressed by the COL applicant.

9.5.2.3 Safety Evaluation

Plant communication systems are not required to mitigate a DBA, however they are important to safety. These systems are needed to support effective normal and off-normal operations as well as to coordinate on-site and off-site responses during abnormal or emergency events. The off-site communications systems within the one-site operations support center provide for emergency response following a design basis accident. Redundant communication paths and technologies are employed to minimize the possibility of complete loss of on-site and off-site communications.

9.5.2.4 Inspection and Testing Requirements

The analysis, design, fabrication, erection, inspection, testing and verification of the plant communication systems is performed in accordance with the codes and standards specified in Subsection 9.5.10.

Test procedures are prepared, performed, and recorded in accordance with the requirement of 10 CFR 50, Appendix A (Ref. 9.5.2-4). Inspection, calibration, and testing of sound levels for plant areas is based upon the area's environmental conditions.

Each system will be verified to be in conformance with 47 CFR (FCC) 15 Class A for radio frequency interference emission compliance (Ref. 9.5.2-26). The sound power system's units will be individually tested, channel by channel, in the associated environment for sound quality and applicable operating functions. The PA/PL (including evacuation, fire, and radiation alarms), sound quality and ranges are tested throughout the plant to verify satisfactory operations. Loss of ac power tests are performed to verify functionality of the systems by standby power and battery power sources.

Individual test of communications among the control room, TSC, EOF, principal state and local emergency operations centers and radiological field assessment teams are performed. This is in conformance to the requirements of 10 CFR 50.47 (b)(6).

9.5.2.5 Instrumentation Requirements

No special instrumentation is required. The systems use high grade industrial components and are redundantly configured to assure continuous communications capability both on-site and off-site.

9.5.3 Lighting Systems

The lighting systems provide for adequate lighting during normal, transient, fire, accidents, and off-normal events (e.g., LOOP). The plant's lighting systems are not safety-related in that they are not needed to mitigate the consequences of a design basis accident.

Lighting systems consist of normal and emergency lighting systems. Security lighting system is described in Section 13.6.

9.5.3.1 Design Bases

The lighting system design bases include the following:

- Normal lighting powered from normal power supply system is provided in all plant indoor and outdoor areas, during all modes of plant operation and also design basis events, except for LOOP.

- Emergency lighting is provided in areas required for safe shutdown of the plant, restoring the plant to normal operation, firefighting, and safe movement of people to the access and egress routes during plant emergencies and loss of normal power supply.

- Adequate emergency lighting is provided in areas required for fire fighting.

- Emergency lighting from the Class 1E system provides illumination in the safety-related areas to permit performance of emergency operations during and after a SSE.

- The lighting systems are non safety-related and non-Class 1E.

- The emergency lighting circuits connected to the Class 1E power supplies are provided with Class 1E isolation devices and are non-Class 1E circuits. Emergency lighting from the Class 1E system is also supplemented by 8-hour self-contained battery pack units. The emergency lighting fixtures in Class 1E equipment areas are mounted on seismic category I structures.

- The normal/emergency (N/E) lighting system is powered from the normal power supply system during normal operation and from the non-Class 1E alternate ac power sources during SBO or LOOP conditions.

- Lighting by 8-hour self-contained battery pack units is provided in all plant areas to supply sufficient illumination for safe ingress and egress of personnel following loss of normal lighting and prior to restoration of N/E lighting from the alternate ac power sources or Class 1E emergency lighting from the Class 1E onsite ac or dc power sources.

- Dedicated portable lighting units are also provided in designated areas for access and egress to areas requiring manual actions where permanently installed emergency lighting is not provided.

- The lighting system design provides adequate illumination levels in various plant areas for performing actions required during normal, shutdown, maintenance, and emergency conditions, in accordance with the recommendations of the Illuminating Engineering Society of North America (Ref. 9.5.3-1).

- Emergency lighting systems are required to remain “ON” during normal plant operation and emergency conditions.

- Due to the mercury content in the high intensity discharge (HID), fluorescent, and mercury vapor lamps, these are not used in the fuel handling areas and inside the containment. Incandescent lighting or other lighting not containing restricted material is used in these areas.

9.5.3.2 System Description

The lighting systems are comprised of the following:

- Normal lighting
    - Normal lighting powered from the 480V non-Class 1E ac system.
- Emergency lighting
    - Class 1E emergency lighting powered from the 480V Class 1E ac system and 125V DC system.
    - N/E lighting powered from the 480V non-Class 1E ac system, backed up by the alternate ac power sources.
    - Emergency lighting powered by 8-hour self-contained battery pack units that are normally powered from the 480V non-Class 1E ac system or the 480V Class 1E ac system, as applicable.

The lighting systems are provided with the following features:

- The lighting fixtures circuits in an area (other than the self-contained battery pack emergency lighting units) are powered by circuits from separate load groups and the circuits are staggered as much as practical to ensure availability of the minimum required lighting in case of failure of a circuit or load group.
- Fluorescent lamps are generally used for indoor, enclosed areas.
- High-pressure sodium vapor lamps are generally used outdoor for roadways and parking areas.
- Metal halide lamps are generally used for general plant indoor high bay or low bay lighting, outdoor lighting, and all classified locations.
- Incandescent lamps are used for emergency dc lighting.
- Electric power to lighting fixtures in the plant services buildings are switched at the panels. Electric power to lighting fixtures will be switched with wall mounted lighting switches in areas where lightings can be turned “OFF” when the area is not occupied. Power to outdoor lighting fixtures is controlled by photoelectric controllers.
- The design of the lighting system for areas containing rotating machinery includes provisions such as feeding the fixtures in the area from different phases of the power supply or use of electronic ballasts to eliminate the risk of stroboscopic effects caused by the lamp flicker.

9.5.3.2.1 Normal Lighting System

Normal lighting is provided for all indoor and outdoor areas of the plant. The normal lighting system has the following features:

- Lighting fixtures for normal lighting located in vicinity of Class 1E equipment are supported so that they do not adversely impact Class 1E equipment when subjected to the seismic loading of a SSE.
- The MCR and remote shutdown consoles lighting is designed to provide adequate illumination considering the recommendations of NUREG-0700 (Ref. 9.5.3-2). The MCR and remote shutdown consoles normal lighting provides 50 foot-candles on the consoles and safety panels and uses low glare lighting fixtures and programmable dimming features.

The normal lighting system is powered from the non-Class 1E ac power distribution system connected to the normal power supply system, at the following voltage levels.

- 480V/277V, three phase, 4 wire, grounded neutral system lighting panels fed from the 480V non-Class 1E motor control centers through dry-type 480V-480V/277V transformers for feeding lighting fixtures and welding receptacles rated at 480V/277V.
- 208V/120V, three-phase, four-wire, grounded neutral system distribution panels fed from the 480V non-Class 1E motor control centers through dry-type 480V-208V/120V transformers for feeding lighting.

9.5.3.2.2 Emergency Lighting System

Emergency lighting is provided in the plant areas required for performing emergency tasks and safe ingress and egress of personnel during loss of normal power supply.

9.5.3.2.2.1 Class 1E emergency lighting

Class 1E emergency lighting is provided only in areas where emergency operations are required to be performed to safely shutdown the reactor, and maintain the plant in safe shutdown condition during the design basis events. The Class 1E emergency lighting system provides at least 10 foot-candles of illumination at the safety panels, workstations in the MCR and at the remote shutdown consoles. Class 1E emergency lighting is provided in areas such as the following:

- MCR
- Remote shutdown consoles
- Class 1E emergency generator rooms

- Class 1E switchgear, motor control center, Class 1E uninterruptible power supply (UPS) panels

- Battery and battery charger rooms

- Access and egress routes to the remote shutdown consoles

Class 1E emergency lighting circuits in the MCR are powered from redundant Class 1E dc. Class 1E lighting in all other areas shown above is powered from the redundant Class 1E 480V ac motor control centers through 480V-208V/120V dry-type isolating transformers. The lighting circuit from the Class 1E motor control center is provided with a Class 1E isolation device.

9.5.3.2.2.2 N/E lighting

The N/E lighting is powered from the normal power supply, when normal power supply is available. During LOOP and SBO condition, N/E lighting is powered from the alternate ac power sources (gas turbine generators). The N/E lighting system is powered from the non-Class 1E ac power distribution system connected at the following voltage levels.

- 208V/120V, three-phase, four-wire, grounded neutral system distribution panels fed from the 480V non-Class 1E motor control centers connected to the alternate ac power sources through dry-type 480V-208V/120V transformers for feeding N/E lighting.

N/E lighting is “ON” during normal plant operation and supplements normal lighting. The starting time of alternate ac power sources (gas turbine generators) is about 100 seconds and the N/E lighting is not available during this period.

9.5.3.2.2.3 Emergency lighting powered by 8-hour self-contained battery pack units

Emergency lighting from 8-hour self-contained battery pack units is provided in all areas of the plant where emergency operations are performed, safe ingress and egress of personnel during emergencies are required, and during loss of normal lighting. The self-contained battery pack units in the Class 1E areas are qualified for seismic category I requirements. The receptacles for charging these self-contained battery pack units in the MCR are also fed from the lighting and receptacle panels powered from the Class 1E motor control centers. The receptacles for charging the self-contained battery pack units in all other non-Class 1E areas are connected to the lighting and receptacle circuits fed from the alternate ac power sources. The self-contained battery pack units provide minimum illumination of about 0.5 foot-candles at the floor level.

9.5.3.3 Safety Evaluation

- Emergency lighting in the MCR is provided from Class 1E dc or ac system and this lighting is always “ON” and supplements normal lighting.

- During LOOP, SSE, and SBO condition normal lighting will not be available.

- Emergency lighting in the MCR fed from the Class 1E dc systems and self-contained battery pack units is uninterrupted and remains “ON”. The emergency lighting provides minimum illumination of 10 foot-candles. During LOOP and SSE condition, power supply to the Class 1E dc systems is automatically restored from the onsite Class 1E sources (gas turbine generators). During SBO, power supply to the Class 1E dc systems is manually restored from the alternate ac power sources (gas turbine generators).

- During LOOP, SSE or SBO, emergency lighting fed from the Class 1E 480V ac motor control centers is interrupted until the power supply from Class 1E or alternate ac buses is restored. During this period, emergency lighting from the self-contained battery pack units provides adequate illumination for fire fighting and safe movement of personnel to the access and egress routes. During LOOP and SSE conditions, power supply to the Class 1E 480V ac motor control centers is automatically restored from the onsite Class 1E power sources. During SBO, power supply to the Class 1E 480V ac motor control centers is manually restored from the alternate ac power sources within 60 minutes.

- During LOOP and SBO conditions, N/E lighting is interrupted until the power supply from the alternate ac GTGs is restored. During this period, self-contained battery pack units provide emergency lighting for fire fighting and safe movement of the personnel to the access and egress routes. The N/E lighting is not likely to be available during and after SSE condition.

- Emergency lighting circuits powered from the redundant Class 1E sources are classified as non-Class 1E circuits.

- The self-contained battery pack units located in Class 1E equipment areas meet seismic category I requirements. Self-contained battery units in all other areas meet seismic category II requirements.

- Lamps with mercury content are not used in the fuel handling areas and inside the containment.

- Lamps can only fail open and therefore do not represent a hazard. Therefore, lamps are not seismically qualified.

9.5.3.4 Inspection and Testing Requirements

Preoperational testing on the lighting systems is performed during initial startup as described in Subsection 14.2.12. System operability is verified during plant normal operation.

The ac and dc lighting circuits are normally energized and require no periodic testing. The self-contained 8-hour battery pack lighting is inspected and tested periodically.

9.5.3.5 Instrumentation Requirements

There is no specific instrumentation associated with the lighting systems.

9.5.4 Gas Turbine Generator Fuel Oil Storage and Transfer System

The fuel oil storage and transfer system (FOS) provides storage for and continuous supply of fuel oil to each of the four Class 1E emergency GTGs.

9.5.4.1 Design Bases

The FOS provides fuel oil to Class 1E GTGs to safely shut down the plant and maintain a safe shutdown condition following a design basis accident concurrent with a LOOP by supplying power to essential loads.

Each GTG is supplied by a fuel oil storage tank and a fuel oil day tank. These tanks store diesel grade fuel. The FOS is safety-related and the classification is described in Section 3.2. The control functions and power supplies are described in Chapter 8, respectively.

The GTGs' electrical system and control system are described in Section 8.3 and Chapter 7 respectively.

The safety functions of the FOS are as follows:

- Each GTG fuel oil storage tank provides 7 days storage of fuel oil. This allows power to be supplied to the safety-related loads for postulated accident conditions, assuming the loss of all offsite power sources and an additional amount for periodic testing of the onsite power sources. Each GTG also has an associated fuel oil day tank with a capacity to supply sufficient fuel oil for a period of one and half (1 ½) hours.

- The FOS is designed so that a single failure of any active component cannot affect the ability of the system to store and deliver fuel oil.

- The FOS is designed to remain functional after a SSE.

- The FOS contents are protected from the effects of low temperatures so that the fuel oil does not cloud.

The codes and standards that are applicable to the support systems and components of the GTGs are listed in Section 3.2. The FOS is designed in accordance with the following:

- ANSI Standard N195-1976
- Quality Group C requirements of RG 1.26
- Seismic Category 1 of RG 1.29.
- 10 CFR 50, Appendix A, Criterion 2 - Design Bases for protection against Natural Phenomenon
- 10 CFR 50, Appendix A, Criterion 4 - Environmental and Missile Design Bases
- 10 CFR 50, Appendix A, Criterion 5 - Sharing of Systems, Structures, and Components
- RG 1.137, “Fuel Oil Systems for Standby Diesel Generators”
- ANSI/ANS-59.51-1997, “Fuel Oil Systems for Safety-Related Emergency Diesel Generators”
- 10 CFR 50, Appendix A, Criterion 17 – “Independence and Redundancy Criteria”
- The FOS is designed for protection against pipe break outside the Containment, to withstand worst environmental phenomenon, and to seismic category I requirements.

9.5.4.2 System Description

9.5.4.2.1 General Description

The FOS is shown schematically in Figure 9.5.4-1. Classification of equipment and components is given in Section 3.2.

There are four GTGs.

Each GTG FOS has the following:

(1) One fuel oil storage tank

(2) Two fuel oil transfer pumps

(3) One fuel oil day tank

(4) One fuel filling box for outside supply of fuel oil to the fuel oil storage tank

(5) Vent piping from both the fuel oil storage tank and the fuel oil day tank

(6) Piping and valves

(7) Instrumentation and controls

The system is safe from flooding. The system is protected from the effects of low temperatures in the building.

Each of the four GTG fuel oil storage tanks are contained in a separate, reinforced concrete seismic category I, and missile protected underground compartment. Each GTG is located in a separate seismic category I compartment. Each GTG room contains the GTG, one fuel oil day tank, piping, valves, and instrumentation. The compartments are separated to prevent a fire from spreading to another compartment. System component characteristics are provided in Table 9.5.4-1.

9.5.4.2.2 Component Descriptions

9.5.4.2.2.1 Fuel Oil Storage Tanks and Piping

Each fuel oil storage tank is designed for a seven-day supply to its associated GTG, without relying on the associated fuel oil day tank inventory, plus a margin for periodic testing of the associated GTG.

The fuel oil storage tanks are designed and fabricated to ASME Section III code and American Petroleum Institute Standards (API-650) (Ref. 9.5.4-7 and 8). Fittings are provided for tank level instrumentation, venting, sampling, and water removal. Flanged openings are provided as manholes for access to the tank interior and each tank is equipped with an internal sump and a drain connection. Each fuel oil storage tank is erected inside a concrete compartment to contain spills. Each fuel oil storage tank is equipped with a vent line with a flame arrestor and a level transmitter.

Each fuel oil storage tank has a fill connection, which terminates in a box allowing replenishment of fuel from an outside supply source (e.g., truck) without interrupting operation of the GTG. The fuel oil storage tank fill connection includes an internal pipe and diffuser to limit inlet filling velocities to prevent turbulence of sediment on the bottom of the tank. In addition, the fuel oil storage tank outlet connections are 6 inches above the tank bottom, to reduce the potential of sediment entry into the pipeline. A moisture separator and duplex filters are provided in the fuel oil piping and a duplex fuel oil filter is provided on each GTG to prevent detrimental effects on performance from sediment.

The exterior and interior surfaces of the fuel oil storage tanks are painted with a primer and finish coat system for corrosion protection of the tank surface. Exterior surfaces of the fuel oil transfer piping are painted for corrosion protection.

The piping material is ASTM A106, Grade B carbon steel and the valve material is carbon steel (Ref. 9.5.4-9).

Materials used (with proper coating, as necessary) are compatible with fuel oil service.

9.5.4.2.2.2 Gas Turbine Generator Fuel Oil Transfer Skids

Each GTG FOS is serviced by a modularized skid mounted fuel oil transfer assembly, consisting of suction strainers, two fuel oil transfer pumps, a moisture separator, and a fuel filter with the interconnecting piping, valves, and instrumentation.

The fuel oil transfer pump skids are powered from their respective Class 1E power buses.

The fuel oil transfer pumps are of the motor driven centrifugal type. The pump and pump motor are mounted on a common baseplate.

9.5.4.2.2.3 Gas Turbine Generator Fuel Oil Day Tanks and Piping

Each GTG fuel oil day tank provides one and half (1 ½) hours of operation for its associated GTG at continuous rating without refilling from the corresponding fuel oil storage tank. The fuel oil day tanks are located separately from the adjacent GTG compartments by 3-hour rated fire barriers.

Each fuel oil day tank is separated from sources of ignition and high-temperature surfaces. The tank elevation is selected to provide the necessary suction head for the GTG fuel oil pump. The fuel oil piping in the GTG compartment is located away from hot surfaces. Fill, vent, drain connections, and a return line to the fuel oil storage tank for overflow protection are provided for each fuel oil day tank. Tank fittings provide for water removal, vent connection, and instrumentation.

The fuel oil day tank vent to atmosphere is fitted with a flame arrestor. Since venting is to the outside atmosphere, the flame arrester prevents the buildup of combustible fumes within the GTG enclosure and compartment.

The fuel oil day tanks are elevated above the GTGs to maintain a positive pressure at the suction of each gas turbines startup and main shaft driven fuel oil pumps.

9.5.4.2.3 Fuel Oil

The diesel fuel oil choice is in accordance with ASTM D975, and Chapter 16 requirements (Ref. 9.5.4-10).

In order to prevent deterioration of the oil, accumulation of sludge, and the growth of algae and fungi, biocides and other fuel additives are introduced to the fuel oil storage tank.

Samples of new fuel oil are quality tested prior to replenishing the fuel oil storage tanks. In addition, samples of fuel oil in the storage tanks are periodically tested to monitor for contamination and degradation. Fuel oil samples are tested for water and sediment content, viscosity, specific gravity, and impurity level in accordance with ASTM D975 requirements and manufacturer’s recommendations.

9.5.4.2.4 System Operation

Each fuel oil storage tank is replenished from various mobile suppliers as required to maintain a seven day supply for the corresponding GTG. The fill line incorporates a normally closed valve and a filler cap at the end to preclude the entrance of water. The fill line is above grade. The fill line has a strainer located downstream of the isolation valve to prevent entrance of solid material into the tank.

One of the two 100% fuel oil transfer pumps takes suction from its fuel oil storage tank and discharges fuel oil to its associated GTG fuel oil day tank. Each pump is capable of supplying its GTG and, simultaneously, increasing the inventory in the fuel oil day tank. The fuel oil transfer pump is automatically started and stopped on day tank level control. Part of the pump discharge flow is returned to the fuel oil storage tank via the recirculation line. Any overflow is returned to the fuel oil storage tank via the recirculation line. Provisions are included in the fuel oil storage tanks and fuel oil day tanks to check for and remove accumulated water.

9.5.4.3 Safety Evaluation

The GTG FOS consists of four redundant and independent trains, each dedicated to its respective GTG.

All components of the GTG FOS are designed to ASME Section III, Class 3 (equipment Class 3) and seismic category I requirements (Ref. 9.5.4-7). However, when an ASME Class 3 design component is not available, the component is proven to be of equivalent quality (through seismic design, testing, qualification and documentation).

The fuel oil storage tank compartment is designed to seismic category I requirements. The fuel oil storage tanks are separately located underground in concrete vaults and are protected from damage by missiles (tornados and hurricanes), external floods, and other environmental factors. The fill and sample connections are located at grade elevation with locked-closed isolation valves and are capped and locked to prevent entry of moisture. The fuel oil storage tanks are vented to atmosphere, and the vent connection is located above the grade elevation. The vent is located above the maximum flood level. The fuel oil storage tanks vents are fitted with a flame arrestor to protect the tanks from an exterior fire. The end of the goose necked vent is covered with a fine meshed screen to prevent insects and debris from entering the vent.

The seismic category I portions of GTG fuel oil piping is routed in tunnels between the storage tank concrete vaults and the power source building.

The fuel oil storage tanks are protected from corrosion.

All fuel lines are routed so that they are remote from heat producing components and equipment, which may be in located the same compartment. Each fuel oil day tank is enclosed in its GTG room which is fire rated for three hours of fire separation. The redundant GTG rooms are separated from each other by concrete walls, which are three hour rated fire barriers.

The fuel oil storage tanks are sized to provide sufficient capacity for seven days of operation for each GTG. Within this period, the operator can arrange for additional fuel to be delivered to the plant site. Each pump is powered from the same train Class 1E bus. Failure of one FOS train would not affect the operability of components in the other train.

The fuel oil temperature is maintained above the cloud point to assure its quality.

The fuel oil storage tank inventory is sampled for quality on a periodic basis for specific gravity, water sediment, viscosity, contamination, algae formation, etc. and if degradation is detected, corrective action is taken, as discussed in subsection 9.5.4.2.3.

9.5.4.4 Inspection and Testing Requirements

The FOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance is verified during periodic GTG testing.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI, as discussed in Section 6.6 (Ref. 9.5.4-11).

Technical Specification surveillance testing and inspection of the FOS is performed to assure operational readiness, as described in Chapter 16.

Periodic sampling of the fuel oil quality in fuel oil storage tank is performed.

Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, and viscosity and will be visually inspected for appearance in accordance with ASTM D975 limits.

The GTG FOS operability may be demonstrated during tests of the GTG, or testing may be performed by operation of the system in recirculation mode (bypassing the service day tank) and pumping fuel through the recirculation line back to the fuel oil storage tank.

9.5.4.5 Instrumentation Requirements

The fuel oil storage tanks are provided with level instrumentation for level indication in the GTG control cabinet. Low fuel oil level in the fuel oil storage tanks is alarmed in the MCR.

Each fuel oil day tank is provided with level instrumentation to control the fuel oil transfer pumps, provide level indication on the GTG control cabinet, and indicate low and high level alarms in the GTG Room and in the MCR.

The fuel oil transfer pumps start and stop on low and high level, respectively, and the tank level transmitter activates a fuel oil day tank high or low level alarm. The fuel oil transfer pumps start automatically when the level in the day tank decreases to the set capacity. The day tank low-level alarm annunciates when the level decreases to a set point. The fuel oil transfer pumps are automatically stopped when the day tank level has increased to a higher set level.

The fuel oil transfer pumps can be operated locally and from the MCR.

All tank levels may also be determined by dipsticks or sounding ports.

Pressure indicators and a differential pressure alarm on the fuel oil transfer pump discharge strainers are provided.

The filter in the discharge line to the fuel oil day tank is monitored by measuring differential pressures across the filter and by providing a high differential pressure alarm.

9.5.5 Gas Turbine Generator Cooling Water System [Not Required]

The GTG does not need cooling water system. Cooling of GTG is achieved by air ventilation system (see Subsection 9.5.8).

9.5.6 Gas Turbine Generator Starting System

The GTG starting system provides for a reliable GTG start following a LOOP. Each GTG consists of two gas turbines that drive one generator.

9.5.6.1 Design Bases

A. The GTG starting system initiates a start of the GTG such that within 100 seconds after receipt of the start signal, the GTG is operating at rated 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 GTG starting system is designed so that no single active failure, assuming a LOOP, can result in a complete loss of the standby power source function.

C. The GTG starting system is required to start the GTG upon receipt of a Class 1E bus undervoltage or an ECCS actuation signal.

D. The GTG starting system is designed to remain functional after a SSE.

E. Active components of the system can be tested during plant operation.

F. 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.

G. Codes and standards applicable to the GTG starting system are listed in Section 3.2.

9.5.6.2 System Description

The GTG starting system is an air-powered system designed to start the GTG. Control for starting the GTG system are discussed in Chapter 7 and Section 8.3. The standby emergency power supply from the GTG (electrical side) is discussed in detail in Section 8.3.

The GTG air starting system is shown schematically in Figure 9.5.6-1. Each GTG starting air system is equipped with six (6) air compressors with an air cooler in each, three (3) drain chambers, two (2) air receivers, compressor air intake filters, four (4) air starting units that include solenoid valves, 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

Six motor-driven compressors are provided for two starting systems per GTG.

9.5.6.2.1.2 Air Receivers

Each starting system is equipped with two air receivers. An air receiver is capable of providing starting air for three consecutive GTG starts without compressor assistance. Provisions are made for blowdown of air receivers to eliminate any moisture that might accumulate in them.

9.5.6.2.1.3 Air Coolers

Each air compressor is equipped with a finned coil pipe air cooler to cool the air after compression. The air cooler is installed on the compressor skid.

9.5.6.2.1.4 Air Start Distributors

Each GTG is equipped with two air start distributors, one per an air starting unit.

9.5.6.2.1.5 Air Starting Unit

Each air starting unit is equipped with two air start solenoid valves. The piping downstream of the air receiver is provided with a drain line to remove any moisture which may accumulate. A Y-strainer is installed upstream of the parallel air start valves to prevent oil and particulates from fouling the valves. Periodic testing of the GTG confirms the operability of the valves.

9.5.6.2.2 System Operation

The air receivers for each GTG are maintained at operating pressure by compressors. The compressors start when air receiver pressure drops to 384 psia and stop when pressure is increased to 435 psia. Six air compressors are provided. Each compressor keeps one receiver pressurized. A check valve in the air receiver charging line ensures that a broken line from any of the compressors will not affect the air receiver. 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.

When the GTG receives a start signal, all four solenoid valves are energized simultaneously, allowing starting air to flow to the GTG, using air from both air distributors. As soon as the GTG has started 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.

9.5.6.3 Safety Evaluation

A. A starting system holds sufficient air to start the GTG three times. The continuous availability of the air starting system keeps the GTG in constant readiness.

B. A failure of a compressor is indicated by an air receiver low-pressure alarm; this alarm prompts the operator to take corrective action.

C. The starting system, except for the air compressors with air coolers, is designed in accordance with seismic category I requirements as specified in Section 3.2. The system components are designed to the requirements of ASME Boiler & Pressure Vessel Code, Section III, Class 3, except for the air compressor and air coolers(Ref. 9.5.4-7). These components are designed to manufacturer's standards and are pressure tested. System, equipment, and components which are not seismic category I and whose failure could impair the functioning of the lubrication system are upgraded in design to seismic category I.

D. The design of the system allows all active components of the system to be separately tested during normal plant operation, as discussed in Subsection 9.5.6.4 below.

9.5.6.4 Inspection and Testing Requirements

The starting system is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance is verified during periodic GTG testing.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI, as discussed in Section 6.6 (Ref. 9.5.4-11).

Technical Specification surveillance testing and inspection of the GTG starting system is performed to assure operational readiness, as described in Chapter 16.

Due to the redundancy of the starting system, all testing can be performed without affecting other train systems.

9.5.6.5 Instrumentation Requirements

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.

9.5.7 Gas Turbine Lubrication System

A GTG lubrication system for each of the four GTGs provides essential lubrication to the GTG components. Each GTG consists of two gas turbines that drive one generator though one gear box.

9.5.7.1 Design Bases

The GTG lubrication system is designed to provide adequate lubrication under all operating conditions, including full load operation after starting, as required by the design basis.

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 qualification is discussed in Section 3.11.

A. The GTG lubrication system provides lubricating oil to all gas turbine bearings during GTG operation and shutdown.

B. The GTG lubrication system is designed to remain functional during and after a safe shutdown earthquake.

C. The GTG lubrication system is designed so that a single failure of any active component, assuming a LOOP, cannot result in complete loss of the power source function.

D. Active components of the system can be tested during plant operation.

E. Codes and standards applicable to the GTG lubrication system are listed in Section 3.2.

9.5.7.2 System Description

The lubrication system is shown schematically in Figure 9.5.7-1. Major components of the system include two gas turbine shaft driven pumps, a reduction gear box (including its oil reservoir), suction strainer at each oil pump’s suction line, a full flow filter, a lube oil cooler for each pump, oil cooler fan, and associated valves, piping, and instrumentation. Design parameters for major system components are provided in Table 9.5.7-1.

The GTG lubrication system circulates oil through a lube oil filter, a strainer, and then through the entire gas turbine.

When the GTG is operating, circulation is accomplished by the gas turbine shaft driven pumps, which draw oil from the reduction gear oil reservoir through a suction strainer, and passes it through a full-flow filter, a strainer, and air cooled lube oil cooler before distribution to the bearings.

During operation of the gas turbine, failure of the gas turbine shaft driven pumps results in unsatisfactorily low lube oil pressure. Receipt of a low lube oil pressure signal from the trip logic will shut down the GTG during routine operation. The low lube oil pressure shutdown signal is bypassed or defeated during accident conditions. During starting of the gas turbine, GTG does not need pre-circulation of lube oil. GTG can start without circulation of lube oil until shaft driven pumps start.

Loss of cooling to the lube oil cooler would cause a high lube oil temperature condition and alarm. Receipt of a low high lube oil temperature signal from the trip logic will shut down the GTG during routine operation. The low lube oil pressure shutdown signal is bypassed or defeated during accident conditions.

9.5.7.3 Safety Evaluation

A. The gas turbine shaft driven pumps provide oil to the gas turbine bearings during GTG operation. Oil is kept at a constant pressure and temperature by use of regulating valves and a lube oil cooler.

B. The components of the systems are designed to ASME Boiler & Pressure Vessel Code, Section III, Class 3. When a component is commercially unavailable as ASME Boiler & Pressure Vessel Code, Section III, Class 3 design, the component is proven of equivalent quality. Equivalent quality of a component is interpreted to mean an item designed for commercial use is upgraded to ASME Boiler & Pressure Vessel Code Section III, Class 3 requirements through seismic design, testing, qualification and documentation (Ref. 9.5.4-7).

C. The lubrication system is designed in accordance with seismic category I requirements as specified in Section 3.2. System, equipment, and components which are not seismic category I and whose failure could impair the functioning of the lubrication system are upgraded in design to seismic category I.

D. The lubricating oil supply to each gas turbine is sized to provide gas turbine lubrication. The lubrication system 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 gas turbine with which it is associated. Because of these arrangements and the redundancy of emergency GTG design and installation, a failure of any single active component of the GTG lubrication system cannot result in a complete loss of the power source. A single failure is assessed as a failure of the gas turbine with which it is associated; in such a circumstance, safe shutdown is attained and maintained by the remaining GTGs.

E. All active components are capable of being tested during power generation operation to ensure proper functioning of the system (Subsection 9.5.7.4).

9.5.7.4 Inspection and Testing Requirements

The lubrication system is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance is verified during periodic GTG testing.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI, as discussed in Section 6.6 (Ref. 9.5.4-11).

Technical Specification surveillance testing and inspection of the GTG starting air system is performed to assure operational readiness, as described in Chapter 16.

The lubrication system is operationally tested during the startup and checkout of the gas turbine. Lube oil pressure and temperature are monitored to ensure operability of the gas turbine shaft driven pump. Inspection and testing of the system can be performed without disturbing normal plant operations. The lube oil in the gas turbine will be analyzed periodically for wear and failure parameters. The lube oil will have the following tests performed: kinematic viscosity, water content, and wear metal content. Strainers may be removed and inspected for the buildup of impurities on a periodic basis.

9.5.7.5 Instrumentation Requirements

Instrumentation provided for the lubrication system includes pressure and temperature switches and indicators. Low lube oil pressure, high lube oil temperatures, are alarmed in the MCR and in the GTG room. In addition, local indications associated with the lubrication system that are provided, including oil temperature and pressure.

A dipstick is provided to verify lube oil sump tank oil level. Low lube oil pressure during operation of the GTG initiates a GTG trip. GTG oil pressure trip logic initiates a GTG trip and alarms at the GTG control panel and the MCR.

Setpoints for instrumentation associated with the lubrication system are in accordance with the GTG manufacturer's recommendations. During surveillance testing, any alarm condition would be immediately verified by the operator utilizing instrumentation at the GTG location.

9.5.8 GTG Combustion Air Intake and Exhaust System

A GTG combustion air intake and exhaust system for each of the four GTGs supply combustion air of reliable quality to the gas turbine and exhausts combustion products from the gas turbine to the atmosphere. The air intake also provides ventilation/cooling air to the GTG assembly. Each GTG consists of two gas turbines that drive one generator through one gearbox.

9.5.8.1 Design Bases

Protection of the GTG 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 qualification is discussed in Section 3.11.

- The combustion air intake and exhaust system is capable of supplying adequate combustion air and disposing of resultant exhaust products to permit continuous operation of the GTGs for each unit at 110% of nameplate rating.

- The combustion air intake and exhaust system is designed to remain functional during and after a SSE.

- The combustion air intake and exhaust system is designed so that a single failure of any component, assuming a LOOP, cannot result in complete loss of the power source.
- The GTG combustion air intake and exhaust system is capable of being tested during plant operation in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 9.5.2-4).

Codes and standards applicable to the system are listed in Section 3.2 and Table 9.5.8-1. The equipment class, seismic category, and principal design code for the various components are as shown.

9.5.8.2 System Description

9.5.8.2.1 General Description

As shown in Figure 9.5.8-1, each gas turbine is provided with:

(1) A combustion air intake and exhaust system consisting of air filter, silencer, and associated piping and flexible connections.

(2) Ventilation/cooling air to the GTG assembly consisting of ventilation fan and duct work.

9.5.8.2.2 Component Description

9.5.8.2.2.1 Room Intake Air Filter

Each GTG room contains a combustion air intake filter. Mist eliminator pads are installed within the filter to remove any oil mist from the filtered air.

9.5.8.2.2.2 GTG Package Intake Air Filter

A combustion air intake filter is installed in each GTG enclosure.

9.5.8.2.2.3 Combustion Air Intake and Exhaust Silencers

A Silencer is installed in the intake system to minimize the noise level within the GTG enclosure. A silencer is installed in the turbine exhaust system to reduce the noise emitted from the system.

9.5.8.2.2.4 Ventilation Fan

Each GTG package contains a ventilation fan.

9.5.8.2.2.5 Piping/ducts

The turbine and air exhaust piping is made of carbon steel. Duct work is made of galvanized steel. Expansion joints are strategically located to accommodate the thermal growth of the exhaust piping. The piping is of adequate size so that it can accommodate the total pressure drop when the engine is operating at 110% of continuous rating.

9.5.8.2.3 System Operation

Upon initiation of a GTG start signal, combustion air is drawn into the intake piping to the GT intake manifolds. The combustion air intake filter, silencer, and the combustion air piping are sized to supply an adequate supply of air to the GT while operating at 110% of nameplate rating. The turbine exhaust gases enter the turbine exhaust pipe, pass through the turbine exhaust silencer, and are then ducted out of the building. The exhaust piping and silencer are sized to prevent excessive backpressure on the engine when operating at 110% nameplate rating.

Cooling air is supplied and exhausted out of the building through the air exhaust piping.

9.5.8.3 Safety Evaluation

A. The GTG combustion air intake and exhaust system is capable of supplying an adequate quantity of filtered combustion air to the GT and of disposing the exhaust gases without creating an excessive backpressure on the GT when operating at 110% of nameplate rating. Cooling air is supplied to the GTG and exhausted from the building.

   The power source buildings (PS/Bs) are equipped with a fire suppression system.

   US-APWR power block general arrangement drawings (Chapter 1) show the physical relationship of the PS/B to those plant features, which could affect the system. The PS/B is not located near any gas storage facilities. The carbon dioxide storage tank is located 260 ft. away, the hydrogen storage facility is 600 ft. away, and the nitrogen bulk storage is 600 ft. away.

   The distances between the PS/B and those facilities are adequate to ensure that an accidental release of these gases does not degrade GTG performance.

   The turbine intake and exhaust openings above the roof of the PS/B, and the portion of the piping/ducts above the roof is protected by a guard structure against precipitation and tornado missiles. The turbine exhaust is located appropriately away from the engine air intake, thereby minimizing the chances of the turbine exhaust being drawn into the combustion air intake.

B. The combustion air intake and exhaust system is designed to seismic category I requirements as specified in Section 3.2. Systems, equipment, and components which are not seismic category I 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. A single failure is assessed as a failure of the GTG with which the component is associated. In such a circumstance, safe shutdown is attained and maintained by the redundant GTG installation.

D. Cooling air for the GTG and room ventilation is drawn through a separate duct. The cooling/ventilation air is exhausted through a separate return duct system. A variable damper in the air exhaust duct controls air pressure in the room.

9.5.8.4 Inspection and Testing Requirements

The combustion air intake and exhaust system is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance during normal operation is verified.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI, as discussed in Section 6.6 (Ref. 9.5.4-11).

A visual inspection of the intake air filters is performed during surveillance testing.

9.5.8.5 Instrumentation Requirements

The GTG 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 turbine exhaust gas temperature and the turbine exhaust stack temperature. A digital temperature indicator with manual selector switch is located at the GTG control cabinet for selecting turbine exhaust stack temperature. At 100% rated load, the exhaust stack temperature is approximately 1,100 ºF + 50 ºF.

GT intake manifold air pressure is measured by a pressure gauge located at the GTG control cabinet. At 100% rated load, the GT intake manifold air pressure is approximately 50 in.Hg + 5 in.Hg. The combustion air intake and exhaust system has no interlocks or alarm instrumentation.

9.5.9 Combined License Information

COL 9.5(1) *The COL applicant establishes a fire protection program, including organization, training and qualification of personnel, administrative controls of combustibles and ignition sources, firefighting procedures, and quality assurance.*

COL 9.5(2) *The COL Applicant addresses the design and fire protection aspects of the facilities, buildings and equipments, such as cooling towers and a fire protection water supply system, which are site specific and/or are not a standard feature of the US-APWR.*

COL 9.5(3) *The COL Applicant provides apparatus for plant personnel and fire brigades such as portable fire extinguishers and self contained breathing apparatus.*

COL 9.5(4) *The COL Applicant addresses all communication system interfaces external to the plant (offsite locations). These include interfaces to utility private networks, commercial carriers and the federal telephone system.*

The configuration of these connections will include consideration of the concerns raised in IE Bulletin 80-15.

COL 9.5(5) *The COL Applicant addresses the emergency offsite communications including the crisis management radio system.*

COL 9.5(6) *The COL Applicant addresses connections to the Technical Support Center from where communications networks are provided to transmit information pursuant to the requirements delineated in 10 CFR 50 Appendix E, Part IV.E.9.*

COL 9.5(7) *The COL Applicant addresses a continuously manned alarm station required by 10 CFR 73.46(e)(5) and the communications requirements delineated in 10 CFR 73.45(g)(4)(i) and (ii). The COL Applicant addresses notification of an attempted unauthorized or unconfirmed removal of strategic special nuclear material in accordance with 10 CFR 73.45(e)(2)(iii).*

COL 9.5(8) *The COL Applicant addresses offsite communications for the onsite operations support center.*

COL 9.5(9) *The COL Applicant addresses the emergency communication system requirements delineate in 10 CFR 73.55(f) such that a single act cannot remove onsite capability of calling for assistance and also as redundant system during onsite emergency crisis.*

COL 9.5(10) *Deleted*

9.5.10 References

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9.5.1-2 SECY-05-0197, “Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria”, U.S. Nuclear Regulatory Commission, Washington, DC, October 28, 2005.

9.5.1-3 “Fire Protection,” Energy Title 10 Code of Federal Regulations Part 50, Appendix A, GDC 3, U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-4 “Sharing of Structures, Systems, and Components,” Energy. Title 10 Code of Federal Regulations Part 50, Appendix A, GDC 5, U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-5 “MCR,” Energy. Title 10 Code of Federal Regulations Part 50, Appendix A, GDC 19. U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-6 "Protection System Failure Modes," Energy. 10 Code of Federal Regulations Part 50, Appendix A, GDC 23, U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-7 "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," Energy. Title 10 Code of Federal Regulations Part 52 U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-8 "Contents of applications; technical information". Energy. Title 10 Code of Federal Regulations 52.47 U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-9 "Issuance of combined licenses." Energy. Title 10 Code of Federal Regulations 52.97(b)(1) U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-10 "Licensing requirements for the independent storage of spent nuclear fuel, high-level radioactive waste, and reactor-related greater than class c waste." Energy. Title 10 Code of Federal Regulations Part 72 U.S. Nuclear Regulatory Commission, Washington, DC.

9.5.1-11 GL 86-10, "Implementation of Fire Protection Requirements," April 24, 1986, and Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe-Shutdown Trains Within the Same Fire Area," U.S.Nuclear Regulatory Commission, Washington DC,March 25,1994.

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9.5.1-14 NFPA 804, "Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants", 2006 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-15 NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection", 2003 Edition, National Fire Protection Association, Quincy, MA.

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9.5.1-18 NFPA 55, "Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks", 2005 Edition, National Fire Protection Association, Quincy, MA.

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9.5.1-20 ANSI/IEEE Std 383-1974 An "American National StandardIEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations", Institute of Electrical and Electronics Engineers, Inc, 3 Park Avenue, 17th Floor, New York, N.Y. 10016-5997.

9.5.1-21 NFPA 13, "Standard for the Installation of Sprinkler Systems", 2002 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-22 NFPA 15, "Standard for Water Spray Fixed Systems for Fire Protection", 2001 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-23 NFPA 72, "National Fire Alarm Code", 2002 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-24 NFPA 750, "Standard on Water Mist Fire Protection Systems", 2006 Edition National Fire Protection Association, Quincy, MA.

9.5.2-1 Contents of construction permit and operating license applications; technical information, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 50.34.

9.5.2-2 Emergency plans, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 50.47.

9.5.2-3 Emergency Planning and Preparedness for Production and Utilization Facilities, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 50, Appendix E.

9.5.2-4 General Design Criteria for Nuclear Power Plants, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 50, Appendix A.

9.5.2-5 Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 73.55.

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9.5.2-20 Telecommunication, Title 47, Code of Federal Regulations (Federal Communications Commission).

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9.5.2-22 IEEE Recommended Practice for Powering and Grounding Electronic Equipment, IEEE Std. 1100, 2005.

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9.5.2-29 Performance Capabilities of Fixed Site Physical Protection Systems – Communications Subsystems, NRC Regulations Title 10, Code of Federal Regulations, 10CFR Part 73.45.

9.5.3-1 IESNA Lighting Handbook, Illuminating Engineering Society of North America (IESNA), 9th Edition.

9.5.3-2 U.S. Nuclear Regulatory Commission, Human-System Interface Design Review Guidelines, NUREG-0700 Revision 2, May 2002.

9.5.4-1 Qualification and Test Plan of Class 1E Gas Turbine Generator System, MUAP-07024-P (Proprietary) and MUAP-07024-NP (Non-Proprietary) December, 2007.

9.5.4-2 Fuel Oil Systems for Standby Diesel-Generators, ANSI N195, 1976.

9.5.4-3 Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants, Regulatory Guide 1.26 Revision 4, March 2007.

9.5.4-4 Seismic Design Classification, Regulatory Guide 1.29 Revision 4, March 2007.

9.5.4-5 Fuel Oil Systems for Standby Diesel Generators, Regulatory Guide 1.137 Revision 1, October 1979.

9.5.4-6 Fuel Oil Systems for Safety-Related Emergency Diesel Generators, ANSI/ANS-59.51, 1997.

9.5.4-7 Rules for Construction of Nuclear Power Plant Components, ASME Boiler & Pressure Vessel Code, Section III, 2004.

9.5.4-8 Welded Steel Tanks for Oil Storage, API 650 Revision 11, 2007.

9.5.4-9 Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service, ASTM A106.

9.5.4-10 Standard Specification for Diesel Fuel Oils, ASTM D975.

9.5.4-11 Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler & Pressure Vessel Code, Section XI, 2004.

9.5.4-12 Power Piping, ANSI/ASME, B31.1, 2004.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 1 of 46)

Regulatory Position	Position Number	Conformance	Remarks
In accordance with 10 CFR 50.48, each operating nuclear power plant must have a fire protection plan. The plan should establish the fire protection policy for the protection of SSCs important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.	1.	COL	COL Item 9.5(1)
The fire protection program should describe the organizational structure and responsibilities for its establishment and implementation. These responsibilities include fire protection program policy; program management (including program development, maintenance, updating, and compliance verification); fire protection staffing and qualifications; engineering and modification; inspection, testing, and maintenance of fire protection systems, features, and equipment; fire prevention; emergency response (e.g., fire brigades and offsite mutual aid); and general employee, operator, and fire brigade training.	1.1	COL	COL Item 9.5(1)
A fire hazards analysis should be performed to demonstrate that the plant will maintain the ability to perform safe-shutdown functions and minimize radioactive material releases to the environment in the event of a fire. This analysis should be revised as necessary to reflect plant design and operational changes.	1.2	Conform	Initial FHA is included as Appendix 9A. COL will update as necessary for site specific changes when COL application is filed and periodically thereafter. COL Item 9.5(2)
In accordance with 10 CFR 50.48, each operating nuclear power plant must provide the means to limit fire damage to SSCs important to safety so that the capability to safely shut down the reactor is ensured.	1.3	Conform	4 safety trains are provided which are completely separated by 3-hour fire rated barriers. Any two trains can achieve safe-shutdown.
The licensee should evaluate fire reports and data (e.g., fire barrier testing results and cable derating data) that are used to demonstrate compliance with NRC fire protection requirements to ensure that the information is applicable and representative of the conditions for which the information is being applied.	1.4	Conform	The US-APWR employs the use of limited applications of cable fire barriers, which have been qualified in accordance with GL 86-10 supplement 1.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 2 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Temporary changes to specific fire protection features that may be necessary to accomplish maintenance or modifications are acceptable, provided interim compensatory measures, such as fire watches, temporary fire barriers, or backup suppression capability, are implemented. For common types of deficiencies, the technical specifications or the NRC-approved fire protection program generally note the specific compensatory measures. For unique situations or for measures that the approved fire protection program does not include, the licensee may determine appropriate compensatory measures. A licensee may opt to implement an alternative compensatory measure, or combination of measures, to the one stated in its fire protection program.	1.5	COL	COL Item 9.5(1)
The fire protection program should be under the direction of an individual who has available staff personnel knowledgeable in both fire protection and nuclear safety. Plant personnel should be adequately trained in the administrative procedures that implement the fire protection program and the emergency procedures relative to fire protection.	1.6	COL	COL Item 9.5(1)
Fire protection staff should meet the following qualifications: a. The formulation and assurance of the fire protection program and its implementation should be the responsibility of personnel prepared by training and experience in fire protection and in nuclear plant safety to provide a comprehensive approach in directing the fire protection program for the nuclear power plant. A fire protection engineer (or a consultant) who is a graduate of an engineering curriculum of accepted standing and satisfies the eligibility requirements as a Member in the Society of Fire Protection Engineers should be a member of the organization responsible for the formulation and implementation of the fire protection program.	1.6.1.a	COL	COL Item 9.5(1)
b. The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity and the fire brigade training as described in Regulatory Position 1.6.4.	1.6.1.b	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 3 of 46)

Regulatory Position	Position Number	Conformance	Remarks
c. The personnel responsible for the maintenance and testing of the fire protection systems should be qualified by training and experience for such work.	1.6.1.c	COL	COL Item 9.5(1)
d. The personnel responsible for the training of the fire brigade should be qualified by knowledge, suitable training, and experience for such work.	1.6.1.d	COL	COL Item 9.5(1)
Each nuclear plant employee has a responsibility to prevent, detect, and suppress fires. General site employee training should introduce all personnel to the elements of the site's fire protection program, including the responsibilities of the fire protection staff. Training should also include information on the types of fires and related extinguishing agents, specific fire hazards at the site, and actions in the event of a fire suppression system actuation.	1.6.2	COL	COL Item 9.5(1)
Fire watches provide for observation and control of fire hazards associated with hot work, and they may act as compensatory measures for degraded fire protection systems and features. Specific fire watch training should provide instruction on fire watch duties, responsibilities, and required actions for both 1-hour roving and continuous fire watches. Fire watch qualifications should include hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch. If fire watches are to be used as compensatory actions, the fire watch training should include recordkeeping requirements.	1.6.3	COL	COL Item 9.5(1)
The fire brigade training program should establish and maintain the capability to fight credible and challenging fires. The program should consist of initial classroom instruction followed by periodic classroom instruction, firefighting practice, and fire drills. (See Regulatory Position 3.5.1.4 for drill guidance.)	1.6.4	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 4 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader should be competent to assess the potential safety consequences of a fire and advise MCR personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant systems. Nuclear power plants staffed with a dedicated professional fire department may utilize a fire team advisor to assess the potential safety consequences of a fire and advise the MCR and incident commander. The fire team advisor should possess an operator's license or equivalent knowledge of plant systems and be dedicated to supporting the fire incident commander during fire emergency events.	1.6.4.1	COL	COL Item 9.5(1)
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. The licensee should provide instruction to all fire brigade members and fire brigade leaders.	1.6.4.2	COL	COL Item 9.5(1)
The licensee should hold practice sessions 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 should provide brigade members with experience in actual fire extinguishment and the use of self-contained breathing apparatuses under the strenuous conditions encountered in firefighting. The licensee should provide these practice sessions at least once per year for each fire brigade member.	1.6.4.3	COL	COL Item 9.5(1)
The licensee should maintain individual records of training provided to each fire brigade member, including drill critiques, 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.	1.6.4.4	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 5 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The overall plant QA plan should include the QA program for fire protection. For fire protection systems, the licensee should have and maintain a QA program that provides assurance that the fire protection systems are designed, fabricated, erected, tested, maintained, and operated so that they will function as intended. Fire protection systems are not "safety-related" and, therefore, are not within the scope of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR 50, unless the licensee has committed to include these systems under the plant's Appendix B program.	1.7	Conform during DCD phase. COL to address also	Chapter 17 of DCD addresses QA including fire protection COL Item 9.5(1) to follow-up.
The licensee should establish measures to include the guidance presented in this RG in its design and procurement documents.	1.7.1	COL	COL Item 9.5(1)
Documented instructions, procedures, or drawings should prescribe inspections, tests, administrative controls, fire drills, and training that govern the fire protection program.	1.7.2	COL	COL Item 9.5(1)
The licensee should establish the following measures to ensure that purchased material, equipment, and services conform to the procurement documents: a. provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor, inspections at suppliers, or receipt inspections b. source or receipt inspection, at a minimum, for those items that, once installed, cannot have their quality verified.	1.7.3	COL	COL Item 9.5(1)
The licensee should establish and execute a program for independent inspection of activities affecting fire protection that allows the organization performing the activity to verify conformance to documented installation drawings and test procedures.	1.7.4	COL	COL Item 9.5(1)
The licensee should establish and implement a test program 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 corrective actions taken as necessary.	1.7.5	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 6 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The licensee should establish measures to provide for the documentation or identification of items that have satisfactorily passed required tests and inspections. These measures should include provisions for identification by means of tags, labels, or similar temporary markings to indicate completion of required inspections and tests and operating status.	1.7.6	COL	COL Item 9.5(1)
The licensee should establish measures to control items that do not conform to specified requirements to prevent inadvertent use or installation.	1.7.7	COL	COL Item 9.5(1)
The licensee should establish measures to ensure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible materials, and nonconformances, are promptly identified, reported, and corrected.	1.7.8	COL	COL Item 9.5(1)
The licensee should prepare and maintain records to furnish evidence that the plant is meeting the criteria enumerated above for activities affecting the fire protection program.	1.7.9	COL	COL Item 9.5(1)
The licensee should conduct and document audits to verify compliance with the fire protection program.	1.7.10	COL	COL Item 9.5(1)
For those licensees who have relocated audit requirements from their technical specifications to the QA program, annual fire protection audits may be changed to a “maximum interval of 24 months” by implementation of a performance-based schedule, if justified by performance reviews, provided that the maximum audit interval does not exceed the interval specified in American National Standards Institute/American Nuclear Society (ANSI/ANS) 3.2-1994, “Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants.”	1.7.10.1	COL	COL Item 9.5(2)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 7 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The 24-month audit of the fire protection program and implementing procedures should ensure that the requirements for design, procurement, fabrication, installation, testing, maintenance, and administrative controls for the respective programs are included in the plant QA program for fire protection and meet the criteria of the QA/QC program established by the licensee, consistent with this guide. Personnel from the licensee's QA organization, who do not have direct responsibility for the program being evaluated, should perform these audits.	1.7.10.2	COL	COL Item 9.5(1)
The triennial audit is basically the same as the annual audit; the difference lies in the source of the auditors. Qualified utility personnel who are not directly responsible for the site fire protection program or an outside independent fire protection consultant may perform the annual audit. However, an outside independent fire protection consultant should perform the triennial audit. These audits would normally encompass an evaluation of existing documents (other than those addressed under the 24-month audit) and an inspection of fire protection system operability, inspection of the integrity of fire barriers, and witnessing the performance of procedures to verify that the licensee has fully implemented the fire protection program and that the plan is adequate for the objects protected.	1.7.10.3	COL	COL Item 9.5(1)
This section provides guidance relative to the regulatory mechanisms for addressing changes, deviations, exemptions, and other issues affecting compliance with fire protection regulatory requirements. Risk-informed, performance-based methodologies may be used to evaluate the acceptability of fire protection program changes; however, the licensee should use NRC reviewed and approved methodologies and acceptance criteria for this approach.	1.8	Information Statement	No compliance action, this is an informational statement.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 8 of 46)

Regulatory Position	Position Number	Conformance	Remarks
If an existing plant licensee has adopted the standard license condition for fire protection and incorporated the fire protection program in the final safety analysis report (FSAR), the licensee may make changes to the approved fire protection program without the Commission's prior approval only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire as documented in a safety evaluation.	1.8.1	N/A	The US-APWR is a new plant that will be subject to current licensing requirements of the US NRC at the time of COL application.
If the fire protection program committed to by the licensee is required by a specific license condition and is not part of the FSAR for the facility, the licensee may be required to submit amendment requests even for relatively minor changes to the fire protection program.	1.8.1.1	N/A	The US-APWR is a new plant that will be licensed under current regulations at the time of COL application.
The NRC transmitted the standard license condition for fire protection to licensees in April 1986 as part of GL 86-10 with information on its applicability to specific plants.	1.8.1.2	Information Statement	No compliance applicable, informational statement
If a proposed change alters compliance with a rule then an exemption from the rule is required in accordance with 10 CFR 50.12. If a proposed change alters a license condition or technical specification that was used to satisfy NRC requirements, the licensee should submit a license amendment request. When a change that falls within the scope of the changes allowed under the standard fire protection license condition is planned, the licensee's evaluation should be made in conformance with the standard fire protection license condition to determine whether the change would adversely affect the ability to achieve and maintain safe shutdown.	1.8.1.3	COL	This area is part of the COL Applicant's fire protection program responsibility for controlling future plant modifications after initial licensing and will be an integral part of the overall program developed as part of COL Item 9.5(1).
In addition to an evaluation of planned changes, an evaluation may also be required for nonconforming conditions. In the case of a degraded or nonconforming condition, an evaluation depends on the licensee's compensatory and corrective actions. Three potential conditions exist for determining the need for an evaluation. These conditions are (1) the use of interim compensatory actions, (2) corrective actions that result in a change, or (3) corrective actions that restore the nonconforming or degraded condition to the previous condition.	1.8.1.4	COL	This area is integral with the corrective action program required to address COL Item 9.5(1).

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 9 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The licensee should maintain records of fire protection program-related changes in the facility, changes in procedures, and tests and experiments made in accordance with the standard fire protection license condition. These records should include a written evaluation that provides the bases for the determination that the change does not adversely affect safe-shutdown capability.	1.8.1.5	COL	This item is integral with the overall fire protection program required under COL Item 9.5(1).
For plants licensed before January 1, 1979, the NRC requires requests for exemption from the requirements of Appendix R for modifications or conditions that do not comply with the applicable sections of Appendix R. The exclusion of the applicability of sections of Appendix R other than Sections III.G, III.J, and III.O (and Section III.L as applicable) is limited to those features accepted by the NRC staff as satisfying the provisions of Appendix A to BTP APCSB 9.5-1 reflected in staff fire protection safety evaluation reports issued before the effective date of the rule. For these previously approved features, an exemption request is not required except for proposed modifications that would alter previously approved features used to satisfy NRC requirements.	1.8.2	N/A	The US-APWR is a new plant that satisfy the requirement applicable to advanced light water reactors.
The NRC interpretations of certain Appendix R requirements allow a licensee to choose not to seek prior NRC review and approval of, for example, a fire area boundary, in which case a fire protection engineer (assisted by others as needed) should perform an evaluation, which should be retained for a future NRC audit.	1.8.3	Conform, COL	Initial fire area boundary determination established in basic reactor island design and described in FHA, DCD Appendix 9A. Future modification to fire area boundaries to fall within COL Applicant fire protection program as developed per COL Item 9.5(1).
Plants licensed after January 1, 1979, that have committed to meet the requirements of Sections III.G, III.J, and III.O of Appendix R to 10 CFR 50 or other NRC guidance (e.g., CMEB 9.5-1), and are required to do so as a license condition, do not need to request exemptions for alternative configurations. However, the FSAR or fire hazards analysis should identify and justify deviations from the requirements of Sections III.G, III.J, and III.O or other applicable requirements or guidance, and these deviations may require a license amendment to change the license condition.	1.8.4	Conform	The US-APWR is a new plant that does not involve unapproved deviations from regulatory requirements.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 10 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The requirements of 10 CFR 50.72 and 10 CFR 50.73 apply to reporting certain events and conditions related to fire protection at nuclear power plants. Licensees should report fire events or fire protection deficiencies that meet the criteria of 10 CFR 50.72 and 10 CFR 50.73 to the NRC as appropriate and in accordance with the requirements of these regulations.	1.8.5	COL	This is to be an integral aspect of the overall fire protection program established as a result of COL Item 9.5(1) and associated with corrective action assessments conducted under the program required to satisfy COL Item 9.5(1).
For those fire protection SSCs installed to satisfy the NRC requirements and designed to NFPA codes and standards, the code of record is the code edition in force at the time of the design or at the time the commitment is made to the NRC for a fire protection feature. The FSAR or the fire hazards analysis should identify and justify deviations from the codes. Deviations should not degrade the performance of fire protection systems or features. The standards of record related to the design and installation of fire protection systems and features required to satisfy NRC requirements in all new reactor designs are those NFPA codes and standards in effect 180 days prior to the submittal of the application under 10 CFR 50 or 10 CFR 52.	1.8.6	COL	FHA in attachment 9A identifies NFPA code applicability for the basic plant. The COL Applicant will identify the specific NFPA codes and standards used for development of the fire protection systems and features and the specific "code of record" for applicable codes and standards as part of COL Item 9.5(2).
Where the evaluation of an fire protection program change is based on fire modeling, licensees should document that the fire models and methods used meet the NRC requirements. The licensee should also document that the models and methods used in the analyses were used within their limitations and with the rigor required by the nature and scope of the analyses. These analyses may use simple hand calculations or more complex computer models, depending on the specific conditions of the scenario being evaluated.	1.8.7	COL	Fire modeling is not used to support the US-APWR FHA or any compliance approach. The COL Applicant shall address the site change process and applicable documentation as part of the overall fire protection program addressed by COL Item 9.5(1).

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 11 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Fire prevention is the first line of defense-in-depth for fire protection. The fire prevention attributes of the program are directly related to the fire protection objective to minimize the potential for fire to occur. These attributes involve design and administrative measures that provide a reasonable level of assurance that fire hazards are adequately protected and managed and that fire consequences will be limited for those fires that do occur.	2.	Information Statement	Compliance statement not appropriate since this is an informational statement only.
Fire prevention administrative controls should include procedures to control handling and use of combustibles, prohibit storage of combustibles in plant areas important to safety, establish designated storage areas with appropriate fire protection, and control use of specific combustibles (e.g., wood) in plant areas important to safety.	2.1	COL	COL Item 9.5(1)
Bulk storage of combustible materials should be prohibited inside or adjacent to buildings or systems important to safety during all modes of plant operation. Procedures should govern the handling of and limit transient fire hazards such as combustible and flammable liquids, wood and plastic products, high-efficiency particulate air (HEPA) and charcoal filters, dry ion exchange resins, or other combustible materials in buildings containing systems or equipment important to safety during all phases of operation, particularly during maintenance, modification, or refueling operations.	2.1.1	COL	COL Item 9.5(1)
Fire prevention elements of the fire protection program should be maintained when plant modifications are made. The modification procedures should contain provisions that evaluate the impacts of modifications on the fire prevention design features and programs. The licensee should follow the guidelines of Regulatory Position 4.1.1 in the design of plant modifications. Personnel in the fire protection organization should review modifications of SSCs to ensure that fixed fire loadings are not increased beyond those accounted for in the fire hazards analysis, or if increased, suitable protection is provided and the fire hazards analysis is revised accordingly.	2.1.2	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 12 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Flammable and combustible liquids and gases are potentially significant fire hazards and procedures should clearly define the use, handling, and storage of these hazards. The handling, use, and storage of flammable and combustible liquids should, as a minimum, comply with the provisions of NFPA 30, "Flammable and Combustible Liquids Code."	2.1.3	COL	COL Item 9.5(1)
When an SSC important to safety is near installations such as flammable liquid or gas storage, the licensee should evaluate the risk of exposure fires (originating in such installations) to the SSCs and take appropriate protective measures. NFPA 80A, "Recommended Practice for Protection of Buildings from Exterior Fire Exposures," provides guidance on such exposure protection. NFPA 30 provides guidance relative to minimum separation distances from flammable and combustible liquid storage tanks. NFPA 55, "Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks," provides separation distances for gaseous and liquefied hydrogen. (See Regulatory Position 7.5 of this guide.) NFPA 58, "Liquefied Petroleum Gas Code," provides guidance for liquefied petroleum gas.	2.1.4	COL	COL Item 9.5(2).
Electrical equipment (permanent and temporary), hot work activities (e.g., open flame, welding, cutting and grinding), high-temperature equipment and surfaces, heating equipment (permanent and temporary installation), reactive chemicals, static electricity, and smoking are all potential ignition sources. Design, installation, modification, maintenance, and operational procedures and practices should control potential ignition sources.	2.2	COL	DCD addresses design to minimize ignition sources. COL Applicant to address control of hot work for modifications and maintenance. COL Item 9.5(1)
Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.	2.2.1	COL	This is an integral aspect of the ignition source control program to be established under COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 13 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The use of temporary services at power reactor facilities is routine, especially to support maintenance and other activities during outages. In view of the magnitude and complexity of some temporary services, proper engineering and, once installed, maintenance of the design basis become significant. Plant administrative controls should provide for engineering review of temporary installations. These reviews should ensure that appropriate precautions, limitations, and maintenance practices are established for the term of such installations.	2.2.2	COL	COL Item 9.5(1)
Leak testing and similar procedures such as airflow determination should not use open flames or combustion-generated smoke. Procedures and practices should provide for control of temporary heating devices. Use of space heaters and maintenance equipment (e.g., tar kettles for roofing operations) in plant areas should be strictly controlled and reviewed by the plant's fire protection staff.	2.2.3	COL	This is an integral aspect of the ignition source control program to be established under COL Item 9.5(1).
The licensee should establish administrative controls to minimize fire hazards in areas containing SSCs important to safety. These controls should govern removal of waste, debris, scrap, oil spills, and other combustibles after completion of a work activity or at the end of the shift. Administrative controls should also include procedures for performing and maintaining periodic housekeeping inspections to ensure continued compliance with fire protection controls.	2.3	COL	COL Item 9.5(1)
The licensee should establish fire protection administrative controls to address the following: a. Fire protection features should be maintained and tested by qualified personnel. b. Impairments to fire barriers, fire detection, and fire suppression systems should be controlled by a permit system. c. Successful fire protection requires inspection, testing, and maintenance of the fire protection equipment. d. Fire barriers, including dampers, doors, and penetration seals, should be routinely inspected.	2.4	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 14 of 46)

Regulatory Position	Position Number	Conformance	Remarks
In general, the fire hazards analysis and regulatory requirements determine the scope of fire detection and suppression in the plant, whereas the applicable industry codes and standards (generally NFPA codes, standards, and recommended practices) determine the design, installation, and testing requirements of the systems and components. The design of fire detection systems should minimize the adverse effects of fires on SSCs important to safety. Automatic fire detection systems should be installed in all areas of the plant that contain or present an exposure fire hazard to SSCs important to safety. These fire detection systems should be capable of operating with or without offsite power.	3.1	Conform	The FHA (Appendix 9A), NRC regulations and NFPA codes and standards are used in the development of fire protection features for the US-APWR.
The fire detection and alarm system should be designed with objectives detailed in the RG.	3.1.1	Conform	RG 1.189, Rev. 1 followed extensively is the implementation of the fire protection program for the US-APWR plant.
NFPA 22, “Standard for Water Tanks for Private Fire Protection,” and NFPA 24, “Standard for the Installation of Private Fire Service Mains and Their Appurtenances,” provide guidance for fire protection water supplies.	3.2.1	COL	COL Item 9.5(2) will provide a water supply system conforming with RG 1.189, Rev. 1 position 3.2.
Fire pump installations should conform to NFPA 20	3.2.2	COL	COL Item 9.5(2)
An underground yard fire main loop should be installed to furnish anticipated water requirements. NFPA 24 provides appropriate guidance for such installation.	3.2.3	COL	COL Item 9.5(2)
Automatic suppression should be installed as determined by the fire hazards analysis and as necessary to protect redundant systems or components necessary for safe shutdown and SSCs important to safety.	3.3	Conform	See Appendix 9A for areas where automatic suppression as determined by the FHA is to be installed.
Equipment important to safety that does not itself require protection by water-based suppression systems, but is subject to unacceptable damage if wetted by suppression system discharge, should be appropriately protected (e.g., water shields or baffles). Drains should be provided as required to protect equipment important to safety from flooding damage.	3.3.1	Conform	Floor drains and raised equipment pedestals are used as well as spray shields where necessary to protect equipment that can suffer unacceptable damage from wetting.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 15 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Water sprinkler and spray suppression systems are the most widely used means of implementing automatic water-based fire suppression. Sprinkler and spray systems should, at a minimum, conform to requirements of appropriate standards such as NFPA 13 and NFPA 15.	3.3.1.1	Conform	Sprinkler systems are designed per NFPA 13 and spray systems designed per NFPA 15.
Water mist suppression systems may be useful in specialized situations, particularly in those areas where the application of water needs to be restricted. Water mist systems should conform to appropriate standards such as NFPA 750, “Standard on Water Mist Fire Protection Systems.”	3.3.1.2	Conform	
Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to the use of foam sprinkler and spray systems. Foam sprinkler and spray systems should conform to appropriate standards such as NFPA 16, “Standard for the Installation of Deluge Foam-Water Sprinkler and Foam-Water Spray Systems,” and NFPA 11, “Standard for Low-, Medium-, and High-Expansion Foam.”	3.3.1.3	N/A	No foam sprinkler or spray systems are used for the US-APWR plant.
Gaseous systems should be evaluated for potential impacts on the habitability of areas containing equipment important to safety where operations personnel perform safe-shutdown actions or where firefighting activities may become necessary. Where gas suppression systems are installed, openings in the area should be adequately sealed or the suppression system should be sized to compensate for the loss of the suppression agent through floor drains and other openings.	3.3.2	The US-APWR plant uses an environmentally friendly clean gaseous fire suppression agent that does not pose a hazard to operations personnel.	See Appendix 9A.
Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12. 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.	3.3.2.1	No carbon dioxide extinguishing systems are used for the US-APWR plant.	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 16 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Halon fire extinguishing systems should comply with the requirements of NFPA 12A. Where automatic Halon systems are used, they should be equipped with a predischarge alarm and a discharge delay to permit personnel egress. Provisions for locally disarming automatic Halon systems should be key locked and under strict administrative control.	3.3.2.2	No Halon fire extinguishing systems are used for the US-APWR plant.	
Halon alternative (or "clean agent") fire extinguishing systems should comply with applicable standards such as NFPA 2001. Only listed or approved agents should be used. Provisions for locally disarming automatic systems should be key locked and under strict administrative control.	3.3.2.3	Conform	Clean agent fire suppression systems conform with applicable NFPA 2001 guidance.
The licensee should provide a manual firefighting capability throughout the plant to limit the extent of fire damage. Standpipes, hydrants, and portable equipment consisting of hoses, nozzles, and extinguishers should be provided for use by properly trained firefighting personnel.	3.4	Conform	Adequate manual hose stations and portable fire extinguishers installed through the US-APWR.
Interior manual hose installations should be able to reach any location that contains, or could present a fire exposure hazard to, equipment important to safety with at least one effective hose stream. To accomplish this, standpipes with hose connections equipped with a maximum of 30.5 m (100 ft) of 38-mm (1.5-in.) woven-jacket, lined fire hose and suitable nozzles should be provided in all buildings on all floors. These systems should conform to NFPA 14, "Standard for the Installation of Standpipe and Hose Systems," for sizing, spacing, and pipe support requirements for Class III standpipes. Water supply calculations should demonstrate that the water supply system can meet the standpipe pressure and flow requirements of NFPA 14	3.4.1	Conform	See Appendix 9A.
Outside manual hose installations should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize equipment important to safety. Hydrants should be installed approximately every 76 m (250 ft) on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24 should be provided as needed, but at least every 305 m (1,000 ft).	3.4.2	COL	This is integral to the fire main system to be provided as part of COL Item 9.5(2).

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 17 of 46)

Regulatory Position	Position Number	Conformance	Remarks
For flammable and combustible liquid fire hazards, consideration should be given to the use of foam systems for manual fire suppression protection. These systems should comply with the requirements of NFPA 11.	3.4.3	N/A	Based on the FHA (Appendix 9A), no installed foam systems are proposed for the US-APWR. The plant fire brigade shall have foam carts available for manual fire fighting efforts in accordance with COL Item 9.5(1).
Fire extinguishers should be provided in areas that contain or could present a fire exposure hazard to equipment important to safety. Extinguishers should be installed with due consideration given to possible adverse effects on equipment important to safety installed in the area. NFPA 10, “Standard for Portable Fire Extinguishers,” provides guidance on the installation (including location and spacing) and the use and application of fire extinguishers.	3.4.4	Conform	See Appendix 9A.
Some fixed fire suppression systems may be manually actuated (e.g., fixed suppression systems provided in accordance with Section III.G.3 of Appendix R to 10 CFR 50). Manual actuation is generally limited to water spray systems and should not be used for gaseous suppression systems except when the system provides backup to an automatic water suppression system.	3.4.5	N/A	The US-APWR is an advanced light water reactor plant and complies with applicable regulations for an advanced plant. Manually actuated water spray systems in the US-APWR are only used for charcoal filter bed protection.
A site fire brigade trained and equipped for firefighting should be established and should be on site at all times to ensure adequate manual firefighting capability for all areas of the plant containing SSCs important to safety. The fire brigade leader should have ready access to keys for any locked doors.	3.5.1	COL	COL Item 9.5(1)
The equipment provided for the brigade should consist of personal protective equipment such as turnout coats, bunker pants, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatuses using full-face positive-pressure masks approved by the 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 MCR personnel.	3.5.1.2	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 18 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Procedures should be established to control actions by the fire brigade upon notification by the MCR of a fire and to define firefighting strategies.	3.5.1.3	COL	COL Item 9.5(1)
Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team. Drills should be performed quarterly for each shift fire brigade. Each fire brigade member should participate in at least two drills annually.	3.5.1.4	COL	COL Item 9.5(1)
Onsite fire brigades typically fulfill the role of first responder, but may not have sufficient personnel, equipment, and capability to handle all possible fire events. Arrangements with offsite fire services may be necessary to augment onsite firefighting capabilities, consistent with the fire hazards analysis and prefire planning documents. The fire protection program should describe the capabilities (e.g., equipment compatibility, training, drills, and command control) of offsite responders.	3.5.2	COL	COL Item 9.5(1)
The local offsite fire departments that provide back up manual firefighting resources should have the following capabilities: a. Personnel and equipment with capacities consistent with those assumed in the plant's fire hazards analysis and prefire plans. b. Hose threads or adapters to connect with onsite hydrants, hose couplings, and standpipe risers.	3.5.2.1	COL	This is inherent with the arrangements to be made under COLA Item 9.5(1).
Local offsite fire department personnel who provide back up manual firefighting resources should be trained.	3.5.2.2	COL	This is inherent with the arrangements to be made under COLA Item 9.5(1).
The licensee should establish written mutual aid agreements between the utility and the offsite fire departments that are listed in the fire hazards analysis and prefire plans as providing a support response to a plant fire. These agreements should delineate fire protection authorities, responsibilities, and accountabilities with regard to responding to plant fire or emergency events, including the fire event command structure between the plant fire brigade and offsite responders.	3.5.2.3	COL	This is inherent with the arrangements to be made under COLA Item 9.5(1).

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 19 of 46)

Regulatory Position	Position Number	Conformance	Remarks
This section provides guidance on building layout (e.g., fire areas and zones), materials of construction, and building system design (e.g., electrical, HVAC, lighting, and communication systems) important to effective fire prevention and protection.	4.1	Information introduction to this section of RG 1.189	No compliance statement is appropriate for this Reg. guide section lead in.
According to GDC 3, noncombustible and heat-resistant materials must be used wherever practical throughout the unit. Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. The fire hazards analysis should identify in situ combustible materials used in plant SSCs and specify suitable fire protection.	4.1.1	Conform	See Appendix 9A for the selection of fire areas, fire compartments, description of materials used for construction and fire protection provided.
Interior finishes should be noncombustible.	4.1.1.1	Conform	See below
Interior finishes should be noncombustible (see the “Glossary” section of this guide) or listed by an approving laboratory	4.1.1.2	Conform	US-APWR interior finishes conform to the items listed as acceptable without test in the text of this section of RG 1.189 or meet the acceptable industry testing listed.
In accordance with GDC 3, SSCs important to safety must be designed and located to minimize the probability and effect of fires and explosions. The concept of compartmentalization meets GDC 3, in part, by utilizing passive fire barriers to subdivide the plant into separate areas or zones.	4.1.2	Conform	See appendix 9A for fire area and fire compartment selection for the US-APWR.
A fire area is defined as that portion of a building or plant that is separated from other areas by fire barriers, including components of construction such as beams, joists, columns, penetration seals or closures, fire doors, and fire dampers. Fire barriers that define the boundaries of a fire area should have a fire-resistance rating of 3 hours or more.	4.1.2.1	Conform	US-APWR fire area boundaries meet 3-hour fire resistance and are protected with appropriately rated fire dampers, penetration seals, and fire doors.
Fire zones are subdivisions of a fire area and are typically based on fire hazards analyses that demonstrate that the fire protection systems and features within the fire zone provide an appropriate level of protection for the associated hazards. Fire zone concepts may be used to establish zones within fire areas where further subdivision into additional fire areas is not practical on the basis of existing plant design and layout (e.g., inside containment).	4.1.2.2	Conform	Fire zones associated with selected fire areas are described in Appendix 9A.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 20 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The plant layout should provide adequate means of access to all plant areas for manual fire suppression. The plant layout should also allow for safe access and egress to areas for personnel performing safe-shutdown operations.	4.1.2.3	Conform	
Electric cable construction should pass the flame test in IEEE Standard 383, “IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations,” or IEEE Standard 1202, “IEEE Standard for Flame Testing of Cables for Use in Cable Trays in Industrial and Commercial Occupancies.” (This does not imply that cables passing either test will not require additional fire protection.) New reactor fiber optic cable insulation and jacketing should also meet the fire and flame test requirements of IEEE 383 or IEEE 1202.	4.1.3.1	Conform	
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. Cable raceways should be used only for cables.	4.1.3.2	Conform	
Redundant cable systems important to safety 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 hours to the extent feasible. Those fire areas that contain cable trays important to safety should be provided with fire detection. Cable trays should be accessible for manual firefighting and 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.	4.1.3.3	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 21 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Redundant systems used to mitigate the consequences of design-basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection should be provided so that a fire within only one such system will not damage the redundant system.	4.1.3.4	Conform	US-APWR design employs 4 redundant trains of safety systems used for mitigation of design basis accidents. Each train is completely separated by 3-hour rated fire barriers.
Transformers that present a fire hazard to equipment important to safety should be protected as described in Regulatory Position 7.3 of this guide.	4.1.3.5	Conform	See Regulatory Position 7.3.
Electrical cabinets present an ignition source for fires and a potential for explosive electrical faults that can result in damage not only to the cabinet of origin, but also to equipment, cables, and other electrical cabinets in the vicinity of the cabinet of origin. Fire protection systems and features provided for the general area containing the cabinet may not be adequate to prevent damage to adjacent equipment, cables, and cabinets following an energetic electrical fault. Energetic electrical faults are more of a concern with high-voltage electrical cabinets [i.e., 480 volts (V) and above]. High-voltage cabinets should be provided with adequate spatial separation or substantial physical barriers to minimize the potential for an energetic electrical fault to damage adjacent equipment, cables, or cabinets important to safety.	4.1.3.6	Conform	
Suitable design of the ventilation systems can limit the consequences of a fire by preventing the spread of the products of combustion to other fire areas. It is important that means be provided to ventilate, exhaust, or isolate the fire area as required and that consideration be given to the consequences of ventilation system failure caused by the fire, resulting in a loss of control for ventilating, exhausting, or isolating a given fire area.	4.1.4	Informational statement	See Appendix 9A for additional discussion on HVAC impact and smoke removal.
Filters for particulate and gaseous effluents may be fabricated of combustible media (e.g., HEPA and charcoal filters). The ignition and burning of these filters may result in a direct release of radioactive material to the environment or may provide an unfiltered pathway upon failure of the filter. Filter combustion may spread fire to other areas.	4.1.4.1	Informational statement	US-APWR design provides protection of HVAC filters and filter media from the damaging affects of a fire.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 22 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Smoke from fires can be toxic, corrosive, and may obscure visibility for emergency egress and access to plant areas. Smoke control and removal may be necessary to support manual suppression activities and safe-shutdown operations.	4.1.4.2	Informational statement	See Appendix 9A for a discussion of smoke removal for selected fire areas
Protection of plant operations staff from the effects of fire and fire suppression (e.g., gaseous suppression agents) may be necessary to ensure safe shutdown of the plant. For MCR evacuation, egress pathways and remote control stations should also be habitable. Consideration should be given to protection of safe-shutdown areas from infiltration of gaseous suppression agents. The capability to ventilate, exhaust, or isolate is particularly important to ensure the habitability of rooms or spaces that should be attended in an emergency. In the design, provision should be made for personnel access to and escape routes from each fire area.	4.1.4.3	Conform	For the US-APWR, the gaseous suppression agent used in R/B areas is a safe clean agent that does not pose a safety concern for personnel.
Redundant safe-shutdown components may be separated by fire-resistant walls, floors, enclosures, or other types of barriers. For the fire barriers to be effective in limiting the propagation of fire, ventilation duct penetrations of fire barriers should be protected by means of fire dampers that are arranged to automatically close in the event of fire. NFPA 90A, “Standard for the Installation of Air Conditioning and Ventilating Systems,” provides additional guidance.	4.1.4.4	Conform	
Floor drains sized to remove expected firefighting water without flooding equipment important to safety should be provided in 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 equipment important to safety in the area. Facility design should ensure that fire water discharge in one area does not impact equipment important to safety in adjacent areas.	4.1.5	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 23 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Emergency lighting should be provided throughout the plant as necessary to support fire suppression actions and safe-shutdown operations, including access and egress pathways to safe shutdown areas during a fire event.	4.1.6	Conform	
Emergency lighting should be provided in support of the emergency egress design guidelines in outlined in Regulatory Position 4.1.2.3 of this guide.	4.1.6.1	Conform	
Lighting is vital to post-fire safe-shutdown and emergency response in the event of fire. The licensee should provide suitable fixed and portable emergency lighting.	4.1.6.2	Conform	
The communication system design should provide effective communication between plant personnel in all vital areas during fire conditions under maximum potential noise levels.	4.1.7	Conform	In plant repeaters used where required.
In situ and transient explosion hazards should be identified and suitable protection provided. Transient explosion hazards that cannot be eliminated should be controlled and suitable protection provided.	4.1.8	Conform, COL to address transient controls	US-APWR design addresses in situ explosion hazards and provides protection. COL Item 9.5(2) to control transient hazards.
Fire barriers are those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire. New reactor designs should be based on providing structural barriers between redundant safe shutdown success paths wherever feasible and should minimize the reliance on localized electrical raceway fire barrier systems, as described in Regulatory Position 4.2.3 of this guide. This approach is in accordance with the enhanced fire protection criteria for new reactors described in Regulatory Position 8.2 of this guide.	4.2.1	Conform	The US-APWR is a new reactor design and minimizes reliance on localized electrical raceway fire barrier systems. Where used, localized barriers are in accordance with Appendix C qualification requirements. See also Regulatory Position 8.2.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 24 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Wall, floor, and ceiling construction should be noncombustible. (See Regulatory Position 4.1.1 of this guide.) NFPA 221, “Standard for High-Challenge Fire Walls and Fire Barrier Walls,” can be used as guidance for construction of fire barrier walls. Materials of construction for walls, floors, and ceilings serving as fire barriers should be rated by approving laboratories in hours of resistance to fire.	4.2.1.1	Conform	The US-APWR uses construction methods that result in noncombustible wall, floor, and ceiling components in safety-related and important to safety areas.
Building design should ensure that door openings are properly protected. These openings should be protected with fire doors that have been qualified by a fire test.	4.2.1.2	Conform	
Building design should ensure that ventilation openings are properly protected. These openings should be protected with fire dampers that have been fire tested. In addition, the construction and installation techniques for ventilation openings through fire barriers should be qualified by fire endurance tests. For ventilation ducts that penetrate or terminate at a fire wall, guidance in NFPA 90A indicates that ventilation fire dampers should be installed within the fire wall penetration for barriers with a fire rating greater than or equal to 2 hours. NFPA 90A requires that fire dampers be installed in all air transfer openings within a rated wall.	4.2.1.3	Conform	
Openings through fire barriers for pipe, conduit, and cable trays that 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 102 mm (4 in.) in diameter should be sealed at the fire barrier penetration. Openings inside conduit 102 mm (4 in.) or less in diameter should be sealed at the fire barrier unless the conduit extends at least 1.5 m (5 ft) on each side of the fire barrier and is sealed either at both ends or at the fire barrier with material to prevent the passage of smoke and hot gases. Fire barrier penetrations that maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.	4.2.1.4	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 25 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Structural fire barriers—The design adequacy of fire barrier walls, floors, ceilings, and enclosures should be verified by fire endurance testing. The NRC fire protection guidance refers to the guidance of NFPA 251 and ASTM E-119, "Standard Test Methods for Fire Tests of Building Construction and Materials," as acceptable test methods for demonstrating fire endurance performance. The guidance of NFPA 251 and ASTM E-119 should be consulted with regard to construction, materials, workmanship, and details such as dimensions of parts and the size of the specimens to be tested. In addition, NFPA 251 and ASTM E-119 should be consulted with regard to the placement of thermocouples on the specimen.	4.2.1.5.a	Conform	
Penetration fire barriers—Penetration fire barriers should be qualified by tests conducted by an independent testing authority in accordance with the provisions of NFPA 251 or ASTM E-119. In addition, ASTM E-814, "Standard Test Method for Fire Tests of Through-Penetration Fire Stops," or IEEE Standard 634, "IEEE Standard Cable Penetration Fire Stop Qualification Test," could be used in the development of a standard fire test.	4.2.1.5.b	Conform	
The results of fire test programs that include a limited selection of test specimens that have been specifically designed to encompass or bound the entire population of in-plant penetration seal configurations may be acceptable.	4.2.1.6	Conform	
Structural steel forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that required of the barrier. Where the structural steel is not protected and has a lower fire rating than the required rating of the fire barrier, the fire hazards analysis should justify the configuration by demonstrating the temperature that the steel will reach during fire and the ability of the steel to carry the required loads at that temperature.	4.2.2	Conform	
Redundant cable systems important to safety should be separated from each other and from potential fire exposure hazards in accordance with the separation means of Regulatory Position 5.5.a–c of this guide.	4.2.3.1	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 26 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Licensees should request an exemption or deviation, as appropriate, when relying on fire-rated cables to meet NRC requirements for protection of safe-shutdown systems or components from the effects of fire. (See Regulatory Position 1.8 of this guide.)	4.2.3.2	N/A	No exemptions are requested as a result of relying on fire rated cables.
Fire stops should be installed every 6.1 m (20 ft) along horizontal cable routings in areas important to safety that are not protected by automatic water systems. Vertical cable routings should have fire stops installed at each floor-ceiling level. Between levels or in vertical cable chases, fire stops should be installed at the mid-height if the vertical run is 6.1 m (20 ft) or more, but less than 9.1 m (30 ft) or at 4.6-m (15-ft) intervals in vertical runs of 9.1 m (30 ft) or more unless such vertical cable routings are protected by automatic water systems directed on the cable trays. Individual fire stop designs should prevent the propagation of a fire for a minimum period of 30 minutes when tested for the largest number of cable routings and maximum cable density.	4.2.3.3	Conform	
Fire barriers relied upon to protect post-fire shutdown-related systems and to meet the separation means discussed in Regulatory Position 5.3 should have a fire rating of either 1 or 3 hours.	4.3.1	Conform	The US-APWR utilizes 3-hour fire rated barriers between redundant trains of safety-related equipment. Only safety-related equipment is relied upon for post fire shutdown.
The fire endurance qualification test for fire barrier materials applied directly to a raceway or component is considered to be successful if all three of the following conditions are met: a. The average unexposed side temperature of the fire barrier system, as measured on the exterior surface of the raceway or component, did not exceed 139 ˚C (250 ˚F) above its initial temperature. b. Irrespective of the unexposed side temperature rise during the fire test, if cables or components are included in the fire barrier test specimen, a visual inspection is performed. Cables should not show signs of degraded conditions resulting from the thermal effects of the fire exposure.	4.3.2	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 27 of 46)

Regulatory Position	Position Number	Conformance	Remarks
c. The cable tray, raceway, or component fire barrier system remained intact during the fire exposure and water hose stream test without developing any openings through which the cable tray, raceway, or component (e.g., cables) is visible.	4.3.2(cont)		
The following are acceptable placements of thermocouples for determining the thermal performance of raceway or cable tray fire barrier systems that contain cables during fire exposure: a. Conduits—The temperature rise on the unexposed surface of a fire barrier system installed on a conduit should be measured by placing the thermocouples every 152 mm (6 in.)(8) on the exterior conduit surface underneath the fire barrier material. b. Cable trays—The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing the thermocouples on the exterior surface of the tray side rails between the cable tray side rail and the fire barrier material. c. Junction boxes—The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each junction box surface. d. Airdrops—The internal airdrop temperatures should be measured by thermocouples placed every 305 mm (12 in.) on the cables routed within the airdrop and by a stranded American Wire Gauge 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm (6 in.) along the length of the copper conductor.	4.3.2.1	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 28 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The following are acceptable thermocouple placements for determining the thermal performance of raceway or cable tray fire barrier systems that do not contain cables. a. Conduits—The temperature rise of the unexposed surface of a fire barrier system installed on a conduit should be measured by placing thermocouples every 152 mm (6 in.) on the exterior conduit surface between the conduit and the unexposed surface of the fire barrier material. b. Cable trays—The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing thermocouples every 152 mm (6 in.) on the exterior surface of each tray's side rails between the side rail and the fire barrier material. c. Junction boxes—The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each junction box surface. d. Airdrops—The internal airdrop temperatures should be measured by a stranded American Wire Gauge 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm (6 in.) along the length of the copper conductor.	4.3.2.2	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.
Temperature conditions on the unexposed surfaces of the fire barrier material during the fire test will be determined by averaging the temperatures measured by the thermocouples installed in or on the raceway. To determine these temperature conditions, the thermocouples measuring similar areas of the fire barrier should be averaged together. Acceptance will be based on the individual averages.	4.3.2.3	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.
NFPA 251 and ASTM E-119 allow flexibility in hose stream testing. The standards allow the hose stream test to be performed on a duplicate test specimen subjected to a fire endurance test for a period equal to one-half of that indicated as the fire-resistance rating, but not for more than 1 hour (e.g., 30-minute fire exposure to qualify a 1-hour fire-rated barrier).	4.3.3	N/A	Informational statement

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 29 of 46)

Regulatory Position	Position Number	Conformance	Remarks
During fire tests of raceway fire barrier systems, thermal damage to the cables has led to cable jacket and insulation degradation without the loss of circuit integrity as monitored using ANI criteria [applied voltage of 8–10V direct current (dc)]. Since cable voltages used for ANI circuit integrity tests do not replicate cable operating voltages, loss of cable insulation conditions can exist during the fire test without a dead short occurring. It is expected that if the cables were at rated power and current, a fault would propagate.	4.3.4	N/A	Informational statement..
Comparison of the fire barrier internal time-temperature profile measured during the fire endurance test to existing cable performance data, such as data from Environmental Qualification tests, could be proposed to the staff as a method for demonstrating cable functionality. Environmental Qualification testing is typically performed to rigorous conditions, including rated voltage and current. By correlating the Environmental Qualification test time-temperature profile to the fire test time-temperature profile, the Environmental Qualification test data would provide a viable mechanism to ensure cable functionality.	4.3.4.1	N/A	Informational statement.
The nuclear industry uses two principal materials as cable insulation and cable jackets, thermoplastics and thermosetting polymeric materials. A thermoplastic material can be softened and resoftened by heating and reheating. Conversely, thermosetting cable insulation materials cure by chemical reaction and do not soften when heated. Under excessive heating, thermosetting insulation becomes stiff and brittle. Electrical faults may be caused by softening and flowing of thermoplastic insulating materials at temperatures as low as 149 ˚C (300 ˚F). Thermosetting electrical conductor insulation materials usually retain their electrical properties under short-term exposures to temperatures as high as 260 ˚C (500 ˚F).	4.3.4.2	N/A	Informational statement.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 30 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Air oven tests can evaluate the functionality of cables for those cable tray or raceway fire barrier test specimens tested without cables. This testing method consists of exposing insulated wires and cables at rated voltage to elevated temperatures in a circulating air oven. The temperature profile for regulating the temperature in the air oven during this test is the temperature measured by the American Wire Gauge 8 bare copper conductor during the fire exposure of those cable tray or raceway test specimens that were tested without cables.	4.3.4.3	N/A	Informational statement
The following analysis, which is based on determining whether a specific insulation material will maintain electrical integrity and operability within a raceway fire barrier system during and after an external fire exposure, is an acceptable method for evaluating cable functionality. To determine cable functionality, it is necessary to consider the operating cable temperatures within the fire barrier system at the onset of the fire exposure and the thermal exposure threshold temperature of the cable.	4.3.4.4	N/A	Informational statement.
When considering the consequences of a fire in a given fire area during the evaluation of safe shutdown capabilities of the plant, it should be demonstrated that one success path of equipment and electrical circuits that can be used to bring the reactor to hot shutdown/standby conditions, remains free of fire damage.	5.	N/A	The US-APWR is an evolutionally plant that complies with Position 8.2
During post-fire shutdown, the reactor coolant system process variables must 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 of any primary coolant boundary, or rupture of the containment boundary. Licensees should ensure that fire protection features are provided for structures, systems, and components important to safe shutdown that are capable of limiting fire damage so that one success path of systems necessary to achieve and maintain hot shutdown conditions from either the MCR or emergency control station(s) is free of fire damage.	5.1	Conform	The US-APWR is an evolutionally plant that complies with Position 8.2

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 31 of 46)

Regulatory Position	Position Number	Conformance	Remarks
For normal safe shutdown, redundant systems necessary to achieve cold shutdown may be damaged by a single fire, but damage should be limited so that at least one success path can be repaired or made operable within 72 hours using onsite capability or within the time period required to achieve a safe-shutdown condition, if less than 72 hours.	5.2	N/A	The US-APWR as an evolutionary plant design must be able to achieve cold shutdown without equipment repairs being involved. Cold shutdown can be achieved as a normal course of action using two of the four redundant safety trains.
Fire barriers or automatic suppression, or both, should be installed as necessary to protect redundant systems or components necessary for safe shutdown.	5.3	Conform	Fire barriers are installed to provide separation of redundant safety trains. Automatic suppression is installed to minimize damage to safety-related equipment where app.
The post-fire safe-shutdown analysis must ensure that one success path of shutdown SSCs remains free of fire damage for a single fire in any single plant fire area. The NRC acknowledges Chapter 3 of industry guidance document, NEI-00-01, Revision 1, in RIS 2005-30, as providing an acceptable deterministic methodology for analysis of post-fire safe-shutdown circuits, when applied in conjunction with the RIS.	5.3.1	Conform	See FHA (Appendix 9A)
The licensee should evaluate the circuits associated with Hi/Low pressure interfaces for the potential to adversely affect safe shutdown. For example, the residual heat removal (RHR) system is generally a low-pressure system that interfaces with the high-pressure primary coolant system. Thus, the interface most likely consists of two redundant and independent motor-operated valves. Both of these two motor-operated valves and their power and control cables may be subject to damage from a single fire. This single fire could cause the two valves to spuriously open, resulting in an interfacing system LOCA through the subject Hi/Low-pressure system interface.	5.3.2	Conform	The US-APWR design considers the impact of high/low pressure interfaces.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 32 of 46)

Regulatory Position	Position Number	Conformance	Remarks
The post-fire safe-shutdown analysis should describe the methodology necessary to accomplish safe shutdown, including any operator actions required. Manual actions may not be credited in lieu of providing the required protection of redundant systems located in the same fire area required by Section III.G.2 of Appendix R to 10 CFR 50, unless the NRC has reviewed and approved a specific operator manual action for a specific plant through the exemption process of 10 CFR 50.12.	5.3.3	Conform	Four redundant trains of safety-related equipment are individually separated with 3-hour fire rated barriers. Should MCR fire involvement prevent safe operation, a completely independent remote shutdown console is located in a separate fire area. No operator manual actions are required, except evacuation and switch transfer for the MCR fire event.
The post-fire safe-shutdown circuit analysis must address all possible fire-induced failures, including multiple spurious actuations. Although some licensees have based this analysis on the assumption that multiple spurious actuations will not occur simultaneously or in rapid succession, cable fire testing performed by the industry had demonstrated that multiple spurious actuations occurring in rapid succession (without sufficient time to mitigate the consequences) have a relatively high probability of occurring. The success path SSCs, including circuits, must be protected from fire damage that could prevent safe shutdown.	5.3.4	Conform	
Appendix R to 10 CFR 50 defines alternative shutdown capability as being provided by rerouting, relocating, or modifying *existing* systems, whereas dedicated shutdown is defined as being provided by installing *new* structures and systems for the function of post-fire shutdown. Since post-fire repairs cannot be credited for achieving and maintaining hot shutdown, the licensee should implement the required rerouting, relocating, or modifying of the existing system for alternative shutdown capability in existing plants when the need for additional alternative shutdown capability is identified.	5.4.1	N/A	The US-APWR is an evolutionally plant that complies with Position 8.2.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 33 of 46)

Regulatory Position	Position Number	Conformance	Remarks
When alternative or dedicated shutdown systems are credited for achieving post-fire safe shutdown, a specific category of circuits has been defined (referred to as “associated circuits of concern”) and acceptable approaches to mitigating the consequences of fire-induced failure of these circuits have been identified. These circuits are nonsafety or safety circuits that could adversely affect the identified shutdown equipment by feeding back potentially disabling conditions (e.g., hot shorts or shorts to ground) to power supplies or control circuits of that equipment and should be evaluated. Such disabling conditions should be prevented to provide assurance that the identified safe-shutdown equipment will function as designed.	5.4.2	N/A	The US-APWR is an evolutionally plant that complies with Position 8.2.
The shutdown capability may be protected from the adverse effect of damage to associated circuits of concern by the separation and protection guidelines of Regulatory Position 5.3 of this guide or, alternatively, by the following methods as applied to each type of associated circuit of concern.	5.4.3	N/A	See Position 5.3.
A load fuse/breaker (i.e., interrupting devices) to feeder fuse/breaker coordination to prevent loss of the redundant or alternative shutdown power source may be necessary. IEEE Standard 242, “IEEE Recommended Practices for Protection and Coordination of Industrial and Commercial Power Systems,” provides detailed guidance on achieving proper coordination.	5.4.3.1	N/A	See Position 5.3.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 34 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Spurious operation is considered mitigated if one of the following criteria are met: a. A means to isolate the equipment and components from the fire area before the fire (i.e., remove power, open circuit breakers) is provided. b. Electrical isolation that prevents spurious operation is provided. Potential isolation devices include breakers, fuses, amplifiers, control switches, current transformers, fiber optic couplers, relays, and transducers. c. A means to detect spurious operations and develop procedures to mitigate the maloperation of equipment (e.g., closure of the block valve if a power-operated relief valve spuriously operates, opening of the breakers to remove spurious operation of safety injection) is provided.	5.4.3.2	N/A	See Position 5.3.
Common Enclosures. Appropriate measures to prevent propagation of the fire should be provided. Electrical protection (e.g., breakers, fuses, or similar devices) should also be provided.	5.4.3.3	N/A	See Position 5.3.
The MCR fire area contains the controls and instruments for redundant shutdown systems in close proximity. (Separation is usually a few inches.) Remote shutdown capability for the MCR and its required circuits should be independent of the cables, systems, and components in the MCR fire area. The damage to systems in the MCR for a fire that causes evacuation of the MCR cannot be predicted. The licensee should conduct a bounding analysis to ensure that safe conditions can be maintained from outside the MCR.	5.4.4	Conform	The remote shutdown console located in a separate fire area form the MCR contains all controls necessary to safely achieve cold shutdown. When this remote console is used, MCR circuits are defeated so no adverse fire impact on safe-shutdown capability results.
Procedures for effecting safe shutdown should reflect the results and conclusions of the safe shutdown analysis. Implementation of the procedures should not further degrade plant safety functions. Time-critical operations for effecting safe shutdown identified in the safe-shutdown analysis and incorporated in post-fire procedures should be validated.	5.5	COL	COL Item 9.5(1)
Post-fire safe-shutdown operating procedures should be developed for those areas where alternative or dedicated shutdown is required. For other areas of the plant, shutdown would normally be achieved using the normal operating procedures or plant emergency operating procedures.	5.5.1	N/A	The US-APWR is an evolutionally plant that complies with Position 8.2.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 35 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Procedures should be in effect that describe the tasks to implement remote shutdown capability when offsite power is available and when offsite power is not available for 72 hours. These procedures should also address necessary actions to compensate for spurious operations and high-impedance faults if such actions are necessary to effect safe shutdown.	5.5.2	COL	COL Item 9.5(1)
The licensee should develop procedures for performance of repairs necessary to achieve and maintain cold shutdown conditions. For alternative shutdown, procedures should be in effect to accomplish repairs necessary to achieve and maintain cold shutdown within 72 hours. For plants that must proceed to cold shutdown prior to 72 hours, the procedures should support the required time for initiation of cold shutdown.	5.5.3	N/A	Repairs are not required to achieve cold shutdown. Cold shutdown is achieved through redundant safety trains of equipment through normal operating procedures.
Safe-shutdown requirements and objectives are focused on achieving shutdown conditions for fires occurring during normal at-power operations. During shutdown operations (i.e., maintenance or refueling outages), fire risk may increase significantly as a result of work activities. In addition, redundant systems important to safety may not be available as allowed by plant technical specifications and plant procedures. The fire protection program should be reviewed to verify that fire protection systems, features, and procedures will minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the unacceptable release of radioactive materials, under the differing conditions that may be present during shutdown operations.	5.6	Conform for US-APWR design features. COL to address non-power operations procedures.	The US-APWR allows sufficient non-power operation flexibility through four redundant safety trains of equipment. COL Applicant to address under COL Item 9.5(1).
Several areas within a nuclear power plant present unique hazards or design issues relative to fire protection and safe shutdown. This section provides guidance applicable to specific plant areas.	6.	N/A	Informational statement.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 36 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Fire protection for the primary and secondary containment areas should be provided for the hazards identified in the fire hazards analysis. Under normal conditions, containment fire hazards may include lubricating oils, hydraulic fluids, cables, electrical penetrations, electrical cabinets, and charcoal filters. During refueling and maintenance operations, additional hazards may be introduced, including contamination control and decontamination materials and supplies, scaffolding, plastic sheathing, wood planking, chemicals, and hot work.	6.1.1	Conform	Containment standpipe supplied to support fire suppression during outages.
For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Regulatory Position 4.1.3.3 of this guide. Inside non-inerted containments, one of the fire protection means specified in Regulatory Position 5.3, or one of the following, should be provided: a. Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 6.1 m (20 ft) with no intervening combustibles or fire hazards b. Installation of fire detectors and an automatic fire suppression system in the fire area c. Separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of 30 minutes, as demonstrated by testing or analysis	6.1.1.1	Conform	
The licensee should provide fire suppression systems on the basis of a fire hazards analysis. During normal operations, containment is generally inaccessible and, therefore, fire protection should be provided by automatic fixed systems. Automatic fire suppression capability need not be provided in primary containment atmospheres that are inerted during normal operations. However, inerted containments should have manual firefighting capability, including standpipes, hose stations, and portable extinguishers, to provide protection during refueling and maintenance operations.	6.1.1.2	Conform	See FHA (Appendix 9A).

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 37 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Fire detection systems should alarm and annunciate in the MCR. In primary containment, fire detection systems should be provided for each fire hazard. For primary and secondary containment, 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.	6.1.1.3	Conform	See FHA in Appendix 9A for specific discussion on type of detection for specific areas. A general coverage fire detection system is provided in containment.
The MCR complex (including galleys and office spaces) 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 hours. Peripheral rooms in the MCR complex should have automatic water suppression and should be separated from the MCR by noncombustible construction with a fire-resistance rating of 1 hour. Ventilation system openings between the MCR and peripheral rooms should have automatic smoke dampers that close upon operation of the fire detection or suppression system. If a gas extinguishing system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying the agent discharge and seal tightly against infiltration of the agent into the MCR. Carbon dioxide total flooding systems are not acceptable for these areas.	6.1.2	Conform	The MCR staff areas are separated from the MCR by 1 hour fire rated partitions and protected by an automatic low pressure water mist sprinkler system. Automatic fire detection is provided. A very early warning fire detection system is provided in raised-floor compartments and MCR cabinets. The MCR raised-floor compartment is also provided with an automatic fire suppression system that discharges an environmentally friendly clean fire extinguishing agent that does not present a hazard to MCR personnel. 3-hour fire rated separation is provide for the MCR complex No carbon dioxide systems are used in this area.
Manual firefighting capability should be provided for both of the following: a. fire originating within a cabinet, console, or connecting cables b. exposure fires involving combustibles in the general room area Portable Class A and Class C fire extinguishers should be located in the MCR. A hose station should be installed inside or immediately outside the MCR.	6.1.2.1	Conform	A fire hose station is located in the corridor immediately outside the entrance to the MCR. The appropriate portable extinguishers are located within the MCR.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 38 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Smoke detectors should be provided in the MCR, cabinets, and consoles. If redundant safe-shutdown equipment is located in the same MCR cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the MCR. The outside air intake(s) for the MCR ventilation system should be provided with smoke detection capability to alarm in the MCR to enable manual isolation of the MCR ventilation system and, thus, prevent smoke from entering the MCR.	6.1.2.2	Conform	The US-APWR utilizes a very early warning smoke detection system (air aspirating) within the raised-floor area that also senses within the MCR console and cabinets. Intake air is sampled by smoke detection to alarm and allow manual isolation.
Venting of smoke produced by fire in the MCR by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculating portion of the normal ventilation system. Manually operated venting of the MCR should be available to the operators.	6.1.2.3	Conform	MCR smoke removal is provided by design. The smoke removal function is manually activated by MCR operators.
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 hours. If this is not possible, an alternative, dedicated, or backup shutdown capability should be provided.	6.1.3	N/A	The US-APWR does not utilize a cable spreading room for the design. A raised-floor cable routing space is part of the fire zone separation, has automatic detection and suppression installed.
Computer rooms for computers performing functions important to safety that are not part of the MCR complex should be separated from other areas of the plant by barriers having a minimum fire-resistance rating of 3 hours and should be protected by automatic detection and fixed automatic suppression.	6.1.4	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 39 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Switchgear rooms containing equipment important to safety should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 hours. Redundant switchgear safety divisions should be separated from each other by barriers with a 3-hour fire rating. Automatic fire detectors should alarm and annunciate in the MCR and alarm locally. Cables entering the switchgear room that do not terminate or perform a function should be kept at a minimum to minimize the fire hazard. These rooms should not be used for any other purpose. Automatic fire suppression should be provided consistent with other safety considerations. Fire hose stations and portable fire extinguishers should be readily available outside the area.	6.1.5	Conform	A clean agent gaseous automatic fire suppression system is provided in safety-related switchgear rooms, which is an appropriate fire suppression agent for electrical equipment that would not create system malfunction if inadvertently discharged.
Barriers having a minimum fire rating of 3 hours should separate panels providing remote shutdown capability from the MCR complex. Panels providing remote shutdown capability should be electrically isolated from the MCR complex so that a fire in either area will not affect shutdown capability from the other area. The general area housing remote panels important to safety should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the MCR. 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.	6.1.6	Conform	The remote shutdown console is located in a separate fire area on a plant level above the MCR complex and is in a room formed by 3-hour fire rated barriers.
Battery rooms important to safety 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 hours inclusive of all penetrations and openings.	6.1.7	Conform	Ventilation system prevents hydrogen gas buildup. System malfunction is alarmed.
Diesel generators important to safety should be separated from each other and from other areas of the plant by fire barriers that have a fire-resistance rating of at least 3 hours. Diesel generators that are not important to safety should be separated from plant areas containing equipment and circuits important to safety by fire barriers that have a fire-resistance rating of at least 3 hours.	6.1.8	N/A	The US-APWR uses gas turbine generators for emergency power sources. Four safety-related gas turbine generators and the two SBO gas turbine generators are installed in individual fire areas with 3-hour fire rated barriers providing separation.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 40 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Pump houses and rooms housing redundant pump trains important to safety should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour 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 equipment required for safe plant shutdown. Fire detection should alarm and annunciate in the MCR and alarm locally. Hose stations and portable extinguishers should be readily accessible.	6.1.9	Conform	Rooms have fire detection installed. Automatic suppression is not provided unless there is significant lube oil associated with the unit based upon the FHA (See Appendix 9A).
Other areas within the plant may contain hazards or equipment that warrant special consideration relative to fire protection, including areas containing significant quantities of radioactive materials, yard areas containing water supplies or systems important to safety, and the plant cooling tower.	6.2	Informational Statement	
New Fuel Areas. Portable hand extinguishers should be located near this area. In addition, hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the MCR 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.	6.2.1	Conform, COL for combustible controls.	The COL applicant establish combustible control procedures. COL item 9.5(1)
Spent Fuel Areas. Local hose stations and portable extinguishers should provide protection for the spent fuel pool. Automatic fire detection should alarm and annunciate in the MCR and to alarm locally.	6.2.2	Conform	

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 41 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Radioactive waste buildings, storage areas, and decontamination areas should be separated from other areas of the plant by fire barriers having at least 3-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Alternatively, manual hose stations and portable extinguishers (handheld and large-wheeled units sized according to the hazards) are acceptable. Automatic fire detection should annunciate and alarm in the MCR and alarm locally. Ventilation systems in these areas should be capable of being isolated to prevent the release of radioactive materials to other areas or the environment. Water from firefighting activities should drain to liquid Radwaste collection systems.	6.2.3	Conform	
The requirements of 10 CFR 72.122(c) address fire protection of dry cask storage and other independent spent fuel storage facilities. The fire protection provided for these facilities should be commensurate with the potential fire hazards and with the potential for an unacceptable release of radiation during and following a fire. In addition to the requirements of 10 CFR 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste,” fire protection for independent spent fuel storage installations should ensure that fires involving such installations will not impact plant operations and plant areas important to safety.	6.2.4	N/A	Dry Cask storage is not a feature required for the US-APWR plant.
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.	6.2.5	Conform	RWSP is internal to R/B and isolated from damage by a fire. Auxiliary feed water storage in within plant separated by 3-hour fire barriers.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 42 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Cooling towers should constructed of noncombustible construction or be located and protected in such a way that a fire will not adversely affect any systems or equipment important to safety. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply. For the latter, provisions should be made to ensure a continuous supply of fire protection water whenever the cooling tower basin is drained for cleaning or other maintenance.	6.2.6	COL	Cooling towers are not a standard feature of the US-APWR and are dependent on the selection of the ultimate heat sink for the plant determined based on site specific needs. COL Item 9.5(2).
External RCPs with oil lubrication systems should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be designed, engineered, and installed to ensure that failure will not lead to fire during normal or design-basis accident conditions and that the system will withstand the safe-shutdown earthquake.	7.1	Conform	A compliant oil leakage collection system is provided for RCPs.
The T/B should be separated from adjacent structures containing equipment important to safety by a fire barrier with a rating of at least 3 hours. The fire barriers should be designed to maintain structural integrity even 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 a direct fire exposure hazard to the barrier.	7.2	Conform	The R/B wall separating the R/B from the T/B areas meets 3-hour fire resistive construction requirements.
The T/B contains large sources of combustible liquids, including reservoirs and piping for lube oil, seal oil, and electrohydraulic systems. These systems should be separated from systems important to safety by 3-hour rated barriers. Additional protection should be provided on the basis of the hazard or where fire barriers are not provided.	7.2.1	Conform	There is no safety-related equipment in the T/B. The T/B is separated from the R/B by 3-hour barriers. Individual hazards within the T/B are separated based on the US-APWR FHA (Appendix 9A).
Turbine generators may use hydrogen for cooling. Hydrogen storage and distribution systems should meet the guidelines provided in Regulatory Position 7.5 of this guide.	7.2.2	COL	COL Item 9.5(2)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 43 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Smoke control should be provided in the T/B to mitigate potential heavy smoke conditions associated with combustible liquid and cable fires. Regulatory Position 4.1.4 provides specific guidance.	7.2.3	Conform	Smoke vents in T/B roof.
Transformers installed inside fire areas containing systems important to safety 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. NFPA 70 offers additional guidance. Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 15.2 m (50 ft) distant from the building, or building walls within 15.2 m (50 ft) of oil-filled transformers should be without openings and have a fire resistance rating of at least 3 hours.	7.3	Conform for interior locations, COL to address outdoor.	COL Item 9.5(2)
Bulk gas storage (either compressed or cryogenic) should not be permitted inside structures housing equipment important to safety. 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 systems or equipment important to safety.	7.5	COL	COL Item 9.5(2)
The fire protection program should address plant support facilities (e.g., offices, maintenance shops, warehouses, temporary structures, equipment storage yards), collocated power generating units (e.g., nuclear, coal, natural gas), and nearby industrial facilities (e.g., chemical plants, refineries, manufacturing facilities) to the extent that fires and or explosions in these facilities may affect equipment important to safety. Fire protection systems and features should be adequate to protect against potential exposure fires and explosions from nearby facilities.	7.6	Conform to the extent of the US-APWR central structures, COL to address the rest of the support facilities.	COL item 9.5(2)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 44 of 46)

Regulatory Position	Position Number	Conformance	Remarks
Many of the current fire protection requirements and guidelines for operating reactors were issued after Commission approval of construction permits and/or operating licenses. The backfit of these requirements and guidelines to existing plant designs created the need for considerable flexibility in the application of the regulations on a plant-by-plant basis. New reactor designs should integrate fire protection requirements, including the protection of safe-shutdown capability and the prevention of radiological release, into the planning and design phase for the plant.	8.1	Conform	As an advanced nuclear plant, the US-APWR has integrated fire protection requirements into the planning and design phases of the plant.
New reactor designs should ensure that safe-shutdown can be achieved assuming that all equipment in any one fire area will be rendered inoperable by fire and that reentry into the fire area for repairs and operator actions is not possible. Because of its physical configuration, the MCR is excluded from this approach, provided the design includes an independent alternative shutdown capability that is physically and electrically independent of the MCR. The MCR should be evaluated to ensure that the effects of fire do not adversely affect the ability to achieve and maintain safe shutdown. New reactors should provide fire protection for redundant shutdown systems in the reactor containment building that will ensure, to the extent practicable, that one shutdown division will be free of fire damage. Additionally, new reactor designs should ensure that smoke, hot gases, or the fire suppressant will not migrate into other fire areas to the extent that they could adversely affect safe shutdown capabilities, including operator actions.	8.2	Conform	The US-APWR meets the enhanced fire protection provisions of SECY-93-087 as demonstrated in the FHA (Appendix 9A).
As discussed in SECY-94-084, the definitions of safe shutdown contained in the Commission's regulations and guidelines do not address the inherent limitations of passive RHR systems. Based on the discussion and recommendations of SECY-94-084, the passive decay heat removal systems must be capable of achieving and maintaining 215.6 ˚C (420 ˚F) or below for non-LOCA events. This safe-shutdown condition is predicated on demonstration of acceptable passive safety system performance.	8.3	N/A	The US-APWR plant uses four redundant active safety-related trains including the RHR systems to achieve cold shutdown in the event of a fire requiring plant shutdown within one of the safety-related trains.

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 45 of 46)

Regulatory Position	Position Number	Conformance	Remarks
In general, the fire protection program for new light-water reactor designs should comply with the provisions specified in NFPA 804, "Standard for Fire Protection for Advanced Light-Water Reactor Electric Generating Plants," as they relate to the protection of post-fire safe-shutdown capability and the mitigation of a radiological release resulting from a fire. However, the NRC has not formally endorsed NFPA 804 and some of the guidance in the NFPA standard conflicts with regulatory requirements. When conflicts occur, the applicable regulatory requirements and guidance, including the guidance in this RG, will govern.	8.4	Conform	The US-APWR conforms to the requirements of NFPA 804 except where requirements of RG-1.189 conflicts. See table 9.2-2 for an item by item comparison with the requirements of NFPA 804.
Fire protection programs for proposed new non-light-water reactor designs should meet the overall fire protection objectives and guidance provided in the applicable regulations and this RG as they relate to safe shutdown and radiological release, as well as the specific fire protection requirements, as applicable.	8.5	N/A	The US-APWR is light-water reactor.
SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," identifies fire protection as an "operation program." However, only those elements of the fire protection program that will not be implemented fully until the completion of the plant should be addressed as an operational program. This may include, but is not be limited to, the fire brigade, combustible and ignition source control program, procedures and prefire plans, and portable extinguishing equipment. The COL application should identify the operational program aspects of the fire protection program and the implementation schedule for each. In lieu of the implementation schedule, the applicant may propose inspections, tests, analyses, and acceptance criteria for these aspects of the program.	8.6	COL	COL Item 9.5(1)

Table 9.5.1-1 US-APWR Fire Protection Program Conformance with RG 1.189 (Sheet 46 of 46)

Regulatory Position	Position Number	Conformance	Remarks
NRC regulations and guidance do not specifically address fire protection during nonpower modes of plant operation (e.g., during shutdown for maintenance and/or refueling) except for existing plants that adopt an NFPA 805 fire protection program. However, the requirements for fire prevention in Regulatory Position 2 of this guide apply to all modes of plant operation, including shutdown. License applications for new reactors should also address any special provisions to ensure that, in the event of a fire during a nonpower mode of operation, the plant can be maintained in safe shutdown.	8.7	Conform with plant design that facilitates safety, COL Applicant to address procedural requirements to maintain safe-shutdown during non-power modes.	The US-APWR design provides four redundant trains of safety-related equipment to facilitate safe non-power operations. COL Item 9.5(1)
Licensees may apply for a license renewal to permit continued plant operation beyond the original operating license period of operation, in accordance with the provisions of 10 CFR 54. The fire protection licensing and design basis under license renewal should not differ significantly from that in effect before renewal with the exception that fire protection SSCs must be included in an aging management program as appropriate.	9.	N/A	The US-APWR is a new plant that will obtain an initial operating license. The design life of the US-APWR is sixty years.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 1 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
All elements of the site fire protection program shall be reviewed every 2 years and updated as necessary.	4.1.1	COL	COL Item 9.5(1)
Other review frequencies shall be permitted where specified in site administrative procedures and approved by the authority having jurisdiction.	4.1.2	COL	COL item 9.5(1)
A policy document shall be prepared that defines management authorities and responsibilities and establishes the general policy for the site fire protection program.	4.2.1	COL	COL item 9.5(1)
The policy document shall designate the senior management person with immediate authority and responsibility for the fire protection program.	4.2.2	COL	COL item 9.5(1)
The policy document shall define the fire protection interfaces with other organizations and assign responsibilities for the coordination activities.	4.2.3	COL	COL item 9.5(1)
The policy document shall include the authority for conflict resolution.	4.2.4	COL	COL item 9.5(1)
A fire prevention program shall be established and documented to include all of the following: (1) Fire safety information for all employees and contractors, including as a minimum familiarization with plant fire prevention procedures, fire reporting, and plant emergency alarms, including evacuation (2) Documented plant inspections, including provisions for handling of remedial actions to correct conditions that increase fire hazards (3) Procedures for the control of general housekeeping practices and the control of transient combustibles (4) Procedures for the control of flammable and combustible gases in accordance with NFPA standards (5) Procedures for the control of ignition sources, such as smoking, welding, cutting, and grinding (see NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work) (6) Fire prevention surveillance plan (see NFPA 601, Standard for Security Services in Fire Loss Prevention). (7) Fire-reporting procedure, including investigation requirements and corrective action requirements	4.3	COL	COL Item 9.5(1)
A documented fire hazards analysis shall be made for each site.	4.4.1	Conform, COL	US-APWR basic FHA is included in Appendix 9A. COL responsible for adding site specifics, and periodic review and updating, COL item 9.5(2).

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 2 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The analysis shall document all of the following: (1) Physical construction and layout of the buildings and equipment, including fire areas and the fire ratings of area boundaries (2)* Inventory of the principal combustibles within each fire subdivision (3) Description of the fire protection equipment, including alarm systems and manual and automatic extinguishing systems (4) Description and location of any equipment necessary to ensure a safe shutdown, including cabling and piping between equipment (5) Analysis of the postulated fire in each fire area, including its effect on safe shutdown equipment, assuming automatic and manual fire protection equipment do not function (6) Analysis of the potential effects of a fire on life safety, release of contamination, impairment of operations, and property loss, assuming the operation of installed fire-extinguishing equipment (7) Analysis of the potential effects of other hazards, such as earthquakes, storms, and floods, on fire protection (8) Analysis of the potential effects of an uncontained fire in causing other problems not related to safe shutdown, such as a release of contamination and impairment of operations (9) Analysis of the postfire recovery potential (10) Analysis for the protection of nuclear safety–related systems and components from the inadvertent actuation or breaks in a fire protection system (11) Analysis of the smoke control system and the impact smoke can have on nuclear safety and operation for each fire area (12) Analysis of the emergency planning and coordination requirements necessary for effective loss control, including any necessary compensatory measures to compensate for the failure or inoperability of any active or passive fire protection system or feature	4.4.2	Conform for initial US-APWR Design, COL to update.	COL Item 9.5(2) for updating
A formal procedure system for all actions pertaining to the fire protection program shall be established, including all of the following: (1) Inspection, testing, maintenance, and operation of fire protection systems and equipment, both manual and automatic, such as detection and suppression systems (2) Inspection, testing, and maintenance of passive fire protection features, such as fire barriers and penetration seals (3) Trend analysis requirements	4.5	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 3 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
(4) Provisions for entering areas with access restrictions (5) Training requirements	4.5(cont)		
A quality assurance program shall be established in accordance with ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, for all of the following aspects of the fire protection program related to nuclear safety: (1) Design and procurement document control (2)* Instructions, procedures, and drawings (3)* Control of purchased material, equipment, and services (4)* Inspection (5)* Test and test control (6)* Inspection, test, and operating status (7)* Nonconforming items (8)* Corrective action (9)* Records (10)* Audits	4.6.1	COL	US-APWR QA program is detailed in DCD Chapter 17. The QA program is in accordance with RG 1.189, Position 1.7. COL Item 9.5(1) tracks implementation of the QA program as it applies to fire protection.
The quality assurance program shall be documented in detail to verify its scope and adequacy.	4.6.2	Conform US-APWR Basic Design, COL to implement program	DCD Chapter 17 discusses QA program COL Item 9.5(1) tracks implementation QA program.
A written fire emergency plan shall be established.	4.7.1	COL	COL Item 9.5(1)
As a minimum, this plan shall include the following: (1) Response to fire and supervisory alarms (2) Notification of plant and public emergency forces (3) Evacuation of personnel (4) Coordination with security, maintenance, operations, and public information personnel (5) Fire extinguishment activities (6) Postfire recovery and contamination control activities (7) Control room operations during an emergency (8) Prefire plan (9) Description of interfaces with emergency response organizations, security, safety, and others having a role in the fire protection program, including agreements with outside assistance agencies, such as fire departments and rescue services	4.7.2	COL	COL Item 9.5(1)
A plant fire brigade shall be established as indicated in Chapter 6.	4.8	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 4 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The owner or a designated manager shall develop, implement, and update as necessary a fire prevention surveillance plan integrated with recorded rounds to all accessible sections of the plant.	5.2.1	COL	COL Item 9.5(1)
Inspections of the plant shall be conducted in accordance with NFPA 601, Standard for Security Services in Fire Loss Prevention.	5.2.2	COL	COL Item 9.5(1)
A prepared checklist shall be used for the inspection.	5.2.3	COL	COL Item 9.5(1)
Areas of primary containment and high-radiation areas normally inaccessible during plant operation shall be inspected as plant conditions permit but at least during each refueling outage.	5.2.4	COL	COL Item 9.5(1)
The results of each inspection shall be documented and retained for 2 years.	5.2.5	COL	COL Item 9.5(1)
For those plant areas inaccessible for periods greater than 2 years, the most recent inspection shall be retained.	5.2.5.1	COL	COL Item 9.5(1)
Plant administrative procedures shall specify appropriate requirements governing the storage, use, and handling of flammable and combustible liquids and flammable gases.	5.3.1	COL	COL Item 9.5(1)
An inventory of all temporary flammable and combustible materials shall be made for each fire area, identifying the location, type, quantity, and form of the materials.	5.3.1.1	COL	COL Item 9.5(1)
Temporary but predictable and repetitive concentrations of flammable and combustible materials shall be considered.	5.3.1.2	COL	COL Item 9.5(1)
Combustibles, other than those that are an inherent part of the operation, shall be restricted to designated storage compartments or spaces.	5.3.1.3	COL	COL Item 9.5(1)
Consideration shall be given to reducing the fire hazard by limiting the amount of combustible materials.	5.3.1.4	COL	COL Item 9.5(1)
The storage and use of hydrogen shall be in accordance with NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks.	5.3.1.5	COL	COL Item 9.5(2)
The temporary use of wood shall be minimized.	5.3.1.6	COL	COL Item 9.5(1)
Plant administrative procedures shall specify that if wood must be used in the power block, it shall be listed pressure-impregnated fire-retardant lumber.	5.3.1.7	COL	COL Item 9.5(1)
Housekeeping shall be performed in such a manner as to minimize the probability of fire.	5.3.2.1	COL	COL Item 9.5(1)
Accumulations of combustible waste material, dust, and debris shall be removed from the plant and its immediate vicinity at the end of each work shift or more frequently as necessary for safe operations.	5.3.2.2	COL	COL item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 5 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Plant administrative procedures shall require the following: (1) The total fire loads, including temporary and permanent combustible loading, shall not exceed those quantities established for extinguishment by permanently installed fire protection systems and equipment. (2) Where limits are temporarily exceeded, the plant fire protection manager shall ensure that appropriate fire protection measures are provided.	5.3.3.1	COL	COL Item 9.5(1)
The fire protection manager or a designated representative shall conduct weekly walk-through inspections to ensure implementation of required controls.	5.3.3.2	COL	COL Item 9.5(1)
During major maintenance operations, the frequency of these walk-throughs shall be increased to daily.	5.3.3.2.1	COL	COL Item 9.5(1)
The results of these inspections shall be documented and the documentation retained for a minimum of 2 years.	5.3.3.2.2	COL	COL Item 9.5(1)
When the work is completed, the plant fire protection manager shall have the area inspected to confirm that transient combustible loadings have been removed from the area.	5.3.3.3	COL	COL Item 9.5(1)
Extra equipment shall then be returned to its proper location.	5.3.3.3.1	COL	COL Item 9.5(1)
The results of this inspection shall be documented and retained for 2 years.	5.3.3.3.2	COL	COL Item 9.5(1)
Only noncombustible panels or flame-retardant tarpaulins or approved materials of equivalent fire-retardant characteristics shall be used.	5.3.3.4	COL	COL Item 9.5(1)
Any fabrics or plastic films used, other than those complying with 5.3.3.4, shall be certified to conform to the large-scale fire test described in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.	5.3.3.5	COL	COL Item 9.5(1)
Flammable and combustible liquid storage and use shall be in accordance with NFPA 30, Flammable and Combustible Liquids Code.	5.3.4.1	Conform for US-APWR basic plant, COL to implement program	COL Item 9.5(1)
Where oil-burning equipment, stationary combustion engines, or gas turbines are used, they shall be installed and used in accordance with NFPA 31, Standard for the Installation of Oil-Burning Equipment, or NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, as appropriate.	5.3.4.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 6 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Flammable and combustible liquid and gas piping shall be in accordance with ASME B31.1, Power Piping, or ASME Boiler and Pressure Vessel Code, Section III, as applicable.	5.3.4.3	Conform	
Hydraulic systems shall use only listed fire-resistant hydraulic fluids, except as specified by 5.3.4.5.	5.3.4.4	Conform	
Where unlisted hydraulic fluids must be used, they shall be protected by a fire suppression system.	5.3.4.5	Conform	
The ignition of leaked or spilled liquid shall be minimized by the following methods: (1)* Keeping the liquid from contact with hot parts of the steam system (wall temperature greater than or equal to ignition temperature), such as steam pipes and ducts, entry valve, turbine casing, reheater, and bypass valve (2) Using suitable electrical equipment (3) Sealing the insulation of hot plant components to prevent liquid saturation (4) Using concentric piping (5) Using liquid collection systems	5.3.4.6	Conform	
Plant administrative procedures shall require an in-plant review and prior approval of all work plans to assess potential fire hazard situations.	5.4.1.1	COL	COL Item 9.5(1)
Where potential fire hazards are determined to exist, special precautions shall be taken to define appropriate conditions under which the work is authorized.	5.4.1.2	COL	COL Item 9.5(1)
Written permission from the fire protection manager or a designated alternate shall be obtained before starting activities involving cutting, welding, grinding, or other potential ignition sources.	5.4.2.2	COL	COL Item 9.5(1)
A permit shall not be issued until all of the following are accomplished: (1) An inspection has determined that hot work can be conducted at the desired location. (2) Combustibles have been moved away or covered. (3) The atmosphere is nonflammable. (4) A trained fire watch (with equipment) is posted for the duration of the work and for 30 minutes thereafter, to protect against sparks or hot metal starting fires.	5.4.2.3	COL	COL Item 9.5(1)
All cracks or openings in floors shall be covered or closed.	5.4.2.4	COL	COL Item 9.5(1)
Smoking shall be prohibited at or in the vicinity of hazardous operations or combustible and flammable materials.	5.4.3.1	COL	COL Item 9.5(1)
“No Smoking” signs shall be posted in the areas specified in 5.4.3.1.	5.4.3.2	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 7 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Smoking shall be permitted only in designated and supervised safe areas of the plant.	5.4.3.3	COL	COL Item 9.5(1)
Where smoking is permitted, safe receptacles shall be provided for smoking materials.	5.4.3.4	COL	COL Item 9.5(1)
All temporary electrical wiring shall comply with the following to minimize the ignition of flammable materials: (1) Be kept to a minimum (2) Be suitable for the location (3) Be installed and maintained in accordance with NFPA 70, National Electrical Code, or ANSI/IEEE C2, National Electrical Safety Code, as appropriate (4) Be arranged so that energy shall be isolated by a single switch (5) Be arranged so that energy shall be isolated when not needed	5.4.4	COL	COL Item 9.5(1)
Only safely installed, approved heating devices shall be used in all locations.	5.4.5.1	COL	COL Item 9.5(1)
Ample clearance shall be provided around stoves, heaters, and all chimney and vent connectors to prevent ignition of adjacent combustible materials in accordance with NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel–Burning Appliances (connectors and solid fuel); NFPA 54, National Fuel Gas Code (fuel gas appliances); and NFPA 31, Standard for the Installation of Oil-Burning Equipment (liquid fuel appliances).	5.4.5.2	COL	COL Item 9.5(1)
Refueling operations of heating equipment shall be conducted in an approved manner.	5.4.5.3	COL	COL Item 9.5(1)
Heating devices shall be situated so that they are not likely to overturn.	5.4.5.4	COL	COL Item 9.5(1)
Temporary heating equipment, when utilized, shall be monitored and maintained by properly trained personnel.	5.4.5.5	COL	COL Item 9.5(1)
Open-flame or combustion-generated smoke shall not be used for leak testing.	5.4.6	COL	COL Item 9.5(1)
Plant administrative procedures shall specify appropriate requirements governing the control of electrical appliances in all plant areas.	5.4.7	COL	COL Item 9.5(1)
Temporary buildings, trailers, and sheds, whether individual or grouped, shall be constructed of noncombustible material and shall be separated from other structures.	5.5.1.1	COL	COL item 9.5(1)
Temporary buildings, trailers, and sheds and other structures constructed of combustible or limited-combustible material shall be separated from other structures by a minimum distance of 30 ft., unless otherwise permitted by 5.5.1.3.	5.5.1.2	COL	COL item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 8 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Where all portions of the exposed building (walls, roof) within 30 ft. of the exposure constitute a rated fire barrier, the minimum separation distance shall be permitted to be reduced in accordance with Table 5.5.1.3.	5.5.1.3	COL	COL item 9.5(1)
All exterior buildings, trailers, sheds, and other structures shall have the appropriate type and size of portable fire extinguishers.	5.5.1.4	COL for exterior, Conform for US-APWR reactor island	COL item 9.5(1)
Where coverings are utilized for protection of the outdoor storage of materials or equipment, the following shall apply: (1) Only approved fire-retardant tarpaulins or other acceptable materials shall be used. (2) All framing material used to support such coverings shall be either noncombustible or fire-retardant pressure-impregnated wood. (3) Covered storage shall not be located within 30 ft. of any building.	5.5.2	COL	COL item 9.5(1)
All interior temporary structures shall be constructed of noncombustible, limited-combustible, or fire-retardant pressure-impregnated wood.	5.5.3.1	COL	COL item 9.5(1)
Structures constructed of noncombustible or limited-combustible materials shall be protected by an automatic fire suppression system unless the fire hazard analysis determines that automatic suppression is not required.	5.5.3.1.1	COL	COL item 9.5(1)
The structure shall be protected by an automatic fire suppression system if the structure is constructed of fire-retardant pressure-impregnated wood.	5.5.3.1.2	COL	COL item 9.5(1)
The use of interior temporary coverings shall comply with the following criteria: (1) Be limited to special conditions where interior temporary coverings are necessary (2) Be constructed of approved fire-retardant tarpaulins	5.5.3.2	COL	COL item 9.5(1)
Where framing is required, it shall be constructed of noncombustible, limited-combustible, or fire-retardant pressure-impregnated wood.	5.5.3.3	COL	COL item 9.5(1)
All interior temporary facilities shall have the appropriate type and size of portable fire extinguisher.	5.5.3.4	COL	COL item 9.5(1)
A written procedure shall be established to address impairments to fire protection systems and features and other plant systems that directly affect the level of fire risk (e.g., ventilation systems, plant emergency communication systems).	5.6.1	COL	COL Item 9.5(1)
Impairments to fire protection systems shall be as short in duration as practical.	5.6.2	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 9 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Appropriate post maintenance testing shall be performed on equipment that was impaired to ensure that the system will function properly.	5.6.3	COL	COL Item 9.5(1)
Any change to the design or function of the system after the impairment shall be considered in establishing the testing requirements and shall be reflected in the appropriate design documents and plant procedures.	5.6.4	COL	COL Item 9.5(1)
Upon installation, all new fire protection systems and passive fire protection features shall be preoperationally inspected and tested in accordance with applicable NFPA standards.	5.7.1	Conform	COL for modifications, US-APWR initially to undergo preoperational testing of fire suppression systems. COL Item 9.5(1)
Where appropriate test standards do not exist, inspections and test procedures described in the purchase and design specification shall be followed.	5.7.2	COL	COL Item 9.5(1)
Fire protection systems and passive fire protection features shall be inspected, tested, and maintained in accordance with applicable NFPA standards, manufacturers' recommendations, and requirements established by those responsible for fire protection at the plant.	5.7.3	COL	COL Item 9.5(1)
Inspection, testing, and maintenance shall be performed using established procedures with written documentation of results and a program of follow-up actions on discrepancies.	5.7.4	COL	COL Item 9.5(1)
Consideration shall be given to the inspection, testing, and maintenance of nonfire protection systems and equipment that have a direct impact on the level of fire risk within the plant.	5.7.5	COL	COL Item 9.5(1)
Detailed prefire plans shall be developed for all site areas.	6.1.1	COL	COL Item 9.5(1)
Prefire plans shall detail the fire area configurations and fire hazards to be encountered in the fire area along with any safety-related components and fire protection systems and features that are present.	6.1.2	COL	COL Item 9.5(1)
Prefire plans shall be reviewed and, if necessary, updated at least every 2 years.	6.1.3	COL	COL Item 9.5(1)
Prefire plans shall be available in the control room and made available to the plant fire brigade.	6.1.4	COL	COL Item 9.5(1)
A minimum of five plant fire brigade members shall be available for response at all times.	6.2.1.1	COL	COL Item 9.5(1)
Fire brigade members shall have no other assigned normal plant duties that would prevent immediate response to a fire or other emergency as required.	6.2.1.2	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 10 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The brigade leader and at least two brigade members shall have training and knowledge of plant safety–related systems to understand the effects of fire and fire suppressants on safe shutdown capability.	6.2.1.3	COL	COL Item 9.5(1)
The fire brigade shall be notified immediately upon verification of a fire or fire suppression system actuation.	6.2.1.4	COL	COL Item 9.5(1)
Plant fire brigade members shall be physically qualified to perform the duties assigned.	6.2.2.1	COL	COL Item 9.5(1)
Each member shall pass an annual physical examination to determine that the fire brigade member can perform strenuous activity.	6.2.2.2	COL	COL Item 9.5(1)
The physical examination shall determine each member's ability to use respiratory protection equipment.	6.2.2.3	COL	COL Item 9.5(1)
Each fire brigade member shall meet training qualifications as specified in Chapter 6, Section 6.3.	6.2.2.4	COL	COL Item 9.5(1)
Plant fire brigade members shall receive training consistent with the requirements contained in NFPA 600, Standard on Industrial Fire Brigades, or NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, as appropriate.	6.3.1.1	COL	COL Item 9.5(1)
Fire brigade members shall be given quarterly training and practice in fire fighting.	6.3.1.2	COL	COL Item 9.5(1)
A written program shall detail the fire brigade training program.	6.3.1.3	COL	COL Item 9.5(1)
Written records that include but are not limited to the following shall be maintained for each fire brigade member: (1) Initial fire brigade classroom and hands-on training (2) Refresher training (3) Special training schools attended (4) Drill attendance records (5) Leadership training for fire brigades	6.3.1.4	COL	COL Item 9.5(1)
Drills shall be conducted quarterly for each shift to test the response capability of the fire brigade.	6.3.2.1	COL	COL Item 9.5(1)
Fire brigade drills shall be developed to test and challenge fire brigade response, including the following: (1) Brigade performance as a team (2) Proper use of equipment (3) Effective use of prefire plans (4) Coordination with other groups	6.3.2.2	COL	COL Item 9.5(1)
Fire brigade drills shall be conducted in various plant areas, especially in those areas identified by the fire hazards analysis to be critical to plant operation and to contain significant fire hazards.	6.3.2.3	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 11 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Drill records shall be maintained detailing the drill scenario, fire brigade member response, and ability of the fire brigade to perform the assigned duties.	6.3.2.4	COL	COL Item 9.5(1)
A critique shall be held after each drill.	6.3.2.5	COL	COL Item 9.5(1)
The plant fire brigade shall be provided with equipment that enables its members to adequately perform their assigned tasks.	6.4.1	COL	COL Item 9.5(1)
Fire brigade equipment shall be tested and maintained.	6.4.2	COL	COL Item 9.5(1)
Written records shall be retained for review.	6.4.3	COL	COL Item 9.5(1)
A mutual aid agreement shall be offered to the local off-site fire department.	6.5.1.1	COL	COL Item 9.5(1)
Where possible, the plant fire protection manager and the off-site fire authorities shall develop a plan for their interface.	6.5.1.2	COL	COL Item 9.5(1)
The fire protection manager also shall consult with the off-site fire department to make plans for fire fighting and rescue, including assistance from other organizations, and to maintain these plans.	6.5.1.3	COL	COL item 9.5(1)
The local off-site fire department shall be invited to participate in an annual drill.	6.5.1.4	COL	COL Item 9.5(1)
Fire fighters from the off-site fire department who are expected to respond to a fire at the plant shall be familiar with the plant layout.	6.5.2.1	COL	COL Item 9.5(1)
The access routes to fires in the controlled area (to which access doors are locked) shall be planned in advance.	6.5.2.2	COL	COL Item 9.5(1)
The off-site fire department shall be offered instruction and training in radioactive materials, radiation, and hazardous materials that could be present.	6.5.2.3	COL	COL Item 9.5(1)
Plant management shall designate a plant position to act as a liaison to the off-site fire department when it responds to a fire or other emergency at the plant.	6.5.3.1	COL	COL Item 9.5(1)
Plant management shall ensure that the off-site fire department personnel are escorted at all times and emergency actions are not delayed.	6.5.3.2	COL	COL Item 9.5(1)
The fire brigade shall have at its disposal the necessary equipment to assist with routing water from the affected area.	6.6	COL	US-APWR designed with drainage from automatic suppression systems and hoses from standpipes in mind. COL Item 9.5(1)
All plant areas shall be accessible for fire-fighting purposes.	6.7.1	COL	COL Item 9.5(1)
Prefire plans shall identify those areas of the plant that are locked and have limited access for either security or radiological control reasons.	6.7.2	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 12 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Provisions shall be made to allow access to the locked areas, including having security and health physics personnel respond to the fire area along with the fire brigade, if necessary.	6.7.2.1	COL	COL Item 9.5(1)
Health physics personnel shall confer with the fire brigade leader to determine the safest method of access to any radiologically controlled area.	6.7.2.2	COL	COL Item 9.5(1)
Full advantage shall be taken of all fixed radiation shielding to protect personnel responding for fire suppression purposes.	6.8.1	COL	COL Item 9.5(1)
Health physics personnel shall advise the fire brigade leader of the best method for affording radiological protection.	6.8.2	COL	COL Item 9.5(1)
If fixed ventilation systems are not capable of removing smoke and heat, the fire brigade shall utilize portable ventilation equipment (See Chapter 8, Section 8.4.).	6.9	Conform, COL to address portable equipment	US-APWR designed with smoke removal capability from select safety-related areas, COL to address portable equipment. COL Item 9.5(1)
A fire-safe shutdown analysis shall be prepared and maintained for the operating life of the reactor, and shall include, as a minimum, all of the following: (1) Fire hazards analysis (2) Safe shutdown analysis (3) Internal plant examination of external fire events for severe accident vulnerabilities	7.2	Conform	US-APWR designed to allow safe-shutdown from two of three unaffected trains of safety-related equipment. See DCD Chapter 7, Section 7.4
The fire hazards analysis shall include the criteria indicated in Chapter 4, Section 4.4.	7.2.1	Conform	See Appendix 9A.
A safe shutdown analysis of the effects of a fire on those essential structures, systems, and components required to safely shut down the plant and maintain it in a safe shutdown condition shall be performed, including, as a minimum, the requirements of this section.	7.2.2	Conform	
A safe shutdown system available/unavailable calculation or table that provides the following shall be prepared and maintained for each fire area: (1) The document shall identify all safe shutdown equipment that is operable or inoperable due to the effects of a fire in that fire area. (2) The document shall demonstrate compliance with the requirements of Chapter 7, Sections 7.3 and 7.4.	7.2.2.1	Conform	See Appendix 9A.
A shutdown logic diagram shall be available that identifies the conditions necessary to achieve and maintain safe shutdown capability in the event of a fire and those plant features necessary to realize these conditions, including auxiliary and support features.	7.2.2.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 13 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
A risk assessment that estimates the potential risk from a fire in relation to the plant's core damage frequency shall be prepared.	7.2.3	Conform	Fire PRA for US-APWR is performed. See Chapter 19.
An industry-accepted examination process shall be used for the risk assessment.	7.2.3.1	Conform	Fire PRA for the US-APWR follows NUREG/CR 6850 guidance.
An acceptable risk assessment shall demonstrate that the probability of core damage as a result of an internal fire is less than 1×10^{-6} per reactor year.	7.2.3.2	See Chapter 19	
The internal plant examination of external fire events for severe accident vulnerabilities shall be used to evaluate the level of safety of the plant and shall not be used to reduce the overall plant fire protection design basis.	7.2.3.3	Conform	
Only one fire shall be assumed to occur at a given time, and for the purpose of a safe shutdown analysis, damage shall be assumed to occur immediately.	7.3.1.1	Conform	
All components, including electrical cables, that are susceptible to fire damage in a single fire area (except primary containment and annulus areas) shall be assumed to be disabled or to be spuriously actuated, whichever is the worst case.	7.3.1.2	Conform	
A fire shall not impair safe shutdown capability inside primary containment or annulus areas.	7.3.1.3	Conform	
The plant shall be assumed to be operating at 100% power, with all components in their normal configuration, when a postulated fire occurs; however, the analysis also shall consider changes in plant configurations during all normal modes of operation.	7.3.1.4	Conform	
A concurrent single active component failure independent of the postulated fire shall not be assumed to occur.	7.3.1.5	Conform	
Plant accidents or severe natural phenomena shall not be assumed to occur concurrently with a postulated fire, except as specified in 7.3.2.	7.3.1.6	Conform	
A loss of off-site power shall be assumed concurrent with the postulated fire only where the safe shutdown analysis (including alternative shutdown) indicates the fire could initiate the loss of off-site power.	7.3.1.7	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 14 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Fire-safe shutdown components shall be capable of performing all the following functions in the event of the postulated fire: (1) Achieving and maintaining subcritical reactivity conditions in the reactor (2) Maintaining the reactor coolant inventory such that plant safety limits are not violated (3)* Establishing reactor decay heat removal to prevent fuel damage and to achieve and maintain cold shutdown conditions (4) Providing support functions such as process cooling and lubrication necessary to allow operation of the FSSD components (5) Providing direct readings of the process variables necessary to perform and control the FSSD functions	7.3.1.8	Conform	
During a postfire shutdown, the fission product boundary integrity shall be maintained within acceptable limits (e.g., fuel clad damage, rupture of any primary coolant boundary, or rupture of the primary containment boundary).	7.3.1.9	Conform	
An evaluation of spurious signals shall be performed based on the following: (1) All components shall be assumed to be in their normal operating positions for the particular mode of operation being considered by the spurious signal evaluation. (2) The evaluation shall consider the following cable failure modes: (a) A hot short in which individual conductors within a cable are shorted to individual conductors of a different cable such that a de-energized circuit might become energized by shorting to an external source of electrical power (b) An open circuit in which the cable failure results in the loss of electrical continuity (c) A short to ground in which a cable conductor shorts to grounded structures (d) A short circuit in which individual conductors within multiconductor cable short to each other	7.3.1.10.1	Conform	
Functional failure or damage modes of equipment and components that can spuriously operate shall be considered.	7.3.1.10.2	Conform	
The postulates specified in 7.3.1.11.1 through 7.3.1.11.5 shall be used in the analysis of fire-induced spurious actuation of equipment.	7.3.1.11	Conform	
FSSD capability shall not be adversely affected by simultaneous spurious actuation of all valves in a single high-to-low pressure interface line where the power or control circuits for the valves can be damaged by a postulated fire.	7.3.1.11.1	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 15 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
For other than high-to-low pressure boundaries, FSSD capability shall not be adversely affected by spurious actuation or signal.	7.3.1.11.2	Conform	
Separate conditions shall be analyzed concurrent with the spurious actuation(s) or signal addressed in 7.3.1.11.1 and 7.3.1.11.2.	7.3.1.11.3	Conform	
All automatic functions (signal, logic, etc.) from the circuits that can be damaged by the postulated fire shall be assumed lost or assumed to function as intended, whichever is the worst case.	7.3.1.11.4	Conform	
All potential spurious signals shall be analyzed, but only one spurious signal shall be postulated to occur at a time for purposes of analysis, except for high-to-low pressure interface valves.	7.3.1.11.5	Conform	
For the purpose of analysis for cases involving high-to-low pressure interface, hot shorts involving three-phase ac circuits shall be postulated.	7.3.1.12	Conform	
For ungrounded dc circuits, if it can be shown that only two hot shorts of the proper polarity without grounding could cause spurious operation, no further evaluation shall be necessary, except for cases involving high-to-low pressure interfaces.	7.3.1.13	Conform	
All common power supply associated circuits of concern shall be isolated from FSSD circuits by coordinated circuit breakers or fuses.	7.3.1.14	Conform	
Protection for circuits associated by common enclosure shall meet the following criteria: (1) Protection shall be demonstrated by ensuring that suitable electrical overcurrent protection devices are provided for all cables. (2) Appropriate measures to prevent the propagation of fire, such as rated fire stops and seals in the raceway or enclosure, shall be provided.	7.3.1.15.1	Conform	
The overcurrent protection devices specified in 7.3.1.15.1(1) shall be located outside the fire area containing the common enclosure.	7.3.1.15.2	Conform	
A high-impedance fault shall be assumed to occur as a result of a fire.	7.3.1.16.1	Conform	
Evaluation of the impact of high-impedance faults on the ability to achieve and maintain safe shutdown shall be performed to demonstrate that sufficient capacity exists in the electrical protective system to preclude a trip of the main source breaker to the supply.	7.3.1.16.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 16 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
A risk assessment that demonstrates the potential risk from a seismically induced fire in relationship to the plant's core damage frequency shall be prepared and used as follows: (1) The assessment shall be used to evaluate the level of safety of the plant. (2) The assessment shall not be used to reduce the overall plant fire protection design basis.	7.3.2.1	Conform	
An industry-accepted examination process shall be used for the risk assessment.	7.3.2.2	Conform	
One safety division of systems that is necessary to achieve and maintain safe shutdown from either the control room or emergency control station(s) shall be maintained free of fire damage by a single fire, including an exposure fire.	7.4.1	Conform	
One safety division of systems that is necessary to prevent the initiation of a design basis accident shall be maintained free of fire damage from a single fire that occurs outside the MCR.	7.4.2	Conform	
Redundant cables, equipment, components, and associated circuits of nuclear safety–related or safe shutdown systems shall be located in separate fire areas, unless otherwise permitted by 7.4.3.1.	7.4.3	Conform	
Where redundant system separation inside containment cannot be achieved, other measures shall be permitted in accordance with Chapter 7, Section 7.6 to prevent a fire from causing the loss of function of nuclear safety–related or safe shutdown systems.	7.4.3.1	Conform	
The fire barrier forming the separate fire areas specified in Chapter 7, Section 7.4.3 shall have a 3-hour fire rating and automatic area-wide detection shall be installed throughout the fire areas, unless all the following criteria are met: (1) The fire barriers forming the fire areas shall have a minimum fire-resistive rating of 1 hour. (2) Automatic area-wide detection and suppression shall be installed throughout the fire areas. (3) Structural steel forming a part of or supporting the fire barriers shall be protected to provide fire resistance equivalent to that of the barrier.	7.4.3.2	Conform	
Structural steel forming a part of or supporting the fire barriers shall be protected to provide fire resistance equivalent to that of the 3-hour fire-rated barrier specified in Chapter 7, Section 7.4.3.2.	7.4.3.3	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 17 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Fire areas separated by minimum 3-hour fire-rated barriers shall be established to separate redundant safety divisions and safe shutdown functions from fire hazards in nonsafety or safe shutdown–related areas of the plant.	7.4.4	Conform	
In fire areas containing components of either a nuclear safety–related or safe shutdown system, special attention shall be given to detecting and suppressing fire that can adversely affect the system.	7.4.5	Conform	
Measures that shall be taken to reduce the effects of a postulated fire in a given fire area include the following: (1) Limiting the amount of combustible materials (see Chapter 5, Section 5.3) (2) Providing fire-rated barriers between major components and equipment to limit fire spread within a fire area (see Chapter 8, Section 8.1) (3) Installing fire detection (see Chapter 9, Section 9.8) and fixed suppression systems (see Chapter 9, Section 9.6)	7.4.6	Conform	
Procedures shall be developed for actions necessary to achieve FSSD.	7.5.1	COL	COL Item 9.5(1)
Operator actions necessary to achieve FSSD of the reactor shall meet criteria acceptable to the AHJ.	7.5.2.1	Conform	No operator manual actions in the fire-affected area are required to achieve safe-shutdown.
No credit shall be taken for operator actions required to effect repairs to equipment to achieve FSSD of the reactor.	7.5.2.2	Conform	
Personnel necessary to achieve and maintain the plant in FSSD following a fire shall be provided from the normal on-site staff, exclusive of the fire brigade.	7.5.2.3	COL	COL Item 9.5(1)
The operator training program shall include performance-based simulator training on FSSD procedures.	7.5.2.4	COL	COL Item 9.5(1)
Walk-through of operator actions necessary to achieve FSSD of the reactor shall be performed to verify that the actions are feasible and shall be integrated into the operator training program.	7.5.2.5	COL	COL Item 9.5(1)
Postfire shutdown and recovery plans shall be included in the station emergency preparedness plan.	7.5.2.6	COL	COL Item 9.5(1)
Drills and operator requalification training shall ensure that operations personnel are familiar with and can accomplish the necessary actions.	7.5.2.7	COL	COL Item 9.5(1)
Access routes to areas containing equipment necessary for safe shutdown of the reactor shall be protected from the effects of smoke and fire.	7.5.3.1.1	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 18 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Two separate access routes shall be provided from the MCR to the remote shutdown location.	7.5.3.1.2	Conform	
Emergency lighting shall be provided for the access routes and the remote shutdown location (see Chapter 8, Section 8.6).	7.5.3.1.3	Conform	
Operator safety shall not be threatened by fire conditions while FSSD of the reactor is being implemented.	7.5.3.2.1	Conform	
Operation of equipment required to effect FSSD of the reactor shall not require any extraordinary actions by the operator.	7.5.3.2.2	Conform	
Operators (e.g., handwheels of valves that require manual manipulation for FSSD) shall be readily accessible.	7.5.3.2.3	Conform	
If the handwheel is located more than 5 ft. above the floor, it shall be provided with either a chain operator or a permanent platform.	7.5.3.2.3.1	N/A	No manual manipulation of handwheels required to achieve fire safe-shutdown.
The platform shall be of sufficient size to allow the operator to safely perform the manual action.	7.5.3.2.3.2	N/A	No manual manipulation of handwheels required to achieve fire safe-shutdown.
Alternative shutdown capability provided for a specific fire area shall include the following: (1) Achieving and maintaining subcritical reactivity conditions in the reactor (2) Maintaining the reactor coolant inventory (3) Achieving safe shutdown (4) Maintaining safe shutdown following the fire event	7.6.1	N/A	No alternative shutdown required. Shutdown is achieved through normal operation of two out of three undamaged trains of safety-related equipment.
During the postfire shutdown, the reactor coolant system process variables shall be maintained within those values predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected.	7.6.2	Conform	
Performance goals for reactor shutdown functions shall be the same as those required by 7.3.1.8.	7.6.3	Conform	
The safe shutdown circuits for each fire area shall meet the following criteria: (1) They shall be known to be isolated from associated circuits in the fire area so the hot shorts, shorts to ground, open circuits, or short circuits will not prevent the operation of the safe shutdown equipment. (2) Isolation of associated circuits from the safe shutdown equipment shall be such that a postulated fire involving the associated circuits will not prevent safe shutdown or damage the safe shutdown components.	7.6.4	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 19 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
In multiunit plants, each unit shall be separated from adjacent units by either an open space of at least 50 ft. or at least a 3-hour-rated fire barrier	8.1.1.1	COL	See COL Item 9.5(2)
Buildings or portions thereof containing nuclear safety–related systems shall be separated from buildings or portions thereof not related to nuclear safety by barriers having a designated fire resistance rating of 3 hours.	8.1.1.2	Conform	
Buildings containing nuclear safety–related systems shall be permitted to be separated from buildings not related to nuclear safety by an open space of at least 50 ft.	8.1.1.3	Conform	See 8.1.1.2, US-APWR uses 3-hour separation for power block buildings.
Advanced light water reactor electric generating plants shall be subdivided into separate fire areas to minimize the risk of fire spread and the resultant consequential damage from fire gases, smoke, heat, radioactive contamination, and fire-fighting activities.	8.1.2.1	Conform	See Appendix 9A for US-APWR fire area descriptions.
In addition to 8.1.2.1, the subdivision into fire areas shall allow adequate access for manual fire suppression activities.	8.1.2.2	Conform	
A listed fire barrier having a fire resistance rating of at least 3 hours and with listed 3-hour-rated penetration seals shall be provided as follows: (1) To separate all contiguous buildings or portions thereof serving different purposes, such as reactor containment, auxiliary, turbine, rad waste, control, service, administration, and other occupancy areas as dictated by reactor design (2) To separate safety-related standby emergency diesel generators and combustion turbines from each other and the rest of the plant (3) To separate the turbine generator lube oil conditioning system and lube oil storage from the TB and adjacent areas (4) To separate diesel fire pumps and associated equipment from other pumps in the same pump house	8.1.2.3	Conform	
(5) To separate all areas with heavy concentrations of cables, such as cable spreading rooms, cable tunnels, cable penetration areas, and cable shafts or chases, including those within the reactor containment, from adjacent areas (6) To separate auxiliary boiler rooms from adjacent areas (7) Wherever so determined by the fire hazards analysis	8.1.2.3 (cont)	Conform	See Appendix 9A.
To prevent vertical spread of fire, stairways, elevator shafts, trash chutes, and other vertical shafts and plenums shall be enclosed with barriers having a fire resistance rating of at least 2 hours.	8.1.2.4	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 20 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Openings in the barriers specified in 8.1.2.4 shall be protected with listed automatic or self-closing fire doors having a fire protection rating of at least 1½ hours.	8.1.2.5	Conform	
All openings in fire barriers shall be provided with fire door assemblies, fire dampers, penetration seals (fire stops), or other approved means having a fire protection rating consistent with the designated fire resistance rating of the barrier, unless the criterion of 8.1.3.2 is met.	8.1.3.1	Conform	
Assemblies used to meet the requirements of 8.1.3.1 that are not listed or approved due to nuclear safety or security requirements shall be demonstrated to be equivalent.	8.1.3.2	Conform	
Fire door assemblies, fire dampers, and fire shutters used in 2-hour-rated fire barriers shall be listed as not less than 1½ hour rated and shall meet the requirements of NFPA 80, Standard for Fire Doors and Fire Windows, for fire door requirements and NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, for fire damper requirements, unless otherwise permitted by 8.1.3.4.	8.1.3.3	Conform	
Where approved full-scale fire tests indicate that opening protection is not necessary, the opening protection specified in 8.1.3.3 shall not be required.	8.1.3.4	N/A	No unprotected opening are provided in the fire rated barriers of the US-APWR design.
Windows in fire barriers, such as for a control room or computer room, shall be provided with a listed or approved fire shutter or automatic wall curtain.	8.1.3.4.1	Conform	
Cable openings, piping openings, and building joints shall be provided with fire-rated penetration seals that meet the requirements of ASTM E 814, Fire Tests of Through-Penetration Fire Stops, or UL 1479, Standard for Safety Fire Tests of Through-Penetration Firestops.	8.1.3.4.2	Conform	
All conduits shall be sealed at the barrier with a fire-rated seal, if accessible.	8.1.3.4.3	Conform	
As an alternative to 8.1.3.4.3, internally sealing with a fire-rated seal at the first break in the conduit on both sides of the barrier shall be acceptable.	8.1.3.4.3.1	Conform	
For the configuration specified in 8.1.3.4.3.1, the fire rating of the internal conduit seal shall be equivalent to the rating of the fire barrier being penetrated.	8.1.3.4.3.2	Conform	
Where approved full-scale fire tests indicate that internal conduit seals are not necessary, internal conduit seals shall not be required.	8.1.3.4.3.3	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 21 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
All fire-rated assemblies shall be tested with a positive pressure in the furnace.	8.1.3.4.4	Conform	
Normally closed fire doors in fire barriers shall be identified with a sign indicating “Fire Door — Keep Closed.”	8.1.3.4.5	COL	COL Item 9.5(1)
Design features that provide for monitoring and control of fire doors to ensure fire door operability and fire barrier integrity shall be provided, unless otherwise permitted by 8.1.3.6.	8.1.3.5	Conform	
Administrative procedures shall be permitted to be used instead of the design features required by 8.1.3.5.	8.1.3.6	COL	COL Item 9.5(1)
NFPA 101, Life Safety Code, shall be the standard for life safety from fire in the design and operation of the Advanced Light Water Reactor, except where modified by this standard.	8.2.1	Conform	
The majority of the areas involved in the transfer of nuclear energy to electrical energy shall be considered as special-purpose industrial occupancies and special-structure windowless buildings, as defined in NFPA 101, Life Safety Code.	8.2.2	Conform	
In determining the exits for an Advanced Light Water Reactor plant, the actual number of personnel and occupancy hazards during maintenance, refueling, and testing shall determine the exit requirements and occupant load based on NFPA 101, Life Safety Code.	8.2.3	Conform	
Cafeterias, lunchrooms, conference rooms, and assembly rooms having an occupant load greater than 50 shall conform to the new assembly occupancy requirements in NFPA 101, Life Safety Code.	8.2.4	COL	These facilities are not part of US-APWR basic buildings. COL Item 9.5(2)
General office areas, office buildings, and training facilities shall conform to the business occupancy requirements in NFPA 101, Life Safety Code.	8.2.5	COL	These facilities are not part of US-APWR basic buildings. COL Item 9.5(2)
Warehouses and storage areas shall conform to the storage occupancy requirements in NFPA 101, Life Safety Code.	8.2.6	COL	These facilities are not part of US-APWR basic buildings. COL Item 9.5(2)
Construction materials for the Advanced Light Water Reactor plant shall be classified by at least one of the following test methods appropriate to the end-use configuration of the material: (1) NFPA 220, Standard on Types of Building Construction (2) ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C	8.3.1	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 22 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
(3) NFPA 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials(ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials) (4) NFPA 253, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source (5) NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials(ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials) (6) NFPA 256, Standard Methods of Fire Tests of Roof Coverings (7) NFPA 259, Standard Test Method for Potential Heat of Building Materials			
All walls, floors, and structural components, except interior finish materials, shall be of noncombustible construction.	8.3.2	Conform	
Interior wall or ceiling finish classification shall be in accordance with NFPA 101, Life Safety Code, requirements for Class A material.	8.3.2.1	Conform	
Interior floor finish classification shall be in accordance with NFPA 101, Life Safety Code, requirements for Class I interior floor finish.	8.3.2.2	Conform	
Thermal insulation materials, radiation shielding materials, ventilation duct materials, soundproofing materials, and suspended ceilings, including light diffusers and their supports, shall be noncombustible or limited combustible.	8.3.3	Conform	
Wiring above suspended ceilings shall be listed for plenum use, routed in armored cable, routed in metallic conduits, or routed in cable trays with solid metal top and bottom covers.	8.3.4	Conform	
Roof coverings shall be Class A as determined by tests described in NFPA 256, Standard Methods of Fire Tests of Roof Coverings.	8.3.5	Conform	
Metal roof deck construction shall be Class I as listed by Factory Mutual or fire acceptable as listed by Underwriters Laboratories Inc.	8.3.6	Conform	
Bulk flammable gas storage, either compressed or cryogenic, shall not be permitted inside structures housing safety-related systems.	8.3.7	Conform	
Storage of flammable gas, such as hydrogen, shall be located outdoors or in separate detached buildings, so that a fire or explosion will not adversely affect any safety-related systems or equipment.	8.3.7.1	Conform	
Outdoor high-pressure flammable gas storage containers shall be located so that the long axis is not pointing at the building walls.	8.3.7.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 23 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The following requirements shall apply to bulk storage of flammable and combustible liquids: (1) Storage shall not be permitted inside structures housing safety-related systems. (2) As a minimum, the storage and use shall comply with the requirements of NFPA 30, Flammable and Combustible Liquids Code.	8.3.8	Conform	
The design, installation, and operation of ventilation systems necessary for normal and emergency operation of the plant shall be in accordance with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.	8.4.1	Conform	
Automatic damper closure or shutdown of ventilation systems shall be consistent with nuclear safety and the safety of on-site personnel.	8.4.2	Conform	
Smoke removal shall be provided for nuclear safety–related areas of the plant, and the following criteria also shall apply: (1) Equipment shall be suitable for removing smoke without damage to equipment. (2) The release to the environment of smoke containing radioactive materials shall be monitored in accordance with emergency plans. (3) For those plants provided with complete automatic sprinkler protection, fixed ventilation systems for the removal of smoke shall not be required.	8.4.3	Conform	
Smoke and heat removal systems shall be provided for other fire areas based on the fire hazards analysis, unless otherwise permitted by 8.4.3.2.	8.4.3.1	Conform	
For those plants provided with complete automatic sprinkler protection, fixed ventilation systems for the removal of smoke shall not be required.	8.4.3.2	Conform	
Smoke from nonnuclear areas shall be discharged directly outside to an area that will not adversely affect nuclear safety–related areas.	8.4.3.3	Conform	
Any ventilation system designed to exhaust potentially radioactive smoke or heat shall be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant.	8.4.3.4	Conform	
To facilitate manual fire fighting, smoke control shall be provided in high-density cable-use areas, switchgear rooms, diesel fuel oil storage areas, T/Bs, and other areas where potential exists for heavy smoke and heat conditions as determined by the fire hazards analysis.	8.4.4	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 24 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The power supply and controls for mechanical ventilation systems used for smoke removal shall be routed outside the fire area served by the system or protected from fire damage.	8.4.5	Conform	
The fresh air supply intakes to plant areas shall be located remote from the exhaust air outlets and smoke vents of other fire areas.	8.4.6	Conform	
Where natural-convection ventilation is used, a minimum ratio of vent area to floor area shall be at least 1 to 200, except in oil hazard areas, where at least a 1-to-100 ratio shall be provided.	8.4.7	Conform	
Combustible ducts, including fire-retardant types, shall not be used for ventilation systems.	8.4.8.1	Conform	
Fire dampers shall be installed in accordance with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems. Consideration shall be given to the velocity in the duct.	8.4.8.2	Conform	
Where full-scale fire tests that are conducted by testing laboratories indicate that fire dampers are not necessary to prevent fire spread through a fire-rated barrier, fire dampers shall be permitted to be omitted from the fire barrier.	8.4.8.2.1	Conform	
As an alternative to fire dampers, the duct system shall be permitted to be enclosed or constructed to provide the required fire barrier through adjacent areas. (Refer to Figure A.8.4.8.2.)	8.4.8.2.2	Conform	
Listed fire dampers having a rating of 1½ hours shall be installed where ventilation ducts penetrate fire barriers having a required fire resistance rating of 2 hours.	8.4.8.3	Conform	
Approved fire dampers having a fire protection rating of 3 hours shall be installed where ventilation ducts penetrate required 3-hour fire barriers.	8.4.8.4	Conform	
Fire dampers shall be equipped for automatic closure by thermal release elements, and one of the following criteria shall be met: (1) The fire damper shall be mounted directly into the separating wall. (2) The duct shall be protected between the wall and the damper according to the fire resistance of the separating wall structure.	8.4.8.5	Conform	
Fire dampers shall be designed and installed so that the air velocity in the ducts assists in closing fire dampers and does not preclude proper damper closure.	8.4.8.6	Conform	
Ventilation ducts containing fire dampers shall be provided with access ports for ease of inspection and for replacement of the thermal element.	8.4.8.7	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 25 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Air entry filters shall have approved noncombustible filter media that produce a minimum amount of smoke (UL Class 1) when subjected to heat.	8.4.9.1	Conform	
To decrease the fire hazard of air entry and oil-bath-type filters, only approved fire-resistive adhesives and oils meeting all of the following criteria shall be used: (1) They shall be in accordance with ASTM D 92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup. (2) Their flash points shall be equal to or greater than 464°F (240°C). (3) They shall not produce appreciable smoke.	8.4.9.2	Conform	
High-efficiency particulate air (HEPA) filters shall meet the requirements of UL 586, Standard for Test Performance of High-Efficiency Particulate Air Filter Units.	8.4.9.3	Conform	
Fixed water spray systems shall be provided for charcoal adsorber beds containing more than 100 lb (45.4 kg) of charcoal.	8.4.9.4	Conform	
Fire suppression systems shall be installed to protect filters that collect combustible material.	9.4.9.5	Conform	
Drainage shall be provided in all areas of the plant for the removal of all liquids directly to safe areas or for containment in the area without adverse flooding of equipment and without endangering other areas.	8.5.1	Conform	
Drainage and the prevention of equipment water damage shall be accomplished by one or more of the following: (1) Floor drains (2) Floor trenches (3) Open doorways or other wall openings (4) Curbs for containing or directing drainage (5) Equipment pedestals (6) Pits, sumps, and sump pumps	8.5.2	Conform	
Drainage and any associated drainage facilities for a given area shall be sized to accommodate the volume of liquid produced by all of the following: (1) The spill of the largest single container of any flammable or combustible liquids in the area (2) Where automatic suppression is provided throughout, the credible volume of discharge (as determined by the fire hazards analysis) for the suppression system operating for a period of 30 minutes (3)* Where automatic suppression is not provided throughout, the contents of piping systems and containers that are subject to failure in a fire	8.5.3	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 26 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
(4) Where the installation is outside, the volume of credible environmental factors such as rain and snow (5) Where automatic suppression is not provided throughout, the volume based on a manual fire-fighting flow rate of 500 gal/min (1892.5 L/min) for a duration of 30 minutes, unless the fire hazards analysis demonstrates a different flow rate and duration	8.5.3(cont)		
Floor drainage from areas containing flammable or combustible liquids shall be trapped to prevent the spread of burning liquids beyond the fire area.	8.5.4	Conform	
Where gaseous fire suppression systems are installed, floor drains shall be provided with adequate seals, or the fire suppression system shall be sized to compensate for the loss of fire suppression agent through the drains.	8.5.5	Conform	
Drainage facilities shall be provided for outdoor oil-insulated transformers, or the ground shall be sloped such that oil spills flow away from buildings, structures, and adjacent transformers.	8.5.6	COL	COL Item 9.5(1)
Unless drainage from oil spills is accommodated by sloping the ground around transformers away from structures or adjacent equipment, consideration shall be given to providing curbed areas or pits around transformers.	8.5.6.1	COL	COL Item 9.5(1)
If a layer of uniformly graded stone is provided in the bottom of the curbed area or pit as a means of minimizing ground fires, the following shall be assessed: (1) The sizing of the pit shall allow for the volume of the stone. (2) The design shall address the possible accumulation of sediment or fines in the stone.	8.5.6.2	COL	COL Item 9.5(1)
For facilities consisting of more than one generating unit, a curb or trench drain shall be provided on solid floors where the potential exists for an oil spill, such that oil released from the incident on one unit will not expose an adjacent unit.	8.5.7	COL	COL Item 9.5(1)
Water drainage from areas that might contain radioactivity shall be collected, sampled, and analyzed before discharge to the environment.	8.5.8	Conform	
Water released during fire suppression operations in areas containing radioactivity shall be drained to a location that is acceptable for the containment of radioactive materials.	8.5.9	Conform	
Emergency lighting units shall provide lighting levels as required in 8.6.2.	8.6.1	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 27 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The lighting units shall be sized to provide a duration of operation that will illuminate the egress and access routes to areas containing safe shutdown equipment and the equipment operation until all required operator actions are completed or until normal or emergency plant lighting can be reestablished.	8.6.2	Conform	
The illumination of means of egress shall be in accordance with NFPA 101, Life Safety Code, and shall include emergency lighting and marking of the means of egress.	8.6.3	Conform	
The floor of the means of egress and the safe shutdown operations shall be illuminated to values of not less than 1 footcandle measured at the floor and at safe shutdown equipment at all points, including the following: (1) Angles (2) Intersections of corridors (3) Passageways (4) Stairways (5) Landings of stairways (6) Exit doors (7) Safe shutdown equipment (8) Access and egress routes to safe shutdown equipment	8.6.4	Conform	
The required illumination shall be so arranged that the failure of any single lighting unit, such as the burning out of a single light bulb, will not leave any area in darkness.	8.6.5	Conform	
Suitable battery-powered hand lights shall be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.	8.6.6	COL	COL Item 9.5(1)
The plant shall be provided with a lightning protection system in accordance with NFPA 780, Standard for the Installation of Lightning Protection Systems.	8.7	Conform	
As a minimum, combustible cable insulation and jacketing material shall meet the fire and flame test requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations.	8.8.1	Conform	
Meeting the requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations, shall not eliminate the need for protection as specified in this standard and the fire hazards analysis.	8.8.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 28 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Fiber optic cable insulation and jacketing material shall meet the fire and flame test requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations.	8.8.3	Conform	
Group cabling shall be routed away from exposure hazards or protected as specified in this standard.	8.8.4	Conform	
Group cabling shall not be routed near sources of ignition.	8.8.4.1	Conform	
Group cabling shall not be routed near flammable and combustible liquid hazards.	8.8.4.2	Conform	
Cable raceways shall be used only for cables.	8.8.5	Conform	
Only metal shall be used for cable trays.	8.8.6	Conform	
Only metallic tubing shall be used for conduit, unless otherwise permitted by 8.8.7.1.	8.8.7	Conform	
Nonmetallic conduit shall be permitted to be used with concrete encasement or for direct burial runs.	8.8.7.1	Conform	
Thin-wall metallic tubing shall not be used.	8.8.7.2	Conform	
Flexible metallic tubing shall be used only in lengths less than 5 ft. to connect components to equipment.	8.8.7.3	Conform	
Other raceways shall be made of noncombustible materials.	8.8.7.4	Conform	
Buildings shall be protected from exposure fires by any one of the following: (1) Listed 3-hour fire barrier with automatic or self-closing fire doors having a fire protection rating of 3 hours and listed penetration protection of a 3-hour rating (2) Spatial separation of at least 50 ft. (3) Exterior exposure protection	8.9	Conform	
The electrical design and installation of electrical generating, control, transmission, distribution, and metering of electrical energy shall be provided in accordance with NFPA 70, National Electrical Code, or ANSI/IEEE C2, National Electrical Safety Code, as applicable.	8.10	Conform	
The plant-approved voice/alarm communications system in accordance with NFPA 72, National Fire Alarm Code, shall be available on a priority basis for fire announcements, directing the plant fire brigade, and fire evacuation announcements.	8.11.1	Conform	
A portable radio communications system shall be provided for use by the fire brigade and other operations personnel required to achieve safe shutdown.	8.11.2	COL	COL Item 9.5(1)
The radio communications system shall not interfere with the communications capabilities of the plant security force.	8.11.3	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 29 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The impact of fire damage on the communications systems shall be considered when fixed repeaters are installed to permit the use of portable radios.	8.11.4	COL	COL Item 9.5(1)
Repeaters shall be located such that a fire-induced failure of the repeater will not also cause failure of the other communications systems relied on for safe shutdown.	8.11.5	COL	COL Item 9.5(1)
Plant control equipment shall be designed so that the control equipment is not susceptible to radio frequency interferences from portable radios.	8.11.6	Conform	
Preoperational tests and periodic testing shall demonstrate that the frequencies used for portable radio communications will not affect actuation of protective relays or other electrical components.	8.11.7	Conform	
A fire hazards analysis shall be conducted to determine the fire protection requirements for the facility.	9.1.1	Conform	See Appendix 9A
All fire protection systems, equipment, and installations shall be dedicated to fire protection purposes unless permitted by the following: (1) The requirement of 9.1.2 shall not apply to fire protection systems, equipment, and installations where in accordance with 9.4.10. (2) Fire protection systems shall be permitted to be used to provide redundant backup to nuclear safety–related systems provided that both the following criteria are met: (a) The fire protection systems shall meet the design basis requirements of the nuclear safety–related systems. (b) Fire protection systems used in 9.1.2(2)(a) shall be designed to handle both functions.	9.1.2	Conform	The fire protection system may provide backup functions for severe accident mitigation if the system is available.
All fire protection equipment shall be listed or approved for its intended service.	9.1.3	Conform	
The fire water supply shall be calculated on the basis of the largest expected flow rate for a period of 2 hours but shall not be less than 300,000 gal (1,135,500 L), and the following criteria also shall apply: (1) The flow rate shall be based on 500 gpm (1892.5 L/min) for manual hose streams plus the largest design demand of any sprinkler or fixed water spray system as determined in accordance with this standard, with NFPA 13, Standard for the Installation of Sprinkler Systems, or with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection. (2) The fire water supply shall be capable of delivering the design demand specified in 9.2.1(1) with the hydraulically least demanding portion of the fire main loop out of service.	9.2.1	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 30 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Two 100-percent [minimum of 300,000 gal (1,135,500 L) each] system capacity tanks shall be installed, and the following shall apply: (1) The tanks shall be interconnected such that fire pumps can take suction from either or both. (2) A failure in one tank or its piping shall not cause both tanks to drain. (3) The tanks shall be designed in accordance with NFPA 22, Standard for Water Tanks for Private Fire Protection. (4) Refill times for filling the water tanks shall not apply.	9.2.2	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
The tanks shall not be supplied by an untreated, raw water source	9.2.3	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Fire pumps shall meet the requirements of NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, and shall be automatic starting.	9.2.4.1	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Fire pumps shall be provided to ensure that 100% of the flow rate capacity will be available assuming failure of the largest pump.	9.2.4.2	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Individual fire pump connections to the yard fire main loop shall be separated with sectionalizing valves between connections, and the following criteria also shall be met: (1) Each pump and its driver and controls shall be located in a room separated from the remaining fire pumps by a fire wall with a minimum rating of 3 hours. (2) The fuel for the diesel fire pump(s) shall be separated so that it does not provide a fire source exposing nuclear safety–related equipment.	9.2.4.3	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
A method of automatic pressure maintenance of the fire protection system shall be provided independent of the fire pumps.	9.2.4.4	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Supervisory signals and visible indicators required by NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, shall be received in the control room.	9.2.4.5	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 31 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
All fire protection water supply and system control valves shall be under a periodic inspection program and shall be supervised by one of the following methods: (1) Electrical supervision with audible and visual signals in the MCR or another constantly attended location and monthly valve inspections (2) Locking valves in their normal position and monthly valve inspections with keys made available only to authorized personnel (3) Sealing valves in their normal positions and weekly valve inspections with this option utilized only where valves are located within fenced areas or under the direct control of the property owner	9.3	Conform for initial design, COL to address periodic inspection	COL Item 9.5(1)
The underground yard fire main loop shall be installed to furnish anticipated water requirements, and the following criteria also shall be met: (1) The type of pipe and water treatment shall be design considerations, with tuberculation as one of the parameters. (2) Means for inspecting and flushing the systems shall be provided.	9.4.1	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Approved visually indicating sectional control valves such as post indicator valves shall be provided to isolate portions of the main for maintenance or repair without simultaneously shutting off the supply to both primary and backup fire suppression systems.	9.4.2	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Valves shall be installed to allow isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems.	9.4.3	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Sectional control valves shall allow maintaining independence of the individual loop around each unit, and the following also shall apply: (1) For such installations, common water supplies shall also be permitted to be utilized. (2) For multiple-reactor sites with widely separated plants [approaching 1 mi (1.6 km) or more], separate yard fire main loops shall be used.	9.4.4	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 32 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Outside manual hose installation shall provide an effective hose stream to any on-site location, and the following also shall apply: (1) Hydrants with individual hose gate valves shall be installed approximately every 250 ft. apart on the yard main system. (2) A hose house equipped with hose and combination nozzle and other auxiliary equipment specified in NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be provided at intervals of not more than 1000 ft. along the yard main system. (3) Mobile means of providing hose and associated equipment, such as hose carts or trucks, shall be permitted in lieu of hose houses, and where provided, such mobile equipment shall be equivalent to that supplied by three hose houses.	9.4.5	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
One of the following criteria shall be met: (1) Threads compatible with those used by local fire departments shall be provided on all hydrants, hose couplings, and standpipe risers. (2) The fire departments shall be provided with adapters that allow interconnection between plant equipment and the fire department equipment.	9.4.6	COL	COL Item 9.5(2) provides a fire water supply system meeting RG 1.189, Rev. 1, position 3.2 guidance.
Sprinkler systems and manual hose station standpipes shall have connections to the plant underground water main so that a single active failure or a crack in a moderate-energy line can be isolated so as not to impair both the primary and the backup fire suppression systems unless otherwise permitted by the following: (1) Alternatively, headers fed from each end shall be permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ASME 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. (2) Where provided, such headers shall be considered an extension of the yard main system. (3) Each sprinkler and standpipe system shall be equipped with an outside screw and yoke (OS&Y) gate valve or other approved shutoff valve.	9.4.7	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 33 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
For all power block buildings, Class 3 standpipe and hose systems shall be installed in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.	9.4.8	Conform	
For all other buildings on site, the requirements for standpipe and hose systems shall be appropriate for the hazard being protected.	9.4.9	Conform main plant, COL to address BOP	US-APWR designed to conform, other site buildings COL to address. COL Item 9.5(2)
The proper type of hose nozzle to be supplied to each area shall be based on the fire hazards analysis, and the following criteria also shall apply: (1) The usual combination spray/straight-stream nozzle shall not be used in areas where the straight stream can cause unacceptable damage. (2) Approved, electrically safe fixed fog nozzles shall be provided at locations where high-voltage shock hazards exist. (3) All hose nozzles shall have shutoff capability.	9.4.10	COL	COL Item 9.5(1)
Provisions shall be made to supply water at least to standpipes and hose stations for manual fire suppression in all areas containing nuclear safety–related systems and components for safe shutdown in the event of a SSE.	9.4.11.1	Conform	
The piping system serving these hose stations shall be analyzed for safe shutdown and earthquake loading and shall be provided with supports that ensure pressure boundary integrity.	9.4.11.2	Conform	
The piping and valves for the portion of hose standpipe system affected by the functional requirement of 9.4.11.2 shall, as a minimum, satisfy the requirements of ASME B31.1, Power Piping.	9.4.11.3	Conform	
The system shall be designed to flow a minimum of one Class III standpipe station in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.	9.4.11.4	Conform	
Where the seismic required hose stations are cross-connected to essential seismic Category I water systems, the fire flow shall not degrade the essential water system requirements.	9.4.11.5	Conform	
Portable and wheeled fire extinguishers shall be installed, inspected, maintained, and tested in accordance with NFPA 10, Standard for Portable Fire Extinguishers, unless otherwise permitted by 9.5.2.	9.5.1	COL	COL Item 9.5(3)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 34 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Where placement of extinguishers would result in required activities that are contrary to personnel radiological exposure concerns or nuclear safety–related concerns, fire extinguishers shall be permitted to be inspected at intervals greater than those specified in NFPA 10, Standard for Portable Fire Extinguishers, or consideration shall be given to locating the extinguishers outside high-radiation areas.	9.5.2	COL	COL Item 9.5(3)
Automatic suppression systems shall be provided in all areas of the plant as required by the fire hazards analysis.	9.6.1	Conform	See Appendix 9A
Except as modified in this chapter, the following NFPA standards shall be used: (1) NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam (2) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems (3) NFPA 13, Standard for the Installation of Sprinkler Systems (4) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection (5) NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems (6) NFPA 17, Standard for Dry Chemical Extinguishing Systems (7) NFPA 214, Standard on Water-Cooling Towers (8) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems	9.6.2	COL	COL Item 9.5(2)
The extinguishing systems chosen shall be based on the design parameters required as a result of the fire hazards analysis.	9.6.3	Conform	See Appendix 9A, conform except where RG 1.189 recommends protection not dictated by FHA.
Selection of extinguishing agent shall be based on all of the following: (1) Type or class of hazard (2) Effect of agent discharge on critical equipment such as thermal shock, continued operability, water damage, overpressurization, or cleanup (3) Health hazards	9.6.4	Conform	
Each fire suppression system shall be equipped with approved alarming devices and annunciate in a constantly attended area.	9.6.5	Conform	
Fire signaling systems shall be provided in all areas of the plant as required by the fire hazards analysis.	9.7.1	Conform	Local alarm and MCR

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 35 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The requirements of this chapter shall constitute the minimum acceptable protective signaling system functions when used in conjunction with NFPA 72, National Fire Alarm Code.	9.7.2	Conform	
The signaling system's initiating device and signaling line circuits shall provide emergency operation for fire detection, fire alarm, and water flow alarm during a single break or a single ground fault.	9.7.3	Conform	
The fire signaling equipment used for fixed fire suppression systems shall give audible and visual alarm and system trouble annunciation in the plant control room for the power block buildings, and the following shall apply: (1) Local alarms shall be provided. (2) Other fire alarm signals from other buildings shall be permitted to annunciate at the control room or other locations that are constantly attended.	9.7.4	Conform	
Audible signaling appliances shall meet the following criteria: (1) They shall produce a distinctive sound, used for no other purpose. (2) They shall be located and installed so that the alarm can be heard above ambient noise levels.	9.7.5	Conform	
Plant control room or plant security personnel shall be trained in the operation of all fire signaling systems used in the plant, including the ability to identify any alarm zone or fire protection system that is operating.	9.7.6	COL	COL Item 9.5(1)
Fire signaling equipment and actuation equipment for the release of fixed fire suppression systems shall be connected to power supply sources in accordance with the requirements of NFPA 72, National Fire Alarm Code, and shall be routed outside the area to be protected.	9.7.7	Conform	
Manual fire alarm boxes shall be installed as required by the fire hazards analysis, and the following criteria also shall be met: (1) Where manual release devices are installed for the purpose of releasing an extinguishing agent in a fixed fire suppression system, the manual releases shall be marked for that purpose. (2) The manual release device circuits shall be routed outside the area protected by the fixed extinguishing system.	9.7.8	Conform	
All signals shall be permanently recorded in accordance with NFPA 72, National Fire Alarm Code.	9.7.9	Conform	
Automatic fire detectors shall be selected and installed in accordance with all of the following: (1) NFPA 72, National Fire Alarm Code (2) Design parameters required as a result of the fire hazards analysis of the plant area (3) Additional requirements of this standard	9.8	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 36 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The identification and selection of fire protection systems shall be based on the fire hazards analysis.	10.1.1	Conform	See Appendix 9A
This chapter identifies fire and explosion hazards in advanced light water reactor plants and specifies the protection criteria that shall be used unless the fire hazards analysis indicates otherwise.	10.1.2	Informational Statement	
Fire protection for the primary and secondary containment areas shall be provided for hazards identified by the fire hazards analysis.	10.2.1	Conform	See Appendix 9A
Operation of the fire protection systems shall not compromise the integrity of the containment or other safety-related systems.	10.2.1.1	Conform	
Fire protection systems in the containment areas shall function in conjunction with total containment requirements such as ventilation and control of containment liquid and gaseous release.	10.2.1.2	Conform	
Inside primary containment, fire detection systems shall be provided for each fire hazard identified in the fire hazards analysis.	10.2.1.3	Conform	
The type of detection used and the location of the detectors shall be the most suitable for the particular type of fire hazard identified by the fire hazards analysis.	10.2.1.4	Conform	
A general area fire detection capability shall be provided in the primary containment as a backup for the hazard detection described in 10.2.1.4 by the installation of smoke or heat detectors compatible with the radiation environment in accordance with NFPA 72, National Fire Alarm Code.	10.2.1.5	Conform	
Standpipe and hose stations shall be installed inside containment. Standpipe and hose stations inside containment shall be permitted to be connected to a high-quality water supply of the required quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment.	10.2.1.6	Conform	
For inerted primary containment, standpipe and hose stations shall be permitted to be placed outside the primary containment, with hose no longer than 100 ft., to reach any location inside the primary containment with a 30 ft. effective hose stream.	10.2.1.7	NA	US-APWR containment is not inerted.
Reactor coolant pumps with an external lubrication system shall be provided with an oil collection system.	10.2.1.8	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 37 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The oil collection system shall be so designed, engineered, and installed that failure of the oil collection system will not lead to a fire during normal operations or off-normal conditions such as accident conditions or earthquakes.	10.2.1.9	Conform	
The oil collection systems shall be capable of collecting oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump oil systems, and the following criteria also shall apply: (1) Leakage shall be collected and drained to a vented closed container that can hold the entire oil system inventory. (2) Leakage points to be protected shall include the following, where such features exist on the reactor coolant pumps: (a) Lift pump and piping (b) Overflow lines (c) Oil cooler (d) Oil fill (e) Drain lines and plugs (f) Flanged connections on oil lines (g) Oil reservoirs (3) The drain line shall be large enough to accommodate the largest potential oil leak.	10.2.1.10	Conform	
Management procedures and controls necessary to ensure fire protection for fire hazards introduced during maintenance and refueling shall be provided.	10.2.2.1	COL	COL Item 9.5(1)
Backup fire suppression shall be provided so that total reliance is not placed on a single fire suppression system.	10.2.2.2	Conform	
Self-contained breathing apparatus meeting the following criteria shall be provided near the containment entrance for fire-fighting and damage control personnel: (1) The units shall be independent of any breathing apparatus or air supply systems provided for general plant activities. (2) The units shall be marked as emergency equipment.	10.2.2.3	COL	COL item 9.5(3)
The control room complex (including kitchen, office spaces, etc.) shall be protected against disabling fire damage and shall be separated from other areas of the plant by floors, walls, ceilings, and roofs having a minimum fire resistance rating of 3 hours.	10.3.1	Conform	
Peripheral rooms in the control room complex shall have an automatic water-based suppression system, where required by the fire hazards analysis, and shall be separated from the control room by noncombustible construction with a minimum fire resistance rating of 1 hour.	10.3.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 38 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Ventilation system openings between the control room and the peripheral rooms shall have automatic smoke dampers installed that close on operation of the fire detection and fire suppression systems.	10.3.3	Conform	
Manual fire-fighting capability shall be provided for both of the following: (1) Fires originating within a cabinet, console, or connecting cables (2) Exposure fires involving combustibles in the general room area	10.3.4	Conform	
Portable Class A and Class C fire extinguishers shall be located in the control room, and a fire hose station shall be installed outside the control room.	10.3.5	Conform	
Nozzles that are compatible with the hazards and the equipment in the control room shall be provided for the fire hose stations.	10.3.6	COL	COL Item 9.5(1)
The choice of nozzles shall satisfy fire-fighting requirements and electrical safety requirements and shall minimize physical damage to electrical equipment from hose stream impingement.	10.3.7	COL	COL Item 9.5(1)
Smoke detectors shall be provided in the control room complex, the electrical cabinets, and the consoles.	10.3.8	Conform	
If redundant safe shutdown equipment is located in the same control room cabinet or console, the cabinet or console shall be provided with internal separation (noncombustible barriers) to limit the damage to one safety division.	10.3.9	NA	US-APWR provides separation of safety trains and remote shutdown console.
Breathing apparatus for the control room operators shall be available.	10.3.10	COL	COL Item 9.5(3)
The outside air intakes for the control room ventilation system shall be provided with smoke detection capability to alarm in the control room and enable manual isolation of the control room ventilation system, thus preventing smoke from entering the control room.	10.3.11	Conform	
Venting of smoke produced by a fire in the control room by means of the normal ventilation system shall be permitted to be acceptable if provision is made for isolation of the recirculation portion of the normal ventilation system.	10.3.12	NA	Smoke removal system designed and installed.
Manually operated venting of the control room shall be available to the operators.	10.3.13	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 39 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
All cables that enter the control room shall terminate in the control room, and the following criteria also shall apply: (1) No cabling shall be routed through the control room from one area to another. (2) Cables in spaces underfloor and in above-ceiling spaces shall meet the separation criteria necessary for fire protection.	10.3.14	Conform	
Air-handling functions shall be ducted separately from cable runs in such spaces (underfloor and above ceiling, such spaces shall not be used as air plenums for ventilation of the control room).	10.3.15	Conform	
Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 ft^2 (0.09 m^2) in cross-sectional area, shall have automatic fire suppression inside.	10.3.16	Conform	
Area automatic fire suppression shall be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4 in. (101.6 mm) or smaller steel conduit or cables are in fully enclosed raceways internally protected by automatic fire suppression.	10.3.17	Conform	
The cable spreading room shall have an automatic fixed water-based suppression system, and the following criteria also shall be met: (1) The location of sprinklers or spray nozzles shall protect cable tray arrangements to ensure water coverage for areas that could present exposure fire hazards to the cable raceways. (2) Automatic sprinkler systems shall be designed for a density of 0.30 gpm/ft^2 (12.2 L/min m^2) over the most remote 2500 ft^2 (232.2 m^2).	10.4.1.1	NA	The US-APWR does not use a cable spreading room. The MCR sub floor area is provided a very early warning smoke detection system and a clean agent environmentally friendly gaseous suppression system.
Suppression systems shall be zoned to limit the area of protection to that which the drainage system can handle with any two adjacent systems actuated.	10.4.1.2	Conform	
Deluge and water spray systems shall be hydraulically designed with each zone calculated with the largest adjacent zone flowing.	10.4.1.3	Conform	
Cable spreading rooms shall be provided with all of the following: (1) At least two remote and separate entrances for access by the fire brigade personnel (2) Aisle separation between tray stacks at least 3 ft. wide and 8 ft. high (3) Hose stations and portable fire extinguishers installed outside the room (4)* Area smoke detection	10.4.1.4	NA	The US-APWR does not employ a cable spreading room.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 40 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Cable tunnels shall be provided with smoke detection.	10.4.2.1	N/A	Cable tunnels not employed for US-APWR.
Cable tunnels shall be provided with automatic fixed suppression systems.	10.4.2.2.1	N/A	
Automatic sprinkler systems shall be designed for a density of 0.30 gpm/ft^2 for the most remote 100 linear ft. of cable tunnel up to the most remote 2500 ft^2 .	10.4.2.2.2	N/A	
The location of sprinklers or spray nozzles shall protect cable tray arrangements and possible transient combustibles to ensure water coverage for areas that could present exposure fire hazards to the cable raceways.	10.4.2.2.3	N/A	
Deluge sprinkler systems or deluge spray systems shall meet the following criteria: (1) They shall be zoned to limit the area of protection to that which the drainage system can handle with any two adjacent systems actuated. (2) They shall be hydraulically designed with each zone calculated with the largest adjacent zone flowing.	10.4.2.2.4	N/A	
Cables shall be designed to allow wetting of undamaged cables with water supplied by the fire suppression system without electrical faulting.	10.4.2.3	Conform	
Cable tunnels over 50 ft. long shall be provided with all of the following: (1) At least two remote and separate entrances for access by the fire brigade personnel (2) An aisle separation between tray stacks at least 3 ft. wide and 8 ft. high (3) Hose stations and portable fire extinguishers installed outside the tunnel	10.4.2.4	N/A	
Cable tray fire breaks shall be installed every 20 ft. for vertical cable trays that rise over 30 ft., and the following criteria also shall be met: (1) Access to cable shafts shall be provided every 40 ft. with the topmost access within 20 ft. of the cable shaft ceiling. (2) Automatic sprinkler protection and smoke detection shall be provided at the ceiling of the vertical shaft.	10.4.3	Conform	
Computer and communications rooms shall meet the applicable requirements of NFPA 75, Standard for the Protection of Information Technology Equipment.	10.5	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 41 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Smoke detection shall be provided and shall alarm in both the control room and locally, and the following criteria also shall apply: (1) Cables entering the safety-related switchgear rooms shall terminate in the switchgear room. (2) The safety-related switchgear rooms shall not be used for other purposes. (3) Fire hose stations and portable fire extinguishers shall be readily available outside the area.	10.6.1	Conform	
Equipment shall be located to facilitate fire fighting, and the following criteria also shall be met: (1) Drains shall be provided to prevent water accumulation from damaging safety-related equipment. (2) Remote manually actuated ventilation shall be provided for smoke removal when manual fire suppression is needed.	10.6.2	Conform	
Battery rooms shall be provided with ventilation to limit the concentration of hydrogen to 2% by volume, and loss of ventilation shall alarm in the control room.	10.7.1	Conform	
Safety-related battery rooms shall be protected against fires and explosions, and the following criteria also shall apply: (1) Battery rooms shall be separated from other areas of the plant by fire barriers having a 1-hour minimum rating. (2) Direct current switchgear and inverters shall not be located in the battery rooms. (3) Fire detection shall be provided. (4) Fire hose stations and portable fire extinguishers shall be available outside the room.	10.7.2	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 42 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The T/B shall be separated from adjacent structures containing safety-related equipment by fire-resistive barriers having a minimum 3-hour rating, and the following criteria also shall apply: (1) The fire barriers shall be designed so that the barrier will remain in place even in the event of complete collapse of the turbine structure. (2) Openings and penetrations shall be minimized in the fire barrier and shall not be located where turbine oil systems or generator hydrogen cooling systems create a direct fire exposure hazard to the fire barrier. (3) Smoke and heat removal systems shall be provided in accordance with 8.4.3. (4) For those plants provided with complete automatic sprinkler protection at the roof level, smoke and heat removal systems shall not be required.	10.8.1	Conform	
All areas beneath the turbine generator operating floor shall be protected by an automatic sprinkler or foam-water sprinkler system meeting the following criteria: (1) The sprinkler system beneath the turbine generator shall be designed around obstructions from structural members and piping. (2) The sprinkler system shall be designed to a minimum density of 0.30 gpm/ft^2 (12.2 L/min·m^2) over a minimum application of 5000 ft^2 (464.5 m^2).	10.8.2.1	Conform	
Foam-water sprinkler systems installed in place of automatic sprinklers described in 10.8.2.1 shall be designed in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, and the design densities specified in 10.8.2.1.	10.8.2.2	NA	No foam-water sprinkler systems are used for the US-APWR.
Electrical equipment in the area covered by a water or foam system shall be of the enclosed type or otherwise protected to minimize water damage in the event of system operation.	10.8.2.3	Conform	Sensitive equipment is protected from water spray damage.
Automatic fixed suppression systems shall be provided for all turbine generator and exciter bearings.	10.8.3.1	Conform	
If closed-head water spray systems utilizing directional nozzles in accordance with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, are provided, bearing protection shall be provided for a minimum density of 0.30 gpm/ft^2 (12.2 L/min·m^2) over the protected area.	10.8.3.2	N/A	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 43 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Accidental water discharge on bearing points and hot turbine parts shall be considered. If necessary, these areas shall be permitted to be protected by shields and encasing insulation with metal covers.	10.8.3.3	N/A	
Lubricating oil lines above the turbine operating floor shall be protected with an automatic sprinkler system to a minimum density of 0.30 gpm/ft^2 (12.2 L/min·m^2) that covers those areas subject to oil accumulation, including the area within the turbine lagging (skirt).	10.8.4	Conform	
Lubricating oil reservoirs and handling equipment shall be protected in accordance with 10.8.2.1.	10.8.5	Conform	
If the lubricating oil reservoir specified in 10.8.5 is elevated, sprinkler protection shall be extended to protect the area beneath the reservoir.	10.8.6	Conform	
The following shall apply to protection associated with shaft-driven ventilation systems: (1) Where shaft-driven ventilation systems are not used, the area inside a directly connected exciter housing shall be protected with an automatic fire suppression system. (2) Where shaft-driven ventilation systems are used, an automatic preaction sprinkler system providing a density of 0.30 gpm/ft^2 (12.2 L/min·m^2) over the entire area shall be provided.	10.8.7	Conform	
Clean- or dirty-oil storage areas shall be protected based on the fire risk evaluation, and the designer shall include, as a minimum, the installation of fixed automatic fire protection systems and the ventilation and drainage requirements in Chapter 8.	10.8.8	Conform	See Appendix 9A.
Bulk hydrogen systems supplying one or more generators shall have automatic valves located at the supply and operable by “dead man”–type controls at the generator fill point(s) or operable from the control room.	10.8.9.1.1	Conform	
As an alternative to the requirement of 10.8.9.1.1, vented guard piping shall be permitted to be used inside the building to protect runs of hydrogen piping.	10.8.9.1.2	Conform	
A flanged spool piece or equivalent arrangement shall be provided to facilitate the separation of hydrogen supply when the generator is open for maintenance.	10.8.9.1.3	Conform	
Control room alarms shall be provided to indicate abnormal gas pressure, temperature, and percentage of hydrogen in the generator.	10.8.9.1.4	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 44 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The generator hydrogen dump valve and hydrogen-detraining equipment shall meet the following criteria: (1) They shall be arranged to vent directly to a safe outside location. (2) The dump valve shall be remotely operable from the control room or from an area accessible during a machine fire.	10.8.9.1.5	Conform	
An excess-flow check valve shall be provided for the bulk supply hydrogen piping.	10.8.9.1.6	Conform	
Redundant hydrogen seal oil pumps with separate power supplies shall be provided for reliability of seal oil supply.	10.8.9.2.1	Conform	
Where feasible, electrical circuits to redundant pumps shall be run in buried conduit or provided with fire-retardant coating if exposed in the area of the turbine generator, to minimize the possibility of loss of both pumps as a result of a turbine generator fire.	10.8.9.2.2	Conform	
Hydrogen seal oil units shall be protected as follows: (1) In accordance with 10.8.2 (2) By an automatic, open-head water spray system providing a density of 0.30 gpm/ft^2 (12.2 L/min·m^2) over the hydrogen seal area	10.8.9.2.3	Conform	
Curbing or drainage or both shall be provided for the hydrogen seal oil unit in accordance with Chapter 8, Section 8.5.	10.8.9.2.4	Conform	
Hydrogen lines in safety-related areas shall meet one of the following criteria: (1) They shall be designed to seismic Class I requirements or sleeved such that the outer pipe is directly vented to the outside. (2) They shall 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%.	10.8.9.3.1	Conform	
Hydrogen lines or sensing lines containing hydrogen shall not be piped into or through the control room.	10.8.9.3.2	Conform	
The hydraulic control system shall use a listed fire-resistant fluid.	10.8.10	Conform	
Turbine lubricating oil reservoirs shall be provided with vapor extractors, which shall be vented to an outside location.	10.8.11.1	Conform	
Curbing or drainage or both shall be provided for the turbine lubricating oil reservoir in accordance with Chapter 8, Section 8.5.	10.8.11.2	Conform	
All oil pipe serving the turbine generator shall be designed and installed to minimize the possibility of an oil fire in the event of severe turbine vibration.	10.8.11.3	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 45 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Piping design and installation shall include all of the following measures: (1) Welded construction (2)* Guard pipe construction with the pressure feed line located inside the return line or in a separate shield pipe drained to the oil reservoir (3) Routing oil piping clear of or below steam piping or metal parts (4) Insulating with impervious lagging for steam piping or hot metal parts under or near oil piping or turbine bearing points	10.8.11.4	Conform	
Cable for operation of the lubricating oil pumps shall be protected from fire exposure, and the following criteria also shall apply: (1) Where feasible, electrical circuits to redundant pumps shall be run in buried conduit. (2) Protection shall be permitted to consist of separation of cables for ac and dc oil pumps or 1-hour fire-resistive coating (derating of cable shall be considered).	10.8.11.5	Conform	
The installation and operation of standby emergency diesel generators and combustion turbines shall be in accordance with NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, unless otherwise permitted by 10.9.2.	10.9.1	Conform	
The requirement of 10.9.1 shall not apply to automatic shutdown and remote shutdown features, which shall be governed by nuclear-safety requirements.	10.9.2	Conform	
Standby emergency diesel generators and combustion turbines located within main plant structures shall be protected as follows: (1) They shall be protected by automatic sprinkler, water spray, or foam-water sprinkler systems. (2) The sprinkler and water spray protection systems shall be designed for a 0.25 gpm/ft^2 (10.19 L/min·m^2) density over the entire area.	10.9.3	Conform	.
Fire detection shall be provided to alarm and annunciate in the control room and to alarm locally, and the following criteria also shall be met: (1) Fire hose stations and portable fire extinguishers shall be located outside the area. (2) Drainage for fire-fighting water and means for local manual venting of smoke shall be provided.	10.9.4	Conform	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 46 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
A day tank shall be permitted in standby emergency diesel generator and combustion turbine rooms if the day tank is located in a diked enclosure that has sufficient capacity to hold 110% of the contents of the day tank or is drained to a safe location.	10.9.5	Conform	
Diesel fuel oil storage tanks shall not be located inside buildings containing other nuclear safety–related equipment, and the following criteria also shall apply: (1) If aboveground tanks are used, they shall be located at least 50 ft. from any building, or if within 50 ft., they shall be separated from the building by a fire barrier having a minimum 3-hour rating. (2) Potential oil spills shall be confined or directed away from buildings containing safety-related equipment.	10.10.1	Conform	Gas turbines are used for US-APWR. The gas turbine 7-day fuel storage tanks are located underground.
Aboveground tanks shall be provided with automatic fire suppression systems.	10.10.2	N/A	
Nuclear safety–related pump rooms shall be protected by fire detection systems, and the following criteria also shall apply: (1) Automatic fire suppression systems shall be provided unless the fire hazards analysis determines that fire suppression is not required. (2) Fire hose stations and fire extinguishers shall be readily accessible.	10.11	Conform	
Fire extinguishers shall be located within the new-fuel area, and the following criteria also shall be met: (1) Fire hose stations shall be located as determined by the fire hazards analysis to facilitate access and use for fire-fighting operations. (2) Fire detection systems shall be provided. (3) Combustible material shall be limited to the minimum necessary for operation in the new-fuel area.	10.12.1	Conform	
The storage configuration of new fuel shall always be maintained as to preclude criticality for any water density that could occur during fire water application.	10.12.2	Conform	
Protection for the spent-fuel pool area shall be provided by fire hose stations and fire extinguishers.	10.13.1	Conform	
Fire detection shall be provided in the area.	10.13.2	Conform	Linear Beam Detectors are provided for this large room.
Fire barriers, fire detection, and automatic fire suppression shall be provided as determined by the fire hazards analysis.	10.14.1	Conform	See Appendix 9A.

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 47 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Manual ventilation control to assist in smoke removal shall be provided if necessary for manual fire fighting.	10.14.2	COL	Several areas in plant have installed capability for manual smoke removal.
Storage tanks that supply water for fire-safe shutdown shall be protected from the effects of an exposure fire.	10.15.1	Conform	
Combustible materials shall not be stored next to these tanks.	10.15.2	Conform	
Record storage areas shall be located and protected in accordance with NFPA 232, Standard for the Protection of Records.	10.16.1	COL	COL Item 9.5(2)
Record storage areas shall not be located in safety-related areas and shall be separated from safety-related areas by fire barriers having a minimum 3-hour rating.	10.16.2	COL	COL Item 9.5(2)
Cooling towers shall be of noncombustible or limited-combustible construction.	10.17.1	COL	COL Item 9.5(2)
Cooling towers shall be located such that a fire in the cooling tower will not adversely affect safety-related systems or equipment.	10.17.2	COL	COL Item 9.5(2)
The following criteria also shall be met: (1) Cooling towers shall be of noncombustible construction when the basin is used as the ultimate heat sink. (2) If cooling towers are of combustible construction, the following criteria shall be met: (a) They shall be protected by automatic sprinklers or water spray systems in accordance with NFPA 214, Standard on Water-Cooling Towers. (b) They shall be located so that they do not affect safety-related systems or equipment in the event of a fire.	10.17.3	COL	COL Item 9.5(2)
Gas cylinder storage locations or the fire protection systems that serve those safety-related areas shall not be in areas that contain or expose safety-related equipment.	10.18	COL	COL Item 9.5(2)
Unused ion exchange resins shall not be stored in areas that contain or expose safety-related systems or equipment.	10.19	Conform	
Hazardous chemicals shall not be stored in areas that contain or expose safety-related systems or equipment.	10.20	Conform	
Automatic sprinkler protection shall be provided for warehouses that contain high-value equipment or combustible materials.	10.21	COL	COL Item 9.5(2)
Rooms housing diesel-driven fire pumps shall be protected by automatic sprinkler, water spray, or foam-water sprinkler systems.	10.22.1	COL	COL Item 9.5(2)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 48 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
If sprinkler and water spray systems are provided for fire pump houses, they shall be designed for a minimum density of 0.25 gpm/ft^2 (10.19 $L/min{\cdot}m^2$) over the entire fire area.	10.22.2	COL	COL Item 9.5(2)
Buildings shall be protected from exposure fires involving oil-filled transformers by one of the following means: (1) Locating the transformer casing, conservator tank, and cooling radiators at least 50 ft. from buildings (2) Providing a minimum 2-hour fire barrier between transformers as required in Figure 10.23.1(a) and Figure 10.23.1(b) and exposed buildings (3) Complying with Table 10.23.1[See Figure 10.23.1(a) and Figure 10.23.1(b).]	10.23.1	COL	COL item 9.5(1)
A minimum 1-hour fire barrier or a distance of 30 ft. shall be provided between adjacent transformers.	10.23.1.1	COL	COL Item 9.5(1)
Means shall be provided to contain oil spills.	10.23.1.2	COL	COL Item 9.5(1)
Oil-filled main, station service, and startup transformers shall be protected with automatic water spray systems in accordance with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, or foam-water spray systems in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.	10.23.2	COL	COL Item 9.5(1)
Transformers installed inside fire areas containing safety-related systems or equipment shall be of the dry type or insulated and cooled with noncombustible liquid, unless otherwise specified in 10.23.4.	10.23.3	Conform	
Transformers filled with combustible fluid that are located indoors shall be enclosed in a transformer vault.	10.23.4	Conform	
Auxiliary boilers, their fuel-burning systems, combustion product removal systems, and related control equipment shall be installed and operated in accordance with NFPA 85, Boiler and Combustion Systems Hazards Code.	10.24.1	COL	COL item 9.5(2)
Oil-fired boilers or boilers using oil ignition within the main plant shall be protected with automatic sprinkler, water spray, or foam-water sprinkler systems covering the boiler area.	10.24.2	N/A	
Sprinkler and water spray systems shall be designed for a minimum density of 0.25 gpm/ft^2 (10.19 $L/min{\cdot}m^2$) over the entire area.	10.24.3	N/A	

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 49 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Automatic sprinklers shall be provided for storage rooms, offices, and shops containing combustible materials that present an exposure to surrounding areas that are critical to plant operation and shall be so located and protected that a fire or the effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.	10.25	COL	COL Item 9.5(2)
Simulators shall be provided with a fixed automatic suppression system.	10.26.1	COL	Simulator not in US-APWR Scope, COL Item 9.5(2).
Simulators and supporting equipment shall be separated from other areas by a fire barrier with a minimum 1-hour rating.	10.26.2	COL	Simulator not in US-APWR Scope, COL Item 9.5(2).
Technical support centers shall be separated from all other areas by fire barriers or from all other buildings by at least 50 ft. and be protected by an automatic fixed suppression system as required by the fire hazards analysis.	10.27	Conform	
Intake structures shall be of noncombustible construction and shall be provided with automatic sprinkler protection.	10.28	COL	COL Item 9.5(2)
Consideration of fire protection shall include safety to life and potential for delays in construction schedules and plant startup, as well as protection of property.	11.1	COL	COL Item 9.5(1)
The responsibility for fire protection for the entire site during the construction period shall be defined.	11.2.1	COL	COL Item 9.5(1)
The administrative responsibilities shall be to develop, implement, and periodically update as necessary the measures outlined in this standard.	11.2.2	COL	COL Item 9.5(1)
The responsibility for fire protection programs among various organizations on-site shall be delineated.	11.2.3	COL	COL Item 9.5(1)
The fire protection program to be followed and the owner's right to administration and enforcement shall be established.	11.2.4	COL	COL Item 9.5(1)
The fire protection program shall include a fire risk evaluation of the construction site and construction activities.	11.2.5	COL	COL Item 9.5(1)
Written procedures in accordance with Chapter 5 shall be established for the new construction site, including major construction projects in existing plants.	11.2.6	COL	COL Item 9.5(1)
Security guard service, including recorded rounds, shall be provided through all areas of construction during times when construction activity is not in progress.	11.2.7	COL	COL Item 9.5(1)
Construction schedules shall be coordinated so that the planned permanent fire protection systems are installed and placed in service.	11.2.8	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 50 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Construction and installation of fire barriers and fire doors shall be given priority in the construction schedule.	11.2.9	COL	COL Item 9.5(1)
Prior to clearing forest and brush-covered areas, the following actions shall be taken: (1) The owner shall ensure that a written fire control plan is prepared and that fire-fighting tools and equipment are made available as required by NFPA 1143, Standard for Wildland Fire Management. (2) Contact shall be made with local fire and forest agencies for current data on restrictions and fire potential and to arrange for necessary permits.	11.3.1.1	COL	COL Item 9.5(1)
The following shall apply to all construction vehicles and engine-driven portable equipment: (1) They shall be equipped with effective spark arresters. (2) Vehicles equipped with catalytic converters shall be prohibited from wooded and heavily vegetated areas.	11.3.1.2	COL	COL Item 9.5(1)
Fire tools and equipment shall be distinctly marked and used for fire emergencies only.	11.3.1.3	COL	COL Item 9.5(1)
Each site utility vehicle shall be equipped with at least one fire-fighting tool, portable fire extinguisher, or backpack pump filled with 4 gal to 5 gal (15 L to 19 L) of water.	11.3.1.4	COL	COL Item 9.5(1)
Cut trees, brush, and other combustible spoil shall be disposed of.	11.3.1.5	COL	COL Item 9.5(1)
Where it is necessary to dispose of combustible waste by on-site burning, designated burning areas shall be established with the approval of the owner and shall be in compliance with federal, state, and local regulations and guidelines. The contractor shall coordinate burning with the agencies responsible for monitoring fire danger in the area and shall obtain all appropriate permits prior to the start of work.	11.3.1.6	COL	COL Item 9.5(1)
All structures that are to be retained as part of the completed plant shall be constructed of materials as indicated in Chapter 10 and in accordance with other applicable sections in this standard.	11.4.1	COL	COL Item 9.5(1)
Construction warehouses, offices, trailers, sheds, and other facilities for the storage of tools and materials shall be located with consideration of their exposure to major plant buildings or other important structures.	11.4.2	COL	COL Item 9.5(1)
A fire risk evaluation shall be performed.	11.4.3	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 51 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
Warehouses that contain high-value equipment (as defined by the individual responsible for fire prevention and fire protection) or contents the loss of which or damage to would cause a delay in startup dates of the completed plant shall meet the following criteria: (1) They shall be arranged and protected as indicated in 11.4.4.1 through 11.4.4.4. (2) Although some of these structures are considered to be temporary and will be removed on completion of the plant, the fire and loss potential shall be evaluated and protection provided where warranted.	11.4.4	COL	COL Item 9.5(1)
Building construction materials shall be noncombustible or limited-combustible.	11.4.4.1	COL	COL Item 9.5(1)
Automatic sprinkler systems shall be designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.	11.4.4.2	COL	COL Item 9.5(1)
Waterflow alarms shall be provided and located so as to be monitored at a constantly attended location as determined by the individual responsible for fire protection.	11.4.4.3	COL	COL Item 9.5(1)
Air-supported structures shall be used only for the storage of noncombustibles.	11.4.4.4	COL	COL Item 9.5(1)
Temporary enclosures, including trailers, inside permanent plant buildings shall be prohibited except where permitted by the individual responsible for fire prevention and fire protection.	11.4.5	COL	COL Item 9.5(1)
Where the floor area of a combustible enclosure exceeds 100 ft^2 (9.29 m^2) or where the occupancy presents a fire exposure, the enclosure shall be protected with an approved automatic fire suppression system.	11.4.6	COL	COL Item 9.5(1)
Storage of construction materials, equipment, or supplies that are either combustible or in combustible packaging shall be prohibited in main plant buildings unless either of the following conditions exists: (1) An approved automatic fire suppression system is in service in the storage area. (2) Loss of the materials or loss to the surrounding plant area would be minimal, as determined by the individual responsible for fire prevention and fire protection.	11.4.7	COL	COL Item 9.5(1)
Construction areas that comprise mobile buildings arranged with the buildings adjoining each other to form one large fire area shall be avoided.	11.4.8	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 52 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
If buildings cannot be separated, fire walls shall be installed between units or automatic sprinklers shall be provided throughout the buildings.	11.4.9	COL	COL Item 9.5(1)
Fire alarms shall be connected to a constantly attended central location.	11.4.10	COL	COL Item 9.5(1)
The handling, storage, and dispensing of flammable liquids and gases shall meet the requirements of NFPA 30, Flammable and Combustible Liquids Code, and NFPA 58, Liquefied Petroleum Gas Code.	11.4.11	COL	COL Item 9.5(1)
Vehicle repair facilities shall meet the requirements of NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages.	11.4.12	COL	COL Item 9.5(1)
Fire hydrant systems with an approved water supply shall be provided in lay-down areas where the need is determined by the individual responsible for fire prevention and fire protection.	11.5.1	COL	COL Item 9.5(1)
Combustible materials shall be separated by a clear space to allow access for manual fire-fighting equipment.	11.5.2	COL	COL Item 9.5(1)
Access shall be provided and maintained to all fire-fighting equipment, including fire hoses, extinguishers, and hydrants.	11.5.3	COL	COL Item 9.5(1)
Noncombustible or fire-retardant scaffolds, formwork, decking, and partitions shall be used both inside and outside permanent buildings where a fire could cause substantial damage or delay construction schedules.	11.6.1	COL	COL Item 9.5(1)
The use of listed pressure-impregnated fire-retardant lumber or listed fire-retardant coatings shall be provided.	11.6.2	COL	COL Item 9.5(1)
Tarpaulins (fabrics) and plastic films shall be certified to conform to the weather-resistant and fire-retardant materials described in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.	11.6.3	COL	COL Item 9.5(1)
Where it is necessary to store new nuclear fuel in areas other than the permanent storage facilities, a written procedure shall be developed to address separation from the following: (1) Combustible materials (2) Security (3) Nuclear criticality (4) Packing material (5) Noncombustible or limited-combustible building materials (6) Standpipe (7) Portable fire extinguishers (8) Hydrant protection	11.6.4	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 53 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The permanent underground yard system, fire hydrants, and water supply (at least one water source), as indicated in Chapter 10, shall be installed during the early stages of construction.	11.7.1	COL	COL Item 9.5(1)
Where provision of all or part of the permanent underground system and water supply is not practical, temporary systems shall be provided.	11.7.1.1	COL	COL Item 9.5(1)
Temporary water supplies shall be hydrostatically tested, flushed, and arranged to maintain a high degree of reliability, including protection from freezing and loss of power.	11.7.1.2	COL	COL Item 9.5(1)
Hydrants shall be installed as specified in 11.7.2.1 and 11.7.2.2.	11.7.2	COL	COL Item 9.5(1)
Hydrants shall be installed in the vicinity of main plant buildings, important warehouses, office or storage trailer complexes, and outside structures with combustible construction or combustible concrete formwork (e.g., cooling towers).	11.7.2.1	COL	COL Item 9.5(1)
The underground main shall be arranged to minimize the possibility that any one break will remove from service any fixed water extinguishing system or leave any area without accessible hydrant protection.	11.7.2.2	COL	COL Item 9.5(1)
A fire protection water supply shall be provided on the construction site and shall be capable of furnishing the larger of the following for a minimum 2-hour duration: (1) 500 gpm (1892.5 L/min) (2) The in-service fixed water extinguishing system with the highest water demand and 500 gpm (1892.5 L/min) for hose streams	11.7.3	COL	COL Item 9.5(1)
The highest water demand shall be determined by the hazards present at the stage of construction, which might not correspond with the highest water demand of the completed plant.	11.7.3.1	COL	COL Item 9.5(1)
As fixed water extinguishing systems are completed, they shall be placed in service, even when the available construction phase fire protection water supply is not able to meet the designed system demand, and the following criteria shall be met: (1) When the permanent hazard is introduced, the water supply shall be capable of providing the designed system demand. (2) Where construction water is used in permanent systems, adequate strainers shall be provided to prevent clogging of the system by foreign objects and dirt.	11.7.3.2	COL	COL Item 9.5(1)

Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 54 of 54)

Standard Requirement	Paragraph	Conformance	Remarks
The water supply shall provide the required pressure for hose connections at the highest elevation.	11.7.3.3	COL	COL Item 9.5(1)
Fire-fighting equipment shall be provided in accordance with NFPA 600, Standard on Industrial Fire Brigades, and NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.	11.8.1	COL	COL Item 9.5(1)
Portable fire extinguishers of the required capacity shall be provided in accordance with NFPA 10, Standard for Portable Fire Extinguishers, where one or more of the following conditions exist: (1) Flammable liquids are stored or handled. (2) Combustible materials are stored. (3) Temporary oil- or gas-fired equipment is used. (4) A tar or asphalt kettle is used. (5) Welding or open flames are in use.	11.8.2	COL	COL Item 9.5(1)
A standpipe system shall be provided in any permanent building that has walls erected that are equivalent to two floors in height.	11.8.3	COL	COL Item 9.5(1)
Additional standpipe hose connections shall be added to each floor level as soon as sufficient landings are available to fight fires from that level.	11.8.3.1	COL	COL Item 9.5(1)
Protection from freezing shall be provided.	11.8.3.2	COL	COL Item 9.5(1)
Hoses and nozzles shall be available at strategic locations, such as inside hose cabinets or hose houses or on dedicated fire response vehicles.	11.8.4	COL	COL Item 9.5(1)
If fire hose connections are not compatible with local fire-fighting equipment, adapters shall be made available.	11.8.5	COL	COL Item 9.5(1)

Table 9.5.4-1 Fuel Oil Storage and Transfer System Component Data

Fuel Oil Storage Tank	
Quantity	4
Type	Horizontal, Cylinder
Capacity, Gallons	119,000 for 7 days
Operating Pressure/Temperature	Atmosphere/Ambient
Design Pressure/Temperature (psig/ºF)	20/200
Design Code	ASME Section III, Class 3
Seismic Category	I
Fuel Oil Transfer Pumps	
Quantity	8
Type	Horizontal, centrifugal,
Capacity, GPM (each pump)	25
Total Differential Head, feet	95
Net Positive Suction Head, absolute, feet	Flooded Suction
Material	-
Casing	Stainless Steel
Impeller	Bronze
Pump Shaft	Stainless Steel
Design Code	ASME Section III, Class 3
Driver	Electrical Motor
Horse Power	1.5 HP @ 1800 RPM
Power Supply	460 V, 60 Hz, 3-Phase, Class 1E safety motor control center
Seismic Category	I
Fuel Oil Day Tanks	
Quantity	4
Type	Vertical, Cylinder
Capacity, Gallons	860
Operating Pressure/Temperature	Atmosphere/Ambient
Design Pressure/Temperature (psig/ºF)	15/200
Design Code	ASME Section III, Class 3
Seismic Category	I
Piping, fittings, and valves	
Design Pressure (psig)	50
Design temperature (ºF)	125
Material	Carbon Steel
Design Code (Safety Related Portion)	ASME Section III, Class 3
Seismic Category	I
Non safety related portions	ANSI B31.1
Flame Arrestors (Storage and Day Tanks)	Manufacturer's Standards

Table 9.5.6-1 Starting System Component Data

Compressors	
Quantity (per GT)	6
Type	Reciprocating, air cooled
Capacity	776.9 cu-ft/hr
Discharge pressure (normal)	426.4 psia
Pressure in receiver after 3 starts	188.6 psia
Air Compressor on/off	On: 384.4 psia; Off: 435.1 psia
Air Compressor Low Alarm	On: 311.8 psia; Off: 362.6 psia
Air temperature leaving cooler ºF	120-135
Number of stages/cylinders	2/3 (2 low pressure, 1 high pressure)
Revolutions per minute	790
Regulation	Dual control
Design code	Manufacturer's standard
Driver	
Type	Electric motor (totally enclosed, fan cooled)
Horsepower	7.5
Revolutions per minute	1200
Power supply	460-V, 60-Hz, 3-phase
Seismic Category	II
Air receivers	
Quantity (per GTG)	2
Type	Vertical, cylindrical
Capacity (ft^3)	318 cu-ft
Design pressure/temperature (psig/ºF)	440/150
Operating pressure/temperature (psig/ºF)	410/120
Material	Carbon steel SA 516-70
Code	ASME Section III, Class 3
Seismic Category	I
Air Start Necessary Air Vol/one start	120 Nm^3
Lower limit pressure at inlet	142 psig
Numbers of starts/GTG	3
Piping, fittings, and valves (safety-related)	
Material	Carbon steel and stainless steel
Design code	ASME Section III, Class 3
Seismic Category	I
Piping, fittings, and valves (non safety related)	
Material	Carbon steel and stainless steel
Design code	Manufacturer's standard or ANSI B31.1

Table 9.5.7-1 Lubrication System Component Data

Main oil pump	
Quantity (per GTG)	2
Capacity (gpm)	56
Lube Oil Consumption (gpm)	0.00088
Relief valve set pressure (psig)	49
Design code	Manufacturer's standards
Driver	Gas turbine shaft driven
Seismic Category	I
Oil cooler	
Quantity (per GTG)	2
Type	Air Cooled
Air Cooling Fan	2
Codes and standards	Manufacturer's standards
Seismic Category	I
Fluid	Lubricating oil
Temperature in/out (ºF)	180/151.5
Flowrate (gpm)	56
Design pressure (psig)	125
Design temperature (ºF)	200
Material	Carbon steel
Reduction gear reservoir	
Quantity (per GTG)	1
Type	Horizontal, cylindrical
Capacity, each (gal)	95.1
Operating pressure/temperature (psig/ºF)	atm/170-180
Material	Carbon steel
Code	ASME Section III, Class 3
Seismic Category	I
Main oil filter	
Quantity (per GT)	2
Type	Full-flow, duplex, cartridge
Flowrate (gpm)	56
Particle retention capability (μm)	10
Design pressure/temperature (psig/μF)	150/200
Housing	Carbon steel
Code (pressure boundary)	Manufacture's Standard
Seismic Category	I
Main lube oil strainer	
Quantity (per GTG)	2
Flowrate (gpm)	56
Design pressure/temperature (psig/ºF)	150/200
Filtering capacity (μm)	150 mesh
Housing	Carbon steel
Screen	Stainless steel
Code (pressure boundary)	Manufacture's Standard
Seismic Category	I
Piping, fittings, and valves	
Material	Carbon steel
Design code, safety-related portion	Manufacture's Standard
Seismic Category	I

Table 9.5.8-1 Combustion Air Intake and Exhaust System Component Data

Air intake filter	
Quantity (per engine)	1
Design flow at 100 ºF (cfm)	49,440
Design pressure/temperature (psig/ºF)	Atmospheric/120
Pressure drop at rated load (in. WG)	3
Seismic Category	I
Intake silencer	
Quantity (per engine)	1
Make/model/size	AAF, 4R, 24
Type	Pulsco tubular duct
Design flow at 100 ºF (cfm)	49,440
Design pressure/temperature (psig/ºF)	Atmospheric/120
Seismic Category	I
Turbine Exhaust silencer	
Quantity (per engine)	1
Type	Vertical
Design flow at 1,103 ºF (cfm)	135,255
Design pressure/temperature (psig/ºF)	Atmospheric/900
Pressure drop at rated load (in. WG)	5.6
Seismic Category	I
Piping	
Intake piping (except ASME Section III, flexible connectors)	Class 3
Exhaust piping (except ANSI B31.1 flexible connectors)	Flexible connectors (intake Manufacturer's standard and exhaust) design
Seismic Category	I
Ventilation	
Intake Flowrate (cfm)	31,783

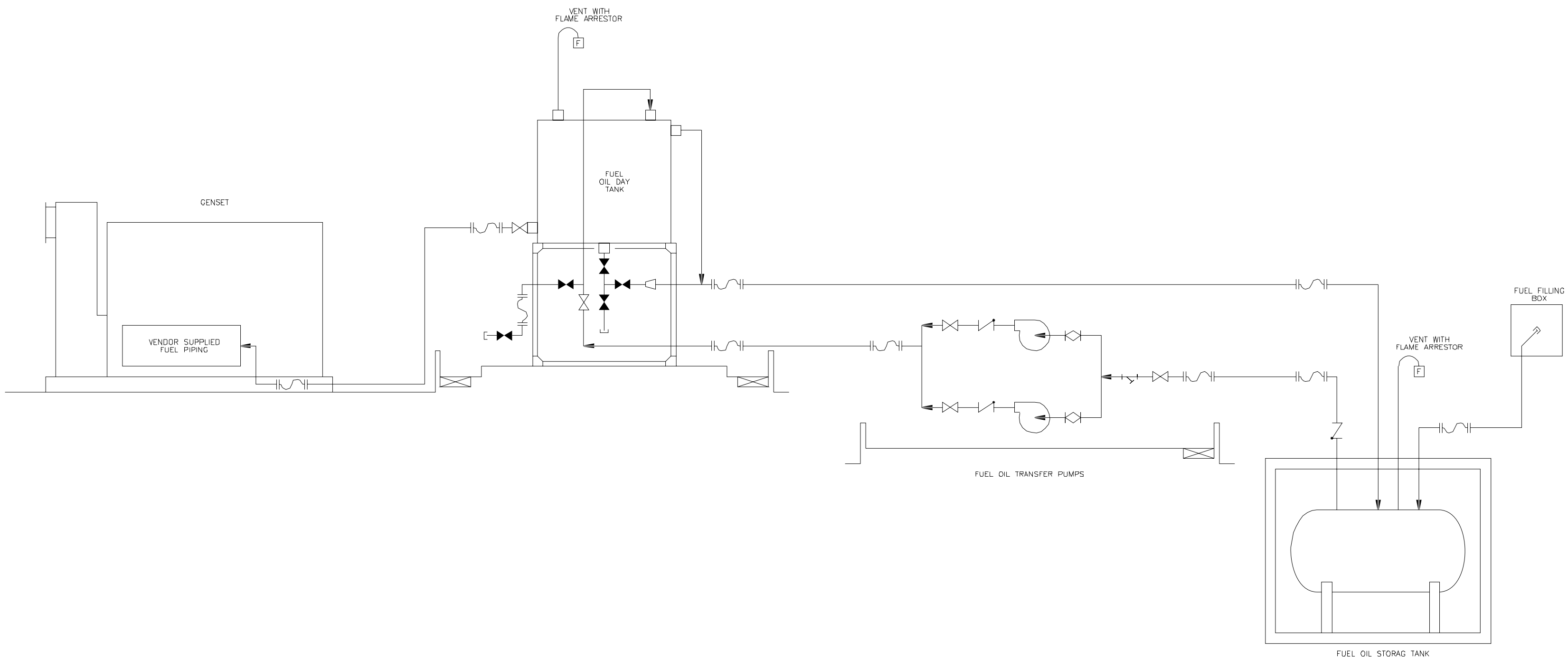

Figure 9.5.4-1 Gas Turbine Generator Fuel Oil Storage and Transfer System

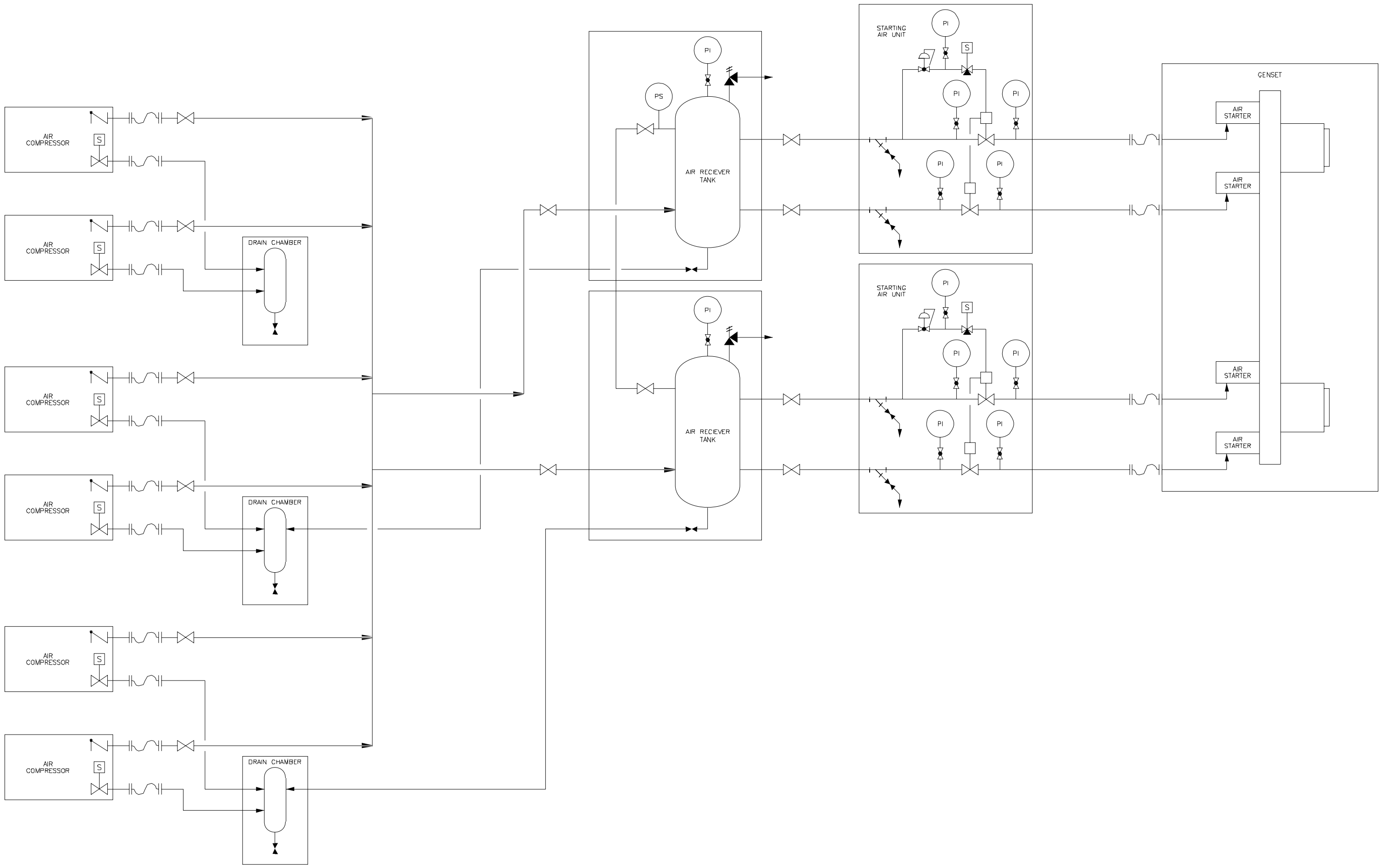

Figure 9.5.6-1   Gas Turbine Generator Starting System

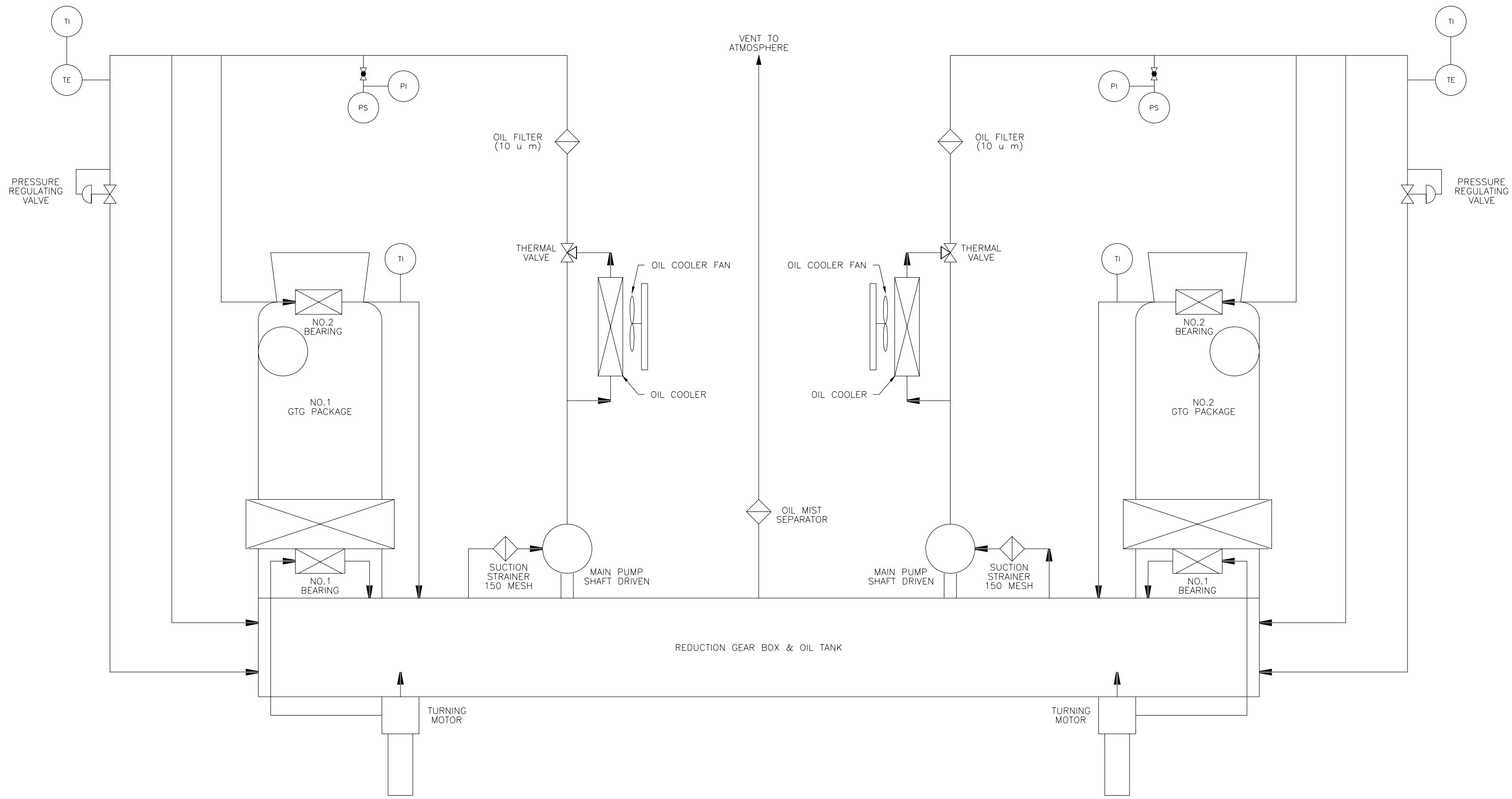

Figure 9.5.7-1 Gas Turbine Lubrication System

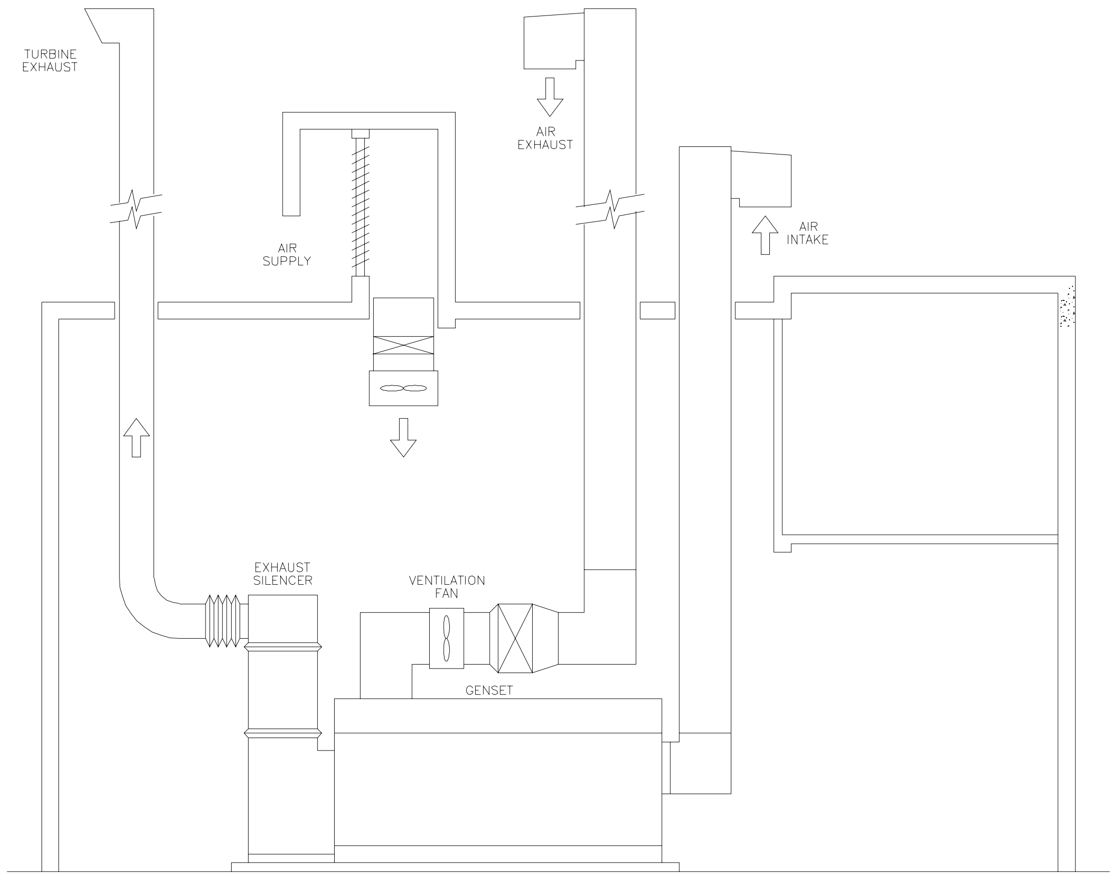

Figure 9.5.8-1 Gas Turbine Generator Air Intake And Exhaust Component

APPENDIX 9A

FIRE HAZARD ANALYSIS

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9A Fire Hazard Analysis

9A.1 Introduction

This fire hazard analysis for the US-APWR plant evaluates the potential for occurrence of fires within the plant and demonstrates that the plant will maintain the ability to perform safe-shutdown functions and minimize radioactive material releases to the environment in the event of a fire. The fire hazard analysis is an inherent and essential activity associated with proper selection of fire prevention, detection, and suppression methods, and provides a supporting design basis for the fire protection system as described in section 9.5.1.

The purpose of the fire hazards analysis is to:

- Evaluate potential in situ and transient fire hazards.
- Confirm that the effects of a fire in any location in the plant do not adversely impact the ability to safely shut down the reactor and that the release of radioactivity to the environment is controlled and minimized.
- Select appropriate measures for fire prevention, fire detection, fire suppression, and fire containment for each fire area containing structures, systems, and components (SSCs) important to safety in accordance with NRC guidelines and regulations.

The fire hazards analysis verifies that the applicable NRC regulatory requirements and guidance for the FPP have been met. The analysis lists applicable elements of the program, with explanatory statements as needed to identify location, type of system, and design criteria. In addition the fire hazard analysis evaluates the degree of compliance with industry guidance provided by NFPA 804, NFPA 101 and nuclear plant property insurance requirements. The fire hazard analysis is performed for each fire area using the methodology described in section 9A.2. This methodology follows the guidance of RG 1.189 (Reference 9A-1). The results of the analysis are provided in Section 9A.3.

The fire hazard analysis is performed for areas of the plant containing safety-related components and for areas containing systems important to the generation of electricity. It is performed on a zone by zone basis and fire area by fire area basis as appropriate. This approach provides confidence that plant safety is achieved and the intent of NRC fire protection requirement is satisfied.

9A.2 Fire Hazard Analysis Methodology

The fire hazards analysis considers the following elements and attributes as appropriate for each fire zone and fire area:

- The applicability of NRC fire protection requirements and guidance.
- In situ and potential transient fire and explosion hazards, including amounts, types, configurations, and locations of flammable and combustible materials (e.g.,

electric cable insulation and jacketing material, lube oil, diesel fuel oil, flammable gases, chemicals, building materials and finishes) associated with operations, maintenance, and refueling activities are identified.

- The continuity of combustible materials (e.g., exposed electrical cables that span the distance between redundant trains), the potential for fire spread, and sources of ignition are identified and described in the analysis.

- External exposure hazards (e.g., flammable and combustible liquid or gas storage, auxiliary boiler units and adjacent plant support facilities) that could potentially expose SSCs important to safety to damage from the effects (e.g., heat, flame, smoke) of fires are identified. Wildfire hazards are also addressed if there is the potential for a wildfire to damage SSCs important to safety.

- The design, installation, operation, testing, and maintenance of automatic fire detection and suppression capability are addressed. The fire hazards analysis describes the level of automatic protection (e.g., water spray density, gaseous agent concentration) provided relative to the specific fire hazards that are identified. The effects of lightning strikes are included in the design of fire detection systems.

- The layout and configurations of SSCs important to safety are depicted. The protection for safe-shutdown systems within a fire area are determined on the basis of the worst-case fire that is likely to occur and the resulting damage. The fire hazards analysis explains and documents the expected extent of such damage.

- The analysis considers the degree of spatial separation between redundant shutdown systems, the presence of in situ and transient combustibles, the available fire protection systems and features, sources of ignition, and the susceptibility to fire damage of the safe-shutdown related cables, equipment, systems, and features in the area.

- The basic US-APWR design involves limited reliance on fire barriers other than structural boundaries such as cable raceway barriers. Where fire barriers such as cable raceway barriers protecting safe-shutdown circuits are used in the basic US-APWR design, the fire testing requirements delineated in RG 1.189, Rev. 1, Position 4.3 and Appendix C have been performed and the qualification requirements have been satisfied.

- Fire area construction (walls, floor, and ceiling materials, including coatings and thicknesses; fireproofing of structural members; area dimensions and volume; normal ventilation and smoke removal capability; and level of congestion as it applies to access for manual firefighting activities) are described. The fire hazards analysis provides sufficient information to determine that fire areas have been properly selected based on the fire hazards present and the need for separation of SSCs important to safety. Guidance provided by Regulatory Position 4.1.2 of RG 1.189, Rev. 1 is considered for the evaluation of fire areas and zones.

- Manual suppression capability, including systems (e.g., hydrants, standpipes, extinguishers), fire brigades, manual firefighting equipment, plans and procedures, training, drills, mutual aid, and accessibility of plant areas for manual firefighting is identified. The fire hazards analysis lists the location and type of manual firefighting equipment and accessibility for manual firefighting.

- Potential fire impacts on operations are identified, including the following:

  - fire in control rooms or other locations where operations important to safety are performed

  - fire conditions that may necessitate evacuation from areas that are required to be attended for safe-shutdown

  - lack of adequate access or smoke removal facilities that impede plant operations or fire extinguishment in plant areas important to safety

- Potential disabling effects of fire suppression systems on safe-shutdown capability are identified. The fire hazards analysis addresses the effects of firefighting activities.

- Explosion-prevention measures in areas subject to potential explosive environments from flammable gases or other potentially energetic sources (e.g., chemical treatment systems, ion exchange columns, high-voltage electrical equipment) are listed.

- The availability of oxygen (e.g., inerted containment) is identified as applicable.

- Alternative or dedicated shutdown capability for those fire areas where adequate separation of redundant safe-shutdown systems cannot be achieved are identified and discussed.

Fire initiation is postulated at the location within each fire area/zone that will produce the most severe fire with the potential to adversely impact SSCs important to safety. Fire development considers the potential for involvement of other combustibles, both fixed and transient, in the fire area. Where automatic suppression systems are installed, the effects of the postulated fire are evaluated with and without actuation of the automatic suppression system. “Worst-case” fires are not postulated to be concurrent with non-fire-related failures in safety systems, other plant accidents, or the most severe natural phenomena.

9A.2.1 Fire Area Description

In accordance with GDC 3 (Reference 9A-2), which requires SSCs important to safety to be designed and located to minimize the probability and effect of fires and explosions, the US-APWR is compartmentalized by utilizing passive fire barriers to subdivide the plant into separate areas and zones. These fire areas and fire zones serve the primary purpose of confining the effects of fires to a single compartment or area, thereby minimizing the potential for adverse effects from fires on redundant SSCs important to safety.

A fire area is defined as that portion of a building or plant that is separated from other areas by fire rated barriers, including components of construction such as beams, joists, columns, penetration seals or closures, fire doors, and fire dampers. Fire barriers that define the boundaries of a fire area for the US-APWR have a fire-resistance rating of 3 hours or more and achieve the following:

- Separation of SSCs important to safety from any potential fires in non-safety related areas that could affect their ability to perform their safety function.
- Separation of redundant trains of systems and components important to safety from each other so that both are not subject to damage from a single fire.

Fire zones are subdivisions of a fire area and are typically based on fire protection systems and structural features within the fire zone that provide an appropriate level of protection for the associated hazards but are not necessarily isolated by complete fire barriers or fire rated construction. Fire zone boundaries are however capable of substantially confining the impact of a fire that occurs with the fire zone. Fire zone concepts may be used to establish zones within fire areas where further subdivision into additional fire areas is not practical or desirable on the basis of plant design and layout (e.g., inside containment, structures containing a single safety train of equipment, etc.).

The standard US-APWR plant is divided into fire areas and fire zones as described in subsection 9.5.1.2.1. The fire areas and fire zones are the result of building separation into operating compartments, corridors for proper equipment layout, consideration for unimpeded maintenance and emergency access, and division or the plant into four separate safety trains of equipment and electrical divisions. The analysis for each fire area is discussed in section 9A.3 and briefly describes the fire area and the associated fire zones as applicable and describes the principal systems and safety-related or other equipment in the area. Fire detection and fire suppression features are discussed and smoke removal features as applicable. The term “smoke” applies to products of combustion which may, or may not, be visible.

9A.2.2 Combustible Material Tabulation

Each fire area and fire zone is reviewed for the type, quantity, and distribution of in-situ combustible materials associated with the plant systems, components, and equipment. Examples are electrical cable insulation, lubricants, rubber and plastics. Additionally, in most areas where there is personnel access and identifiable combustible fire loading, transient combustibles are anticipated (i.e. materials for radiological controls, equipment maintenance, and outage support). The combustible material tabulation reflects that presence. When estimating quantities of electrical cable insulation, cable trays are assumed to have a maximum cable fill as allowed by construction standards and industry codes. Cable enclosed in conduit or in closed metal cabinets is normally not included in the combustible material tabulation as such an installation does not contribute to a fire. For this analysis, however, cable installed within conduit or metal cabinets is included within the combustible tabulation to present a conservative analysis.

The combustible loading tabulation for the US-APWR considered the anticipated fire loading using a conservative estimate for each fire zone based on standard design equipment. An additional 20% margin was added to allow for detailed site specific design options and then a transient combustible estimate of 93,000 Btu or "three airline trash bags" as described in NUREG/CR 6850, Appendix G Table G-7, test "LBL-Von Volkinburg" was added as a transient combustible to every fire zone that had more than a negligible combustible content. This total fire loading including the maximum expected loading based on standard design, design margin for site specific deviation, and transient combustible fire loading, is reflected as the "maximum anticipated" fire loading.

9A.2.3 Fire Barrier Ratings

Within industry, fire barriers are fire rated in accordance with industry codes and standards for a time period of fire resistance. The temperature curves used by the industry to rate fire barrier fire resistance is based on ASTM E-119 (Reference 9A-3) standard time and temperature curves. Time and temperature points for the ASTM E-119 standard time temperature curve are as follows,

1000˚F at 5 minutes
1300˚F at 10 minutes
1550˚F at 30 minutes
1700˚F at 1 hour
1850˚F at 2 hours
1925˚F at 3 hours
2000˚F at 4 hours
2300˚F at 8 hours

In a nuclear power plant, the highest rating for fire barriers is usually selected as three hours based on RG 1.189 guidance. However, the construction involved in a nuclear power plant is often realistically capable of much longer fire resistance due to reinforced concrete construction utilized for seismic design requirements and radiological shielding.

9A.2.4 Combustible Loading Calculations

As discussed in the NFPA Handbook (Reference 9A-4), Section 12, the original concepts of fire severity and fire load evaluating fire loading on the basis of Btu/ft^2 and equivalent fire severity based on equivalent fire loading are technically obsolete even though the concepts remain important since the concepts form the basis for many of the fire resistive requirements of building codes and government regulations. In many cases, the original fire severity/fire load relationship is more severe that indicated by a detailed analysis. In these situations, the methodology errs on the safe side and remains conservative. For many installations within a power plant, the concentration of combustible material is not necessarily uniform throughout an area. For example cable trays may be the most significant fire hazard in an area and be located at the ceiling level while the floor based hazards in the space are minimal. In such cases the use of the traditional concepts must be used with proper diligence.

For the US-APWR, combustible loading calculations are performed for each fire area and each fire zone. The preliminary calculations provide information used for general assessment of the adequacy of selected fire detection and fire suppression methods. In addition to this general assessment, the review considered individual specifics such as concentration of combustibles, type of combustibles, regulatory requirements, and property insurer's recommendations in the assessment of the adequacy of selected fire detection and fire suppression methods.

Combustible Loading Tabulations

The tabulation of combustible material on a fire area by fire area basis has traditionally been performed for nuclear power stations. As discussed above, this methodology is technically obsolete but does have some value for input to support evaluation of fire barriers and helping decide where fire protection features are required to address the fire hazards. Traditionally, this methodology has taken the maximum heat that is released if all combustibles in a given fire area/fire zone are consumed. The potential heat release (expressed in Btus or British Thermal Units) is the sum total of the product of each quantity (in pounds) times the heat of combustion (Btu/lb) of each combustible in the area. This total heat release is then divided by the floor area of compartment to determine the unit fire loading (Btu/ft^2) of the applicable fire area/fire zone. The fire hazard analysis summary table identifies on a zone by zone basis, the heat contribution within each compartment and the resulting traditional fire loading.

Fire barriers, fire detection and fire suppression methods described within this FHA are based on several factors including (in order of priority) regulatory guidance, NFPA 804 guidance, the type and quantity of combustible present, life safety, business interruption and property protection considerations, and general combustible fire loading. The fire barriers, fire detection and fire suppression methods are described in the discussion for each fire area in Section 9A.3.

9A.2.5 Fire Protection Adequacy

The adequacy of the fire protection features for a postulated fire in each fire zone or fire area is assessed. This assessment involves the following considerations:

- Compliance with regulatory guidance or requirements
- Compliance with NFPA 101 criteria
- Compliance with NFPA 804 criteria
- Verification that property insurance requirements are addressed
- Verification of fire barrier adequacy to confine a fire and limit fire damage
- Verification that the HVAC system within the area properly removes or controls smoke and limits fire spread from the area
- Verification that a fire in non-safety related areas does not threaten safety-related equipment.

- Verification that a fire in a safety-related area is properly confined to the area and does not adversely impact the ability to safely shutdown the plant
- Verification that a fire in an area containing radioactive materials does not result in the release of radioactive material to the public
- Confirmation that the capability to safely contain and control the water released from fire suppression activities is provided

9A.2.6 Fire Protection System Integrity

For fires in areas containing safety-related systems structures or components, the potential for a credible inadvertent actuation of automatic fire suppression systems is evaluated and potential consequences assessed. The design of automatic and/or manual fire suppression systems is evaluated to verify that no potential single system impairment can incapacitate both the automatic and manual system.

9A.2.7 Safe Shutdown Evaluation

The safe-shutdown methodology for the US-APWR is described in section 7.4. This subsection describes the methodology for evaluating the potential impact of a fire in each fire area upon the ability to achieve safe-shutdown of the plant. The US-APWR, as an evolutionary design nuclear power plant, meets the enhanced fire protection criteria designated in RG 1.189, Regulatory Position 8.2. For the US-APWR, safe-shutdown is defined as cold shutdown and is achievable using solely safety-related equipment from two of the four redundant safety trains of equipment provided in the plant design. The safe-shutdown evaluation confirms that safe-shutdown can be achieved assuming that all equipment in the affected fire area is rendered inoperable by fire and that reentry into the fire area for repairs and operator actions is not possible.

The control room because of its physical configuration is excluded from this approach. The US-APWR design includes an independent alternative shutdown capability that is physically and electrically independent of the control room. The control room is evaluated to ensure that the effects of fire do not adversely affect the ability to achieve and maintain safe-shutdown.

Fire protection for redundant shutdown systems in the reactor containment structure that will ensure, to the extent practicable, that any fire damage within the structure will be confined to only one of the four safety trains is evaluated. Additionally, assessment that smoke, hot gases, or the fire suppressant will not migrate into other fire areas to the extent that they could adversely affect safe-shutdown capabilities, including operator actions is performed.

9A.2.7.1 Criteria and Assumptions

The criteria and assumptions described below are utilized in evaluation the safe-shutdown capability.

Postulated Fire

Only one fire necessitating safe-shutdown is assumed to occur at any given time consistent with guidance provided in Section B of RG 1.189, Rev.1 regardless of whether or not that area/zone contains in-situ combustibles.

Any fire damage which would prevent proper operation of equipment and which fire is capable of causing is assumed to occur. Except where explicitly noted, no credit is taken for proper operation of equipment or the operation of valves to the proper position when not protected from the effects of a postulated fire.

Fire Barriers

As described above in Section 9A.2.1, 3-hour fire rated barriers provide separation of redundant safety trains of electrical and mechanical equipment, systems, structures, and components and within designated fire areas, fire zones are separated with structural features that provide substantial resistance to the propagation of fire.

Fire Areas

The US-APWR fire areas are three dimensional spaces that are designed to contain any fire that should occur within the boundaries of the fire area. The fire areas are separated by 3-hour fire rated walls, ceilings, and floors with all penetrations into or out of the fire are protected with 3-hour fire rated penetration seals and HVAC system components such as fire dampers to prevent /uncontrolled fire propagation.

Any credible fire within the fire area does not extend beyond the fire area. For fires outside the main control room, remote shutdown room, and the containment fire areas, the zone of influence is defined for analytical purposes as the entire fire area and all equipment in any one fire area is assumed to be rendered inoperable by the fire and reentry into the fire area for repairs and operator actions is assumed impossible. If continued equipment operation within the affected fire area can affect safe plant shutdown, it is assumed as operating until positive shutdown (i.e. no beneficial fire effects are credited).

Zone of Influence

The zone of influence for any fire is the boundary of fire damage created from the fire. When smoke damage is considered, this area can sometimes be quite large. The zone is usually smaller for structural damage. For this FHA, the zone of influence is taken within a fire zone as rendering all equipment within that fire zone as inoperable and entry into the fire zone is assumed impossible for any operator actions. Similar to the assumptions for fire areas, if continued equipment operation is not beneficial, it is assumed operating. No beneficial fire effects are credited, but the extent of fire damage and impact is limited to the boundaries of the fire zone in which the fire occurs.

Fire Zones

Fire zones are three dimensional spaces within a fire area. The boundaries of fire zones are not necessarily comprised of all fire rated barriers. A fire zone is defined as a well enclosed area, not necessarily fully enclosed by rated fire barriers. Fire zones fall within a fire area and are bounded by noncombustible or substantial barriers where heat and products of combustion from a fire within the compartment will be substantially confined. Barriers defining fire zones may have open hatches, ladder ways, doorways or unsealed penetrations. Fire zone is a term defined specifically for fire risk analysis and maps fire areas into compartments defined by fire damage potential (i.e. zone of influence).

Independence of Affected Fire Areas

Fire areas are primarily used for the US-APWR to separate the four redundant trains of safety-related equipment. Additional fire area designation is provided to prevent the release of radioactive material and to prevent damage from a fire involving non-safety related equipment from damaging safety-related equipment. Only systems, components, circuits free of fire damage are credited for achieving safe plant shutdown for any given fire. For fire zones inside primary containment, systems, components, and circuits outside the zone of influence are considered free of fire damage if the effects of fire do not prevent them from performing their design functions.

Event Assumptions

As per guidance in RG 1.189, Rev.1, Section B, the evaluation and analysis assesses fire damage to safe-shutdown equipment or fires with the potential to result in release of radioactive materials to the environment on the basis of a single fire occurrence, including an exposure fire. An exposure fire is a fire in a given area that involves either in situ or transient combustibles and has the potential to affect SSCs important to safety or release of radioactive materials located in or adjacent to that same area.

There is no regulatory requirement to prevent fire-induced failure of redundant systems necessary for mitigation of consequences following design-basis accidents if the system is not required to operate for safe-shutdown after a fire. However, the US-APWR provides four redundant trains of safety-related equipment of which only two are required for mitigation of design basis accidents or safe plant shutdown.

This analysis assumes that a fire may occur at any time but does not postulate a fire occurring simultaneously with and independently from plant accidents or severe natural phenomena. However, since the US-APWR design provides redundant trains of equipment used for accident mitigation, should a design basis accident occur concurrent with a fire, the defense in depth philosophy employed for the US-APWR design will allow mitigation of the design basis event.

Offsite Power

A loss of offsite power is assumed concurrent with the postulated fire only when the safe-shutdown evaluation indicates that the fire could result in the loss of offsite power.

Availability of Non-Safety Related Systems

The US-APWR is capable of achieving post fire safe-shutdown using only safety-related equipment in two of the four safety-related trains of equipment. If non-safety related equipment is not rendered inoperable by the fire and offsite power is available, plant operators may elect to utilize the non-safety related equipment if it provides a less severe transient for the plant. However, in the event that any non-safety related equipment becomes available, automatic and manual transfer to available safety-related equipment will occur. Two trains of safety-related equipment are sufficient for the US-APWR to achieve cold shutdown within acceptable time frames.

Process Monitoring

The basic process monitoring for plant operation is provided by the digital based instrumentation and control (I&C) systems of the plant which are monitored on the main control board safety and non safety visual display units (VDU). Additionally, an analog based diverse actuation system (DAS) to cope with common mode failures in the digital systems. Four safety trains of digital circuits are provided which allow safe-shutdown from the main control room for any fire requiring only two of the four safety trains.

The remote shutdown consol is used for maintaining safe-shutdown in the event that the MCR is not available due to any conditions, including fire which results in catastrophic damage to I&C equipment located in the MCR. The remote shutdown console includes non-safety VDUs which provide monitoring or process equipment in all safety and non-safety divisions and safety VDUs as backup which provide control for only safety systems. The remote shutdown console is located in a separate fire area two floors above the MCR to assure that safe-shutdown defined as cold shutdown for the US-APWR is obtainable for the most severe single fire that can be postulated for the plant.

Manual Operation

Manual operations or repair operations within a fire affected area is assumed to not be possible. For the control room fire scenario, manual scram of the reactor is assumed provided there is adequate time and safety assured by the action. If manual scam from the control room is not possible prior to exiting, this action can be performed at the remote shutdown panel.

No other manual actions are required for safe reactor shutdown which can be accomplished from either the main control room or the remote shutdown station.

High-Low Pressure Interfaces

High-low pressure interfaces for the US-APWR plant such as the RHR system are designed with proper consideration for isolating high pressure systems from low pressure components where required and providing overpressure protection to prevent damage to low pressure components from unintended high pressure. Where redundant valves in series are used to prevent damage in the event of a single failure in one, appropriate fire separation and installation is provided to prevent a fire induced failure from resulting in a violation of a high-low pressure interface.

Associated Circuits and Spurious Actuation of Equipment

The US-APWR was specifically designed with the intent to separate redundant safety trains of equipment from the effects of a fire and to minimize the use of associated circuits to the extent possible. Any associated circuits comply with NRC RG 1.75 position 4 as related to associated circuits and IEEE 384-1992, section 5.5.2. No fire postulated as involving associated circuits will adversely impact the ability to achieve and maintain safe-shutdown. The safe-shutdown equipment and systems for the US-APWR are safety-related and isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in associated circuits will not prevent the operation of the safety-related safe-shutdown equipment function. Spurious actuation of equipment is possible due to hot shorts, open circuits, and shorts to ground. The US-APWR design process performed a fire-induced circuit failure analysis including the evaluation of cable routing related to achieve and maintain safe-shutdown equipment to identify vulnerable areas. To the extent practical, the US-APWR design minimizes the potential for spurious actuation of equipment due to a fire.

Fault isolation devices are incorporated into data links and safety buses which connect redundant train sets, or which carry signals to or from non-safety systems. The isolation devices ensure that credible faults, such as physical damage, short circuits, open circuits, or the application of credible fault voltage do not propagate between systems. The isolation devices provide assurance that, where protection signals are used by non-safety systems, and non-safety signals are used by safety systems, credible single failures in the non-safety system will not degrade the performance of the safety system. For signals interfaced between redundant train sets, the isolation devices provide assurance that failures in one train set cannot degrade the performance of any other train set.

For most applications, the I&C systems use fiber optic data communication links to provide fault isolation. Fiber optic cables provide inherent electrical fault isolation and allow required physical separation. For a few cases where electrical isolators are employed (such as, relays, transformers or photo-couplers, etc.), the isolator is qualified by testing.

Physical separation is accommodated through equipment mounting and cable routing. In addition to the above electrical and physical isolations, functional isolation between nonsafety systems and safety systems is provided. The functional isolation is provided by priority logics in the safety systems or by signal selector logic in the non-safety systems. The priority logic ensures that safety actuation signals, both automatic and manual (system level and component level), override all control signals from the non-safety systems. The signal selector logic used within the non-safety systems is discussed below. Functional isolation is also provided for safety signals interfaced between train sets. The functional isolation is provided by two-out-of-four voting logic which ensures erroneous data from one train set does not cause adverse operation of any other train set.

In addition to electrical isolation, physical isolation and functional isolation (as described above), communication isolation is provided for all interface that use communication data links. Communication isolation ensures that all computers run asynchronously without any handshaking, interrupts or data exchange that may create operational dependencies between two computers. Communication isolation ensures that computers execute their performance or failure of their communication data links.

Finally, all computer to computer interfaces employ data isolation. Data isolation ensures that computers exchange only predefined data sets that include only the information required for the predefined functional algorithms. Predefined data sets are independently maintained by both the sending computer and the receiving computer. Both data sets must match to exchange any information. Any mismatch in the data sets will result in no communication. Data isolation ensures there is no capability (and therefore no potential) to exchange any unexpected or malicious data or files (including viruses, trojans, etc.) that could change or corrupt the computers basic software, application software or memory.

Multiple High-Impedance Faults

Multiple high impedance faults are considered in the evaluation of safe-shutdown capability. Fire induced circuit faults may occur with high enough impedance to prevent tripping the affected circuit breaker. In this plant design, Section 5.4.3.1 requirements of RG 1.189 Rev.1, which specifies to apply IEEE Standard 242, “IEEE Recommended Practices for Protection and Coordination of Industrial and Commercial Power systems”, are applied in the design of feeder fuse and breaker coordination. This guidance is expected to be effective to prevent the multiple high-impedance faults from occurring. Therefore, it is assumed that, if multiple high-impedance faults occur simultaneously that affect currents coming from the same power source is prevented.

Plant Personnel

The plant operating staff within the main control room is sufficient to achieve safe plant shutdown without any other staff requirement. No manual actions other that normal main control room actions or tripping the MCR/RSC transfer switches upon MCR evacuation is required to achieve safe-shutdown. The personnel assigned to the plant fire brigade do not reduce the minimum control room staffing and the number of operators required to perform safe-shutdown actions.

Equipment Environment

Equipment that is dedicated to safe plant shutdown is maintained in a normal operating environment by being properly isolated from fire effects by 3-hour rated fire barriers that also confine fire effect to the area of fire occurrence. Equipment within a fire involved compartment is not relied on for achieving safe plant shutdown.

Emergency Lighting

Emergency lighting from 8-hour self-contained battery pack units is provided in all areas of the plant where emergency operations are performed and where safe ingress and egress of personnel during emergencies is required during loss of normal lighting. The self-contained battery pack units in the Class 1E areas are qualified for seismic category I requirements. The receptacles for charging these self-contained battery pack units in the MCR are also fed from the lighting and receptacle panels powered from the Class 1E motor control centers. The receptacles for charging the self-contained battery pack units in all other non-Class 1E areas are connected to the lighting and receptacle circuits fed from the AAC sources. The self-contained battery pack units provide minimum illumination at the end of 8 hours of at least 0.5 foot-candles at the floor level along travel paths. Emergency lighting is provided in selected areas for safe-shutdown of the plant, restoring the plant to normal operation, firefighting and safe movement of people to the access and egress routes during plant emergencies and loss of normal power supply from the MG and the offsite power system. Class 1E emergency lighting is provided in areas where emergency operations are required to be performed to safely shutdown the reactor, maintain the plant in safe-shutdown condition during the design basis events. The Class 1E emergency lighting provides at least 10 foot-candles of illumination at the safety panel, workstations in the control room and the remote shutdown console areas.

Emergency Communication

Fixed emergency communications independent of the normal plant communication system are installed at predetermined stations. In addition, a portable radio communications system is installed for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system does not interfere with the communications capabilities of the plant security force. Fixed repeaters are installed to permit use of portable radio communication units through the plant and are protected from exposure fire damage and have sufficient redundant such that if one repeater unit is out of service due to a fire or any other reason that capability of the emergency communication system is not adversely affected.

Shutdown/Refueling Operations

During shutdown operations, particularly during maintenance or refueling outages, fire conditions can change significantly as a result of work activities. Redundant systems important to safety may not be available. Fire protection during shutdown or refueling conditions should minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the release of radioactive materials, under the unusual conditions that may be present during these operations.

To support fire safety during shutdown/refueling operations, self-contained breathing apparatuses are provided near the containment entrances for firefighting and damage control personnel. These units are independent of any breathing apparatuses or air supply systems provided for general plant activities and are clearly marked as emergency equipment. There is a fire water standpipe system installed within containment that can be pressurized during outages. Fire extinguisher stations are established within containment. Fire hose and fire extinguishers area staged near the containment entrances to facilitate redistribution to the containment locations during refueling outages.

9A.2.7.2 Safe Shutdown Methodology

The safe-shutdown methodology, the systems used, and the functional requirements for safe plant shutdown are described in DCD Section 7.4.

For the US-APWR safe-shutdown is defined as cold shutdown which can be achieved from the main control room or the remote shutdown console. The Remote Shutdown Console, located outside the Main Control Room fire zone on plant level 4F, is installed so that safe-shutdown can be achieved in the case that the operators can not stay within the Main Control Room on plant level 2F. The Remote Shutdown Console provides the equivalent functions of the Operation VDUs and the Safety VDUs in the Main Control Room. These controls are switched over from the Main Control Room to the Remote Shutdown Console by MCR/RSC Transfer Systems. Redundant Transfer Switches (each with four separated contacts) to control each of the four Transfer Systems are located just outside of the Main Control Room and Remote Shutdown Console Room.

When the transfer actions from the Main Control Room to Remote Shutdown Console are initiated from these switches, the selecting signals for the Remote Shutdown Console are logically latched. Activating these Transfer Switches blocks HSI signals from the MCR and enables HSI signals at the RSC for all PSMS trains and the PCMS. Any subsequent damage to these Transfer Switches or the MCR HSI devises, caused by the fire in the Main Control Room, does not affect the functions of the Remote Shutdown Console. Transfer from the RSC back to the MCR is activated separately for each of the four Transfer Systems from each of the Safety I&C equipment rooms.

The safe-shutdown evaluation for each fire zone as discussed in section 9A.3 is performed to assure that a fire in any one zone or fire area is confined to the area and does not adversely impact the ability to achieve and maintain safe-shutdown by maintaining the equipment in the other three safety trains of equipment free of fire damage.

9A.3 Fire Hazards Analysis Results

The fire hazard analysis is conducted for the following primary plant structures and associated fire area and/or fire zones which are depicted in Figures 9A-1 through 9A-27.

- Containment Vessel (C/V)
- Reactor Building (R/B)
- Auxiliary Building (A/B)
- Turbine Building (T/B)
- Access Control Building (AC/B)
- Power Source Buildings (PS/B)
- Essential Service Water (ESW) Piping Tunnel

Table 9A-2 identifies the type and quantity of combustible materials in each fire zone of the primary plant structures and provides a summary of the fire hazards analysis for the associated fire zone. Table 9A-3 shows the fire zone to fire zone interface which also depicts fire area to fire area boundaries that must be protected for 3-hour fire rated boundaries.

9A.3.1 FA1-101 Containment Vessel

The US-APWR C/V is a pressure vessel which completely encloses the reactor and RCS and provides assurance of no leakage of radioactive materials to the surrounding plant environment in the event of a major failure of the RCS and associated pressure boundary. The C/V consists of a pre-stressed, post-tensioned concrete structure with a cylindrical wall, a hemispherical dome, and a flat reinforced concrete foundation slab. The inside surface is lined with carbon steel. The C/V is approximately 149 ft. in diameter and 227 ft. in height. The dome and cylinder thickness is approximately 4 ft. There are two personnel air locks and one equipment hatch provided to access the C/V. In addition there are a large number of electrical and piping penetrations of the C/V and containment isolation valves for the piping. The penetrations are welded to the liner of the C/V and constitute the pressure boundary.

The C/V has five principal floor levels and an upper platform. There is a polar crane provided at the upper portion of the dome to support reactor servicing. The C/V by necessity is an open space structure but has four separate trains of safety equipment arranged in four quadrants to service the reactor. The C/V is classified as one fire area but has a total of twenty-six individual fire zones within the C/V to provide necessary fire separation between redundant equipment to assure that should a fire occur, it is confined to its zone of influence such that sufficient equipment trains remain free of fire damage and are available to safely shutdown the reactor. The necessary fire isolation is provided by a combination of structural boundaries and spatial separation.

The individual fire zones of the C/V are depicted on Figures 9A-3 through 9A-9. The following listing identifies the fire zone designation and maximum expected fire loading for each C/V fire zone.

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA1-101-01	C/V Reactor Coolant Drain Pump Room	3.1E+04
FA1-101-02	Header Compartment	Nil
FA1-101-03	Reactor Cavity	Nil
FA1-101-04	C/V 2F Southeastern Part Floor Area	3.7E+04
FA1-101-05	C/V 2F Southwestern Part Floor Area	6.1E+04
FA1-101-06	C/V 2F Northwestern Part Floor Area	3.6E+04
FA1-101-07	C/V 2F Northeastern Part Floor Area	6.3E+04
FA1-101-08	B-Loop Room	9.9E+04
FA1-101-09	C-Loop Room	9.9E+04
FA1-101-10	D-Loop Room	1.0E+05
FA1-101-11	A-Loop Room	1.0E+05

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA1-101-12	C/V Reactor Coolant Drain Tank Room	Nil
FA1-101-13	FA1-101-13 Zone	Nil
FA1-101-14	FA1-101-14 E.V. shaft	Nil
FA1-101-15	C/V 3F Southeastern Part Floor Area	2.9E+04
FA1-101-16	C/V 3F Southwestern Part Floor Area	3.1E+04
FA1-101-17	C/V 3F Northwestern Part Floor Area	3.8E+04
FA1-101-18	C/V 3F Northeastern Part Floor Area	3.1E+04
FA1-101-19	Regenerative Hx Room	nil
FA1-101-20	FA1-101-20 Zone	6.7E+03
FA1-101-21	Pressurizer Room	4.4E+04
FA1-101-22	Excess Letdown Hx Room	2.2E+04
FA1-101-23	C/V 4F Southeastern Part Floor Zone	6.2E+04
FA1-101-24	C/V 4F Southwestern Part Floor Zone	3.1E+04
FA1-101-25	C/V 4F Northwestern Part Floor Zone	3.3E+04
FA1-101-26	C/V 4F Northeastern Part Floor Zone	3.0E+04

Fire Detection and Suppression Features

This area is provided with automatic fire detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The C/V has tremendous internal volume which will allow dilution of expected smoke releases for any potential fire. The containment ventilation system would eventually exhaust the smoke particles to the plant stack after passing through a HEPA filter. Localized smoke control could be accomplished by the plant fire brigade using manual hose streams. Portable fans and duct work can supplement the fire brigade efforts as required.

Fire Protection Adequacy Evaluation

The fire hazards of the various C/V fire zones are minimal and except for four fire zones where concentrations of combustibles may exist, are mainly comprised of minor quantities of electrical cable in the various areas. Significant fire protection for the C/V fire zones is provided by the general arrangement of combustible material which provides spatial separation between different safety trains. The general lack of sufficient combustible continuity allows any fire that may occur to be confined to its immediate general zone of influence and confined within the fire zone of occurrence.

During refueling outages when additional combustible material and ignition sources may be present, the fire protection features allow an increased level of protection appropriate with the increased hazard level.

Fire Protection System Integrity

Automatic suppression for the C/V is not warranted within the C/V based on the low combustible loading, the lack of combustible continuity, and wide separation between combustible materials. As such, unintended operation of an automatic fire suppression system within C/V is not a credible event. The RCP lube oil leakage collection system is seismically designed to provide structural integrity for containment of the potential fire hazard from RCP oil leakage and negates the benefit an automatic sprinkler system around the pumps would provide. During normal plant power operation, the seismically designed fire protection standpipe system is not pressurized to provide additional assurance that an inadvertent water discharge of the standpipe system does not occur.

Safe Shutdown Evaluation

Safe plant shutdown capability is maintained within the C/V through a combination of strategic location of equipment into four redundant trains of safety functions, spatial separation between safety-related equipment, structural boundaries of reinforced concrete construction and structural steel, limited combustible concentrations, and separation between redundant trains of electrical circuits. The arrangement is such that a fire that may occur within any one fire zone would be sufficiently confined to its zone of influence and not impact safety-related equipment outside that zone of influence or fire zone. As such the ability to safely shutdown the plant following a fire inside C/V is maintained for any single event.

Radioactive Release to Environment Evaluation

Any fire suppression water discharged within C/V will be confined within C/V and can be sampled and processed before any environmental release. Similarly any contaminated or radiological materials released from a fire within C/V will be confined to the C/V air space volume and if purged from the C/V will be processed through containment ventilation filtration units that assure that no unacceptable radiological release would occur from a fire inside containment.

9A.3.2 FA2-101 FA2-101 Stairwell (B1F~Roof)

Figures 9A-1 through 9A-10 show the location of this fire area which is the stairwell located on the southeastern corner of the R/B. The stairwell fire area is comprised of a single fire zone designated as fire zone FA2-101-01. The stairwell is constructed of reinforced concrete walls which result in a fire rating of 3 hours or higher which exceeds NFPA 101 requirements for a 2-hour fire rating. The openings to the stairwell are protected by doors having a 3-hore fire rating which also exceed NFPA 101 requirement for doors rated at 1 ½ hours. General fire loading within the stairwell fire area is minimal and is not expected to exceed 6.6E+02 Btu/ft^2 as a result of transient materials that may pass through the stairwell.

This area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA2-101-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Fire doors installed in accordance with NFPA 80 help to reduce the introduction of smoke into the stairwell from adjacent fire areas. Should additional smoke removal capacity be required, the plant fire brigade can assist the smoke removal for the stairwell utilizing portable equipment.

Fire Protection Adequacy Evaluation

The stairwell is maintained free of transient combustibles and does not have any equipment installed within its boundaries associated with plant operation. The stairwell boundary provides a minimum of 3-hour fire rated protection from adjacent plant areas. This allows the stairwell to serve as an emergency exit and access passage protected from any fire affect from fires in the adjacent areas.

Fire Protection System Integrity

The fire boundaries of the stairwell are of substantial construction and provide protection of at least 3 hours of an ASTM E-119 exposure. While there is no automatic fire detection or suppression systems located within the stairwell, the extremely low expected maximum fire loading is not capable of compromising the structural integrity of the stairwell boundaries. This provides more than adequate assurance of fire protection system integrity for the stairwell.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

There are no normal radiological materials located within the stairwell and the stairwell in located in the non-radiologically controlled access portion of the R/B which results in an extremely low probability that any radiological materials would pass through the stairwell. The 3-hour fire boundaries provide assurance that any fire impact that could credibly occur within the stairwell will be contained within the stairwell boundaries. In the extremely remote probability that any radiological materials were involved within a fire within the stairwell, they would be confined by the structural boundaries of the stairwell.

This assures that a fire within the FA2-101-01 stairwell would not result in a radioactive release to the environment.

9A.3.3 FA2-102 A-Emergency Feedwater Pump (T/D) Room

Figures 9A-1 and 9A-4 show the location of this fire area in the southeastern corner of the R/B. This fire area consists of one fire zone designated as fire zone FA2-102-01. This room contains A-EFW pump (T/D) and A-EFW pump area AHU. There is sufficient combustible fire loading from lube oil, and electrical cable insulation to result in a maximum anticipated fire loading of 6.2E+04 Btu/ft^2. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-102-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

There is a certain amount of lube oil associated with the turbine but this oil is normally enclosed within the lube oil systems and any leakage from the system is cleaned up and leaks repaired by periodic maintenance. The major fire threat to this room is from transient combustibles associated with maintenance activities during equipment outages. The rooms are provided with an automatic fire detection system which alarms upon high temperature detection and summons the plant fire brigade. Should a large fast growing fire occur due to a major turbine or lube oil leak in the pump room, an automatic wet-pipe sprinkler system is provided which can control or extinguish the fire.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for the pump room is provide by a highly reliable automatic sprinkler system. Should this system inadvertently actuate or discharge water due to an impact or mechanical failure, the resulting water flow would summon the fire brigade which could expediently isolate the water flow if no fire was present.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A EFWS (T/D)
- A-EFW Pump Area HVAC system
- C,D-SG Sample Line Isolation Valve(A Train)(AOV)

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.4 FA2-103 B-Emergency Feedwater Pump (M/D) Room

Figures 9A-1 and 9A-2 show the location of this fire area in the southeastern corner of the R/B. This fire area consists of one fire zone designated as fire zone FA2-103-01. This room contains B-EFW pump (M/D) and B-EFW pump area AHU. Maximum fire loading within this room is not expected to exceed 3.5E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the EFW pump motor. A minor amount of lube oil and electrical cable insulation are present. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train B

Fire Detection and Suppression Features

FA2-103-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

There is a small amount of lube oil associated with the pump and motor bearings and the combustible associated with the motor windings, cable routing and instrumentation. The major fire threat to this room is from transient combustibles associated with maintenance activities during equipment outages.

The rooms are provided with a smoke fire detection system located within the rooms and in the adjacent corridor and other fire areas. An alarm will summon the plant fire brigade should a fire occur.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be

expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-EFWS (M/D)
- B-EFW Pump Area HVAC system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiological controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.5 FA2-104 A-Component Cooling Water Pump Room

Figures 9A-1 and 9A-2 show the location of this fire area in the southeastern portion of the R/B. This fire area consists of one fire zone designated as fire zone FA2-104-01. This room contains A-CCWP and CCW HX. Maximum fire loading within this fire area is not expected to exceed 3.1E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the CCWP motor. A minor amount of lube oil and grease are associated with the CCWP. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetration into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-104-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire hazards of this fire area and zone are very minimal.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-CCWS
- A-ESWS
- A-CS/RHRS
- A-SIS

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiological controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.6 FA2-105 B-Component Cooling Water Pump Room

Figures 9A-1 and 9A-2 show the location of this fire area in the south central portion of the R/B. This fire area consists of one fire zone designated as fire zone FA2-105-01. This room contains B-CCWP and CCW HX. Maximum fire loading within this fire area is not expected to exceed 3.0E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the CCWP motor. A minor amount of lube oil and grease are associated with the CCWP. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train B.

Fire Detection and Suppression Features

This area is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire hazards of this fire area and zone are very minimal.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-CCWS
- B-ESWS
- B-EFWS

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.7 FA2-106 C-Component Cooling Water Pump Room

Figures 9A-1 and 9A-2 show the location of this fire area in the south central portion of the R/B. The fire area consists of one fire zone designated as fire zone FA2-106-01. This room contains C-CCWP and CCW HX. Maximum fire loading within this fire area is not expected to exceed 3.0E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the CCWP motor. A minor amount of lube oil and grease are associated with the CCWP. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-106-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire hazards of this fire area and zone are very minimal.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-CCWS
- C-ESWS

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiological controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.8 FA2-107 D-Component Cooling Water Pump Room

Figures 9A-1 and 9A-2 show the location of this fire area in the southwestern portion of the R/B. This fire area consists of one fire zone designated as fire zone FA2-107-01. This room contains D-CCWP and CCW HX. Maximum fire loading within this fire area is not expected to exceed 3.2E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the CCWP motor. A minor amount of lube oil and grease are associated with the CCWP. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-107-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire hazards of this fire area and zone are very minimal.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-CCWS
- D-ESWS
- D-CS/RHRS

- D-SIS

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiological controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.9 FA2-108 D-Emergency Feedwater Pump (T/D) Room

Figures 9A-1 and 9A-2 show the location of this fire area in the southeastern corner of the R/B. This fire area consists of one fire zone designated as fire zone FA2-108-01. This room contains D-EFW pump (T/D) and D-EFW pump area AHU. There is sufficient combustible fire loading from lube oil and electrical cable insulation to result in a maximum anticipated fire loading of 1.1E+05 Btu/ft^2. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-108-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room

and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

There is a certain amount of lube oil associated with the turbine but this oil is normally enclosed within the lube oil systems and any leakage from the system is cleaned up and leaks repaired by periodic maintenance. The major fire threat to this room is from transient combustibles associated with maintenance activities during equipment outages. The rooms are provided with an automatic fire detection system which alarms upon high temperature detection and summons the plant fire brigade. Should a large fast growing fire occur due to a major turbine or lube oil leak in the pump room, an automatic wet-pipe sprinkler system is provided which can control or extinguish the fire.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for the pump room is provide by a highly reliable automatic sprinkler system. Should this system inadvertently actuate or discharge water due to an impact or mechanical failure, the resulting water flow would summon the fire brigade which could expediently isolate the water flow if no fire was present.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-EFWS (T/D)
- D-EFW Pump Area HVAC system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.10 FA2-109 C-Emergency Feedwater Pump (M/D) Room

Figures 9A-1 and 9A-2 show the location of this fire area in the southeastern corner of the R/B. This fire area consists of one fire zone designated as fire zone FA2-109-01. This room contains C-EFW pump (M/D) and A-EFW pump area AHU. Maximum fire loading within the pump room is not expected to exceed 3.5E+04 Btu/ft^2 with the primary fire hazard being electrical cables and wiring associated with the EFWP motor. A minor amount of lube oil and electrical cable insulation are present. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into the room are protected with 3-hour fire resistive seals or components.

This area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-109-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke remova as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting..

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. A fire in this area would be alarmed in the main control room and the fire brigade would respond to extinguish the fire and/or assess damage to the area.

There is a small amount of lube oil associated with the pump and motor bearings and the combustible associated with the motor windings, cable routing and instrumentation. The major fire threat to this room is from transient combustibles associated with maintenance activities during equipment outages.

The rooms are provided with a smoke fire detection system located within the rooms and in the adjacent corridor and other fire areas. An alarm will summon the plant fire brigade should a fire occur.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-EFWS (M/D)
- C-EFW Pump Area HVAC system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.11 FA2-110 FA2-110 E.V Shaft

Figures 9A-1 through 9A-10 show the location of this fire area which is the elevator shaft located on the southwestern corner of the R/B. The elevator shaft is constructed with 3-

hour fire barriers separating it from the adjacent areas on the associated elevations of the R/B. The elevator shaft consists of one fire zone designated as fire zone FA2-110-01. Fire loading within the elevator shaft is not expected to exceed 1.2E+03 Btu/ft^2 as a result of transient material that may be present within the elevator.

This area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA2-110-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke removal from the elevator shaft if required may be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries surrounding the elevator shaft provide significant confinement for the transient materials that may be within the elevator shaft and the fire loading in adjacent fire area and fire zones with the elevator shaft are low and much less than 1-hour fire intensity. Fire hose streams and portable fire extinguishers are provided which are sufficient to extinguish any expected fires that may occur. Based on the fire loading in adjacent areas and the maximum potential expected within the elevator shaft, a fire that can compromise the integrity of the elevator shaft fire boundary is not credible. This provides sufficient fire protection for the elevator shaft area.

Fire Protection System Integrity

The elevator shaft is enclosed by 3-hour fire resistive construction which far exceeds the potential severity of any fire deemed credible within the elevator shaft and/or the adjacent fire areas and fire zones. The fire hose standpipe system is seismically supported such that its failure cannot damage safety-related equipment in the area. Actuation of the fire hose system requires deliberate manual opening of a fire hose station valve in order for water discharge to occur. This assures adequate fire protection system integrity for this fire area.

Safe Shutdown Evaluation

A fire in this area will not impact any circuits that would adversely impact the ability of safe-shutdown functions. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.12 FA2-111 FA2-111 Corridor

Figures 9A-1 and 9A-2 show the location of this fire area which is corridor located on the east side of the south R/B. The fire area consists of one fire zone designated as fire zone FA2-111-01. The structural boundaries of the fire area provide a minimum of 3-hour fire resistance to an ASTM E-119 exposure fire. All penetrations between adjacent areas and FA2-111 are protected with 3-hour fire rated penetration seals and components. Maximum anticipated combustible loading for FA2-111 is slight with loading anticipated to be no more than 2.8E+04 Btu/ft^2. The combustible loading is due to the presence of safety train A associated electrical cables, panels, instrumentation and controls.

FA2-111 is identified as being associated with safety train A since there are some cables and instruments.

Fire Detection and Suppression Features

FA2-111-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire.

The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA□72 and 14, and is the combination of smoke detectors and manual hose stations.

The area is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the fire area. On this basis, there is adequate fire protection provided for this fire area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown function associated with safety train A.

- A-CS/RHRS
- A-SIS

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.13 FA2-112 FA2-112 Corridor

Figures 9A-1 and 9A-2 show the location of this fire area which is corridor located on the south portion of the R/B. The fire area consists of one fire zone designated as fire zone FA2-112-01. The structural boundaries of the fire area provide a minimum of 3-hour fire resistance to an ASTM E-119 exposure fire. All penetrations between adjacent areas and FA2-112 are protected with 3-hour fire rated penetration seals and components. Maximum anticipated fire loading within the corridor is not expected to exceed 2.9E+04 Btu/ft^2. The combustible loading is due to the presence of safety train D associated electrical cables, panels, instrumentation and controls.

FA2-112 is identified as being associated with safety train D since there are some cables and instruments.

Fire Detection and Suppression Features

FA2-112-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire.

The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

The area is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the fire area. On this basis, there is adequate fire protection provided for this fire area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor..

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-CS/RHRS
- D-SIS

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. The piping systems in the area do not contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.14 FA2-113 A-SI Pump Room, CS/RHR Pump Room Area

Figure 9A-1 shows the location of this fire area in the northeast corner of the R/B. The fire area consists of three individual rooms each assigned a specific fire zone designation. FA2-113-01 is the A SIP room, FA2-113-02 is the A CS/RHR pump room and FA2-113-03 is the corridor that provides access to the two pump rooms. The fire loading in the SIP room is not expected to exceed 4.6E+04 Btu/ft^2 of lube oil in the SIP and low voltage and control electrical cable within the room. The fire loading within the CS/RHR pump room is lower at a maximum expected fire loading of 3.0E+04 Btu/ft^2 due to high voltage, low voltage and control electrical cable within the room and lube oil associated with the pump. The maximum expected fire loading in the corridor is 3.0E+04 Btu/ft^2 and is due primarily to low voltage and control electrical circuits installed within the corridor. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The doors entrance to each pump room is of labyrinth design due to the need to shield the corridor from the pump rooms.

This area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-113-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from portable fire extinguishers.

FA2-113-02 and FA2-113-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is

provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

A large fire in the SIP room would activate the automatic fire sprinkler system reducing the damage expected.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke/heat detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system provided in the SI pump room is designed in accordance with NFPA 13 and is seismically supported such that in a design basis earthquake the piping will not fall and damage the safety-related pump and its auxiliaries. The fire protection piping for hose stations in the adjacent corridor are similarly supported. Sprinkler systems installed in accordance with NFPA 13 are highly reliable and not subject to inadvertent actuation. Should the alarm valve actuate, water discharge does not occur unless a sprinkler head is operated due to fire exposure.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown function associated with safety train A.

- A-CS/RHRS
- A-SIS

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiological controlled area of the R/B. The potential radiological material within this area is contained within the pressure boundaries associated with the piping systems. Some minor surface contamination could be present due to system leakage but significant releasable radioactive material is not expected to be present. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the room and if released, it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible release form a fire in this fire area expected.

9A.3.15 FA2-114 B-SI Pump Room, CS/RHR Pump Room Area

Figure 9A-1 shows the location of this fire area in the southeast corner of the R/B. The fire area consists of three individual rooms each assigned a specific fire zone designation. FA2-114-01 is the B-SIP room, FA2-114-02 is the B-CS/RHR pump room and FA2-114-03 is the corridor that provides access to the two pump rooms. The fire loading in the SIP room is not expected to exceed 4.6E+04 Btu/ft^2 of lube oil in the SIP and low voltage and control electrical cable within the room. The fire loading within the CS/RHR pump room is lower at a maximum expected fire loading of 3.0E+04 Btu/ft^2 due to high voltage, low voltage and control electrical cable within the room and lube oil associated with the pump. The maximum expected fire loading in the corridor is 3.0E+04 Btu/ft^2 and is due primarily to low voltage and control electrical circuits installed within the corridor. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The doors entrance to each pump room is of labyrinth design due to the need to shield the corridor from the pump rooms.

This area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-114-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from portable fire extinguishers.

FA2-114-02 and FA2-114-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

A large fire in the SIP room would activate the automatic fire sprinkler system reducing the damage expected.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke/heat detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system provided in the SI pump room is designed in accordance with NFPA 13 and is seismically supported such that in a design basis earthquake the piping will not fall and damage the safety-related pump and its auxiliaries. The fire protection piping for hose stations in the adjacent corridor are similarly supported. Sprinkler systems installed in accordance with NFPA 13 are highly reliable and not subject to inadvertent actuation. Should the alarm valve actuate, water discharge does not occur unless a sprinkler head is operated due to fire exposure.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant wate intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-CS/RHRS
- B-SIS

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled area of the R/B. The potential radiological material within this area is contained within the pressure boundaries associated with the piping systems. Some minor surface contamination could be present due to system leakage but significant releasable radioactive material is not expected to be present. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the room and if released, it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible release form a fire in this fire area expected.

9A.3.16 FA2-115 C-SI Pump Room, CS/RHR Pump Room Area

Figure 9A-1 shows the location of this fire area in the southwest corner of the R/B. The fire area consists of three individual rooms each assigned a specific fire zone designation. FA2-115-01 is the C-SIP room, FA2-115-02 is the C-CS/RHR pump room and FA2-115-03 is the corridor that provides access to the two pump rooms. The fire loading in the SIP room is not expected to exceed 4.6E+04 Btu/ft^2 of lube oil in the SIP and low voltage and control electrical cable within the room. The fire loading within the CS/RHR pump room is lower at a maximum expected fire loading of 3.0E+04 Btu/ft^2 due to high voltage, low voltage and control electrical cable within the room and lube oil associated with the pump. The maximum expected fire loading in the corridor is 3.0E+04 Btu/ft^2 and is due primarily to instrumentation installed within the corridor. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The doors entrance to each pump room is of labyrinth design due to the need to shield the corridor from the pump rooms.

This area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-115-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from portable fire extinguishers.

FA2-115-02 and FA2-115-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

A large fire in the SIP room would activate the automatic fire sprinkler system reducing the damage expected.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke/heat detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the three hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system provided in the SI pump room is designed in accordance with NFPA 13 and is seismically supported such that in a design basis earthquake the piping will not fall and damage the safety-related pump and its auxiliaries. The fire protection piping for hose stations in the adjacent corridor are similarly supported. Sprinkler systems installed in accordance with NFPA 13 are highly reliable and not subject to inadvertent actuation. Should the alarm valve actuate, water discharge does not occur unless a sprinkler head is operated due to fire exposure.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-CS/RHRS
- C-SIS

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiological controlled area of the R/B. The potential radiological material within this area is contained within the pressure boundaries associated with the piping systems. Some minor surface contamination could be present due to system leakage but significant releasable radioactive material is not expected to be present. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the room and if released, it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible release form a fire in this fire area expected.

9A.3.17 FA2-116 D-SI Pump Room, CS/RHR Pump Room Area

Figure 9A-1 shows the location of this fire area in the northwest corner of the R/B. The fire area consists of three individual rooms each assigned a specific fire zone designation. FA2-116-01 is the D-SIP room, FA2-116-02 is the D-CS/RHR pump room and FA2-116-03 is the corridor that provides access to the two pump rooms. The fire loading in the SIP room is not expected to exceed 4.6E+04 Btu/ft^2 of lube oil in the SIP and low voltage and control electrical cable within the room. The fire loading within the CS/RHR pump room is lower at a maximum expected fire loading of 3.0E+04 Btu/ft^2 due to high voltage, low voltage and control electrical cable within the room and lube oil associated with the pump. The maximum expected fire loading in the corridor is 3.4E+04 Btu/ft^2 and is due primarily to low voltage and control electrical circuits installed within the corridor. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The doors entrance to each pump room is of labyrinth design due to the need to shield the corridor from the pump rooms.

This area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-116-01 is provided with automatic heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from portable fire extinguishers.

FA2-116-02 and FA2-116-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

A large fire in the SIP room would activate the automatic fire sprinkler system reducing the damage expected.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke/heat detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system provided in the SI pump room is designed in accordance with NFPA 13 and is seismically supported such that in a design basis earthquake the piping will not fall and damage the safety-related pump and its auxiliaries. The fire protection piping for hose stations in the adjacent corridor are similarly supported. Sprinkler systems installed in accordance with NFPA 13 are highly reliable and not subject to inadvertent actuation. Should the alarm valve actuate, water discharge does not occur unless a sprinkler head is operated due to fire exposure.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-CS/RHRS
- D-SIS

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled area of the R/B. The potential radiological material within this area is contained within the pressure boundaries associated with the piping systems. Some minor surface contamination could be present due to system leakage but significant releasable radioactive material is not expected to be present. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the room and if released, it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible release from a fire in this fire area expected.

9A.3.18 FA2-117 FA2-117 Area

The FA2-117 area consists of forty four individual fire zones located within the north general area of the R/B. The location of the fire zones of FA2-117 are shown on Figures 9A-1 through 9A-8. The following listing provides the individual designation, number of the fire zones, and maximum expected fire load for each fire zone associated with FA2-117.

Fire Zone	Designation	Fire Loading (Btu/ft^2)
FA2-117-01	Corridor	4.1E+04
FA2-117-02	A Charging Pump Room	2.8E+04
FA2-117-03	B Charging Pump Room	5.8E+04
FA2-117-04	Piping Room for Charging Pump	2.8E+04
FA2-117-05	FA2-117-05 Corridor	2.7E+04
FA2-117-06	Seal Water Hx Room	5.6E+02
FA2-117-07	FA2-117-07 Corridor	2.9E+04
FA2-117-08	FA2-117-08 Corridor	2.9E+04
FA2-117-09	Refueling Water Recirculation Pump Room	3.3E+04
FA2-117-10	FA2-117-10 Piping Room	2.7E+04
FA2-117-11	A-Spent Fuel Pit Pump Room	3.0E+04
FA2-117-12	A-Spent Fuel Pit Hx Room	2.8E+04
FA2-117-13	B-Spent Fuel Pit Hx Room	2.8E+04
FA2-117-14	B-Spent Fuel Pit Pump Room	3.0E+04
FA2-117-15	FA2-117-15 Truck Access	2.7E+04
FA2-117-16	FA2-117-16 Piping Room	2.7E+04
FA2-117-17	FA2-117-17 Corridor	2.7E+04
FA2-117-18	FA2-117-18 Zone	2.7E+04
FA2-117-19	FA2-117-19 2F Eastside Corridor	2.8E+04
FA2-117-20	Volume Control Tank Room	2.7E+04
FA2-117-21	FA2-117-21 Piping Room	2.7E+04
FA2-117-22	FA2-117-22 Zone	2.7E+04
FA2-117-23	FA2-117-23 Piping Room	2.9E+04
FA2-117-24	FA2-117-24 Piping Room	3.5E+04
FA2-117-25	FA2-117-25 Piping Room	2.8E+04
FA2-117-26	FA2-117-26 Piping Room	2.7E+04
FA2-117-27	Spent Fuel Handling Zone	3.2E+04
FA2-117-28	FA2-117-28 Corridor	2.8E+04
FA2-117-29	B-Annulus Emergency Exhaust Filtration Unit & Fan Room	3.5E+04

FA2-117-30	FA2-117-30 Piping Room	2.7E+04
FA2-117-31	FA2-117-31 3F Eastside Corridor	2.7E+04
FA2-117-32	A-Annulus Emergency Exhaust Filtration Unit & Fan Room	3.4E+04
FA2-117-33	FA2-117-33 Piping Room	2.7E+04
FA2-117-34	R/B-4F Electrical Penetration Area (FA2-117-34)	2.8E+04
FA2-117-35	C/V Equipment Hatch R/B side Room	2.7E+04
FA2-117-36	C/V Radiation Gas Monitor Room	2.8E+03
FA2-117-37	Pass Sampling Rack Room	8.0E+03
FA2-117-38	Plant Vent Radiation Gas Monitor Room	3.0E+03
FA2-117-39	Fuel Inspection Room	7.9E+03
FA2-117-40	R/B-4F Penetration Area (FA2-117-40)	3.2E+04
FA2-117-41	R/B-4F Electrical Penetration Area (FA2-117-41)	2.7E+04
FA2-117-42	FA2-117-42 2F Westside Corridor	3.0E+04
FA2-117-43	FA2-117-43 3F Westside Corridor	2.7E+04
FA2-117-44	FA2-117-44 4F Westside Corridor	2.8E+04

In general the area contains equipment and circuits that are not associated with a safety train, but equipment associated with non-divisional important to safety or reactor operations functions. There are some circuits associated with all four safety trains within the fire area which are located in select individual zones or locations. Where required the circuits or safety train association are protected from the adverse impact of a fire. Based on the circuit analysis performed for the US-APWR, specific areas where safety associated circuits and circuits required for safety shutdown are installed within FA2-117 are as follows.

- FA2-117-08 – Low voltage cables associated with safety train A for SIS, CSS/RHRS valves, safeguard component area AHU and dampers and instrumentation circuits are installed in this fire zone.
- FA2-117-19 – Control cables associated with safety train A remote shutdown control change board are installed in this fire zone.
- FA2-117-22 – Control cables associated with safety train A for SG Sample line isolation valves are installed within this zone.
- FA2-117-31 – Instrumentation cables associated with safety train A instrumentation for various reactor operation and so forth are installed in this fire zone.

- FA2-117-33 – Low voltage cables associated with safety train A CSS/RHRS and so forth are installed in this fire zone.

The walls defining this fire area and most of fire zones are constructed of reinforced concrete have the capability to provide in excess of 3-hour fire resistance as defined by ASTM E-119. Doors in walls defining the border of the fire area are 3-hour fire rated and all openings or penetration is the fire area boundaries are protected with 3-hour qualified components or seals. Overall fire loading within the fire area is 2.9E+04 Btu/ft^2. And, there is no great difference in fire loading of every fire zones.

And, this fire area is appropriately divided into a few fire zone groups. The boundaries of each fire zone group is rated to provide 3-hour fire resistance to the adjacent fire zone group although each fire zone have the structural barriers of reinforced concrete with some open spaces to the adjacent fire zones within the same group.

There are a number of fire zones and fire areas that border this fire area as shown in Figures 9A-1 through 9A-8.

Fire Detection and Suppression Features

FA2-117-01, FA2-117-04 through 14, FA2-117-16 through 26, and FA2-117-28 through 44 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA2-117-02 and FA2-117-03 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from portable fire extinguishers.

FA2-117-15 is provided with heat detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA2-117-27 is provided with linear beam, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire loading in any fire zone within this fire area is no more that a ½ hour fire and much less in most. Automatic fire suppression is provided where there is a potential for the large fire of lube oil. And, fixed water spray system is provided for charcoal filter unit. Even if a fire should originate in one of the rooms, there is every likelihood that it would be detected and the plant fire brigade would respond. Even if a fire was to occur and spread through the fire area; there is insufficient hazard present to compromise the fire area boundaries of this fire area. There is therefore, adequate fire protection provisions provided for this fire area.

Fire Protection System Integrity

Automatic fire suppression is provided for two pump rooms and is designed following the guidance of NFPA 13. The fire hose standpipe system is designed following the guidance of NFPA 14. This assures proper pressure integrity for these water based systems. Since the fire water systems are installed in a safety-related area, the piping is supported to design basis seismic criteria to prevent a failure of the fire protection piping from damaging safety-related equipment. Sprinkler systems designed to NFPA 13 criteria have proven very reliable in services and unlikely to inadvertently operate. Should the system's alarm valve open, there would still be no water discharge until a sprinkler head actuates. Discharging water from a fire hose station or the charcoal bed water spray systems requires a deliberate manual action to operate a fire water system valve. As such, there is adequate fire protection systems integrity provided for FA2-117.

Safe Shutdown Evaluation

A fire in this fire area has the potential to cause the functional damage of systems and safe-shutdown functions. Fire zone group separation helps adverse impact to the safe-shutdown functions, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled area of the R/B. The potential radiological material within this area is contained within the pressure boundaries associated with the piping systems. Some minor surface contamination could be present due to system leakage but significant releasable radioactive material is not expected to be present. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the room of occurrence and if released, it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible release from a fire in this fire area expected.

9A.3.19 FA2-118 FA2-118 E.V Shaft

Figures 9A-1 through 9A-8 show the location of this fire area which is the elevator shaft located on the northwestern corner of the R/B. The elevator shaft is constructed with 3-hour fire barriers separating it from the adjacent areas on the associated elevations of the R/B. The elevator shaft consists of one fire zone designated as fire zone FA2-118-01. Fire loading within the elevator shaft is not expected to exceed 1.9E+03 Btu/ft^2 as a result of transient material that may be present within the elevator.

FA2-118 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-118-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke removal from the elevator shaft if required may be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries surrounding the elevator shaft provide significant confinement for the transient materials that may be within the elevator shaft and the fire loading in adjacent fire area and fire zones with the elevator shaft are low and much less than 1/2 hour fire intensity. Fire hose streams and portable fire extinguishers are provided which are sufficient to extinguish any expected fires that may occur. Based on the fire loading in adjacent areas and the maximum potential expected within the elevator shaft, a fire that can compromise the integrity of the elevator shaft fire boundary is not credible. This provides sufficient fire protection for the elevator shaft area.

Fire Protection System Integrity

The elevator shaft is enclosed by 3-hour fire resistive construction which far exceeds the potential severity of any fire deemed credible within the elevator shaft and/or the adjacent fire areas and fire zones. The fire hose standpipe system is seismically supported such that its failure cannot damage safety-related equipment in the area. Actuation of the fire hose system requires deliberate manual opening of a fire hose station valve in order for water discharge to occur. This assures adequate fire protection system integrity for this fire area.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this elevator shaft, the smoke products would be confined to the shaft. If released into the adjacent areas and onto the environment it would be through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.20 FA2-119 FA2-119 Stairwell (B1F~Roof)

Figures 9A-1 through 9A-8 show the location of this fire area which is stairwell located on the northeast corner of the R/B. The floor area of this stairwell has the potential of transient material within the stairwell, fire loading as traditionally determined is not expected to exceed 9.3E+02 Btu/ft^2. The stair well is separated from the surrounding fire areas on each building level by construction rated to provide at least 3-hour fire resistance of ASTM E-119.

FA2-119 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-119-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Fire doors installed in accordance with NFPA 80 help to reduce the introduction of smoke into the stairwell from adjacent fire areas. Should additional smoke removal capacity be required, the plant fire brigade can assist the smoke removal for the stairwell utilizing portable equipment.

Fire Protection Adequacy Evaluation

The fire loading within the stairwell is low and is of ordinary combustibles that can be extinguished by portable fire extinguishers or fire hose streams. The boundaries of the stairwell are rated for 3-hour fire resistance and all penetrations into the fire area or openings to it are appropriately addressed for fire protection. There is therefore adequate fire protection for this area.

Fire Protection System Integrity

The fire boundaries of the stairwell are of substantial construction and provide protection of at least 3 hours of ASTM E-119 exposure. While there is no automatic fire detection or suppression systems located within the stairwell, the extremely low expected maximum fire loading is not capable of compromising the structural integrity of the stairwell boundaries. This provides more than adequate assurance of fire protection system integrity for the stairwell.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiological controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this stairwell, the smoke products would be confined to the stairwell area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.21 FA2-120 A-RHR Piping Room Area

The A-RHR piping room area is located in the northeast corner of the radiologically controlled access portion of the R/B as shown on Figures 9A-1 through 9A-6. The fire area consists of seven fire zones which have overall maximum fire loading and designation as follows:

Fire Zone No.	Designation	Fire Loading (Btu/ft^2)
FA2-120-01	R/B Sump Tank Room	2.9E+04
FA2-120-02	A RHR Piping Room	2.8E+04
FA2-120-03	FA2-120-03 Corridor	2.7E+04
FA2-120-04	A CS/RHR Hx Room Area	2.7E+04
FA2-120-05	A Safeguard Component Area AHU Room	3.0E+04
FA2-120-06	R/B-2F A-Penetration Area (FA2-120-06)	3.0E+04
FA2-120-07	C/V Personel Airlock Zone	2.7E+04

The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

This fire area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-120-01~07 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The primary fire hazard is electrical cable insulation which is distributed within the various zones and not concentrated. Therefore a fire that should occur within this area is not capable of breaching the 3-hour fire boundary provided for the area. An automatic fire alarm system is provided throughout the area and fire hoses and fire extinguishers are provided for fire suppression. Manual fire alarm pull stations are also provided in the corridor areas of the R/B.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-CS/RHRS
- A-SIS

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.22 FA2-121 FA2-121 Corridor

FA2-121 consists of two fire zones, FA2-121-01 and FA2-121-02, which are part of the aisle that provides access to the safety train A and B SIP and CS/RHR pump rooms in addition to the R/B sump tank room, FA2-120, from the northeast stairwell (FA2-122) and access is provided between the stairwell and the corridor leading to the safety train A and B RHR piping rooms. Maximum expected fire loading in FA2-121-01 is 2.8E+04 Btu/ft^2 due to electrical cable installed within the corridor. Maximum expected fire loading in FA2-121-02 is 2.7E+02 Btu/ft^2 due to to electrical cable.

The walls defining FA2-121 are of substantial reinforced concrete which provides 3-hour ASTM E-119 fire resistance. Openings and penetrations into the area are protected to maintain a 3-hour fire separation.

This area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA2-121-01 and FA2-121-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manua fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire. The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

The area is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the fire area. On this basis, there is adequate fire protection provided for this fire area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.23 FA2-122 FA2-122 Stairwell (B1F~Roof)

Figures 9A-1 through 9A-8 show the location of this fire area which is stairwell located on the northeast corner of the R/B. The stairwell consists of one fire zone designated as fire zone FA2-122-01. No equipment or circuits other than lighting are installed within the stairwell. Maximum expected fire loading expected in the stairwell is 9.3E+02 Btu/ft^2 and is due to potential transient material being within the stairwell. The stairwell is separated from the surrounding fire areas on each building level by construction rated to provide at least 3-hour fire resistance of ASTM E-119. The openings to the stairwell are protected by doors having a 3-hour fire rating.

FA2-122 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-122-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Fire doors installed in accordance with NFPA 80 help to reduce the introduction of smoke into the stairwell from adjacent fire areas. Should additional smoke removal capacity be required, the plant fire brigade can assist the smoke removal for the stairwell utilizing portable equipment.

Fire Protection Adequacy Evaluation

The fire loading within the stairwell is low and is of ordinary combustibles that can be extinguished by portable fire extinguishers or fire hose streams. The boundaries of the stairwell are rated for 3-hour fire resistance and all penetrations into the fire area or openings to it are appropriately addressed for fire protection. There is therefore adequate fire protection for this area.

Fire Protection System Integrity

The fire boundaries of the stairwell are of substantial construction and provide protection of at least 3 hours of ASTM E-119 exposure. While there is no automatic fire detection or suppression systems located within the stairwell, the extremely low expected maximum fire loading is not capable of compromising the structural integrity of the stairwell boundaries. This provides more than adequate assurance of fire protection system integrity for the stairwell.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this stairwell, the smoke products would be confined to the stairwell area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.24 FA2-123 Tendon Gallery Access Hatch Area

Figures 9A-1 through 9A-3 show the tendon gallery which circles the base of the containment vessel structure. This fire area is one fire zone designated as fire zone FA2-123-01 and is non-divisionally associated. The tendon gallery is used infrequently for inspection and adjustment of the tendons associated with the pre-stressed and post stressed containment vessel and contains negligible fixed combustibles. The area is not associated with any active safety system. This fire area is not occupied except for infrequent tendon inspections and is accessed through a grade level hatchway on the north side of the R/B. The maximum expected fire loading for this area is 1.8E+01 Btu/ft^2 resulting from a maximum expected transient material loading. The tendon gallery is surrounded with very thick concrete walls and barriers. Access to the area is through a grade level hatch. The fire separation for this area easily provides a minimum of 3-hour fire resistive capability for the tendon gallery.

FA2-123 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-123-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke could be removed from the area with portable fan and ducting if required although there are no credible fire scenarios for this area.

Fire Protection Adequacy Evaluation

There is negligible combustible material expected within the area and the thick reinforced concrete walls provide substantial fire resistance capability. This means fire protection provision is adequate for the hazards present.

Fire Protection System Integrity

There is not equipment located to be damaged by inadvertent fire suppression system activation in this area. There are no fire protections systems to inadvertently actuate.

Safe Shutdown Evaluation

A A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B but does not contain any piping systems that could contain radiological materials. Interface with adjacent R/B area where such systems may exist is blocked by the reinforced concrete construction associated with the R/B base slab. There is no source of radiological materials for this fire area. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.25 FA2-124 FA2-124 Corridor

The FA2-124 corridor is located on the west side of the R/B as shown on Figure 9A-1. The fire area consists of one fire zone designated as fire zone FA2-124-01. This corridor is a rectangular area defined by structural reinforced concrete wall in excess of 8 inches thick. The corridor allows access/egress between the CS/RHR and SI pump rooms in the southwest corner of the R/B (Train C) and the CS/RHR and SI pump room (Train D) and charging pumps in the northwest corner of the R/B.

The walls defining FA2-124 are of substantial reinforced concrete which provides 3-hour ASTM E-119 fire resistance. Openings and penetrations into the area are protected to maintain a 3-hour fire separation. Due to small amount of power and control electrical cables located in the corridor, fire loading within the corridor is not expected to exceed 2.7E+04 Btu/ft^2.

This area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA2-124-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire. The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

The area is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the fire area. On this basis, there is adequate fire protection provided for this fire area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire areas and fire zones incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this corridor, the smoke products would be confined to the corridor area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.26 FA2-151 B-RHR Piping Room Area

The B-RHR piping room area is located in the southeast corner of the radiologically controlled access portion of the R/B as shown on Figures 9A-2 through 9A-6. This fire area consists of six fire zones which have overall maximum fire loading and designation as follows:

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA2-151-01	B RHR Piping Room	2.9E+04
FA2-151-02	B Safeguard Component Area AHU Room	3.3E+04
FA2-151-03	B CS/RHR Hx Room	2.7E+04
FA2-151-04	FA2-151-04 Corridor	2.9E+04
FA2-151-05	FA2-151-05 Zone	3.1E+04
FA2-151-06	R/B 2F Penetration Zone (FA2-151-06)	4.5E+04

The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-151-01 through 06 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area's individual fire zones varies from negligible to light and is not comprised of highly combustible materials. The major combustible material present consists of electrical cable insulation and minor plastic contained with a few instruments and controls present. The most likely fire threat to the area is from transient combustibles associated with maintenance activities during equipment outages.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-CS/RHRS
- B-SIS
- B-Safety I&C system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.27 FA2-152 C-RHR Piping Room Area

The C-RHR piping room area is located in the southwest corner of the radiologically controlled access portion of the R/B as shown on Figures 9A-2 through 9A-6. This fire area consists of six fire zones which have overall maximum fire loading and designation as follows:

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA2-152-01	C RHR Piping Room	2.8E+04
FA2-152-02	C Safeguard Component Area AHU Room	3.3E+04
FA2-152-03	C CS/RHR Hx Room	2.7E+04
FA2-152-04	FA2-152-04 Corridor	2.9E+04
FA2-152-05	R/B-2F C-Piping Penetration Area (FA2-152-05)	3.1E+04
FA2-152-06	R/B-2F C-Piping Penetration Area (FA2-152-06)	4.8E+04

The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-152-01~06 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area's individual fire zones varies from negligible to light and is not comprised of highly combustible materials. The major combustible material present consists of electrical cable insulation and minor plastic contained with a few instruments and controls present. The most likely fire threat to the area is from transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems of mitigation functions and safe-shutdown functions associated with safety train C.

- C-CS/RHRS
- C-SIS
- C-Safety I&C system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.28 FA2-153 D-RHR Piping Room Area

The D-RHR piping room area is located in the northwest corner of the radiologically controlled access portion of the R/B as shown on Figures 9A-2 through 9A-6. This fire area consists of five fire zones which have overall maximum fire loading and designation as follows:

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA2-153-01	D RHR Piping Room	2.8E+04
FA2-153-02	FA2-153-02 Corridor	2.7E+04
FA2-153-03	D CS/RHR Hx Room	2.7E+04
FA2-153-04	D Safeguard Component Area AHU Room	3.0E+04
FA2-153-05	R/B-2F Piping Penetration Area(FA2-153-05)	3.2E+04

The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-153-01 through 05 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area's individual fire zones varies from negligible to light and is not comprised of highly combustible materials. The major combustible material present consists of electrical cable insulation and minor plastic contained with a few instruments and controls present. The most likely fire threat to the area is from transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-CS/RHRS
- D-SIS

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. The potential radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials incur uncontrolled leakage. Even if radioactive material was released by a fire occurring in this area, the smoke products would be confined to the area and if released into the adjacent areas; it would release to the environment through the R/B ventilation system after appropriate filtration. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.29 FA2-201 FA2-201 Corridor

The FA2-201 corridor is located in the southeastern portion of the R/B as shown on Figures 9A-3 through 9A-6. The fire area consists of two fire zones, FA2-201-01 and FA2-201-02, provide corridor access between the southeast R/B stairway (FA2-101) and the train A and B area on the east side of the R/B on levels 1F and 2F.

The fire area primarily contains safety-related B train cables. FA2-201-01 contains maximum expected fire load of 2.7E+04 Btu/ft^2. FA2-201-02 contains maximum expected fire loading 2.7E+04 Btu/ft^2. The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-201-01 and FA2-201-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire. The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

The area is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the fire area. On this basis, there is adequate fire protection provided for this fire area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Safety I&C system
- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.30 FA2-202 A-Class 1E Electrical Room

Figures 9A-3 and 9A-4 show the location of FA2-202 in the east side of the non-radiologically controlled access portion of the south R/B. The fire area consists of one fire zone designated as fire zone FA2-202-01 and contains the A-Class 1E metal clad swith gear and load center. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetration into the room are protected with 3-hour fire resistive seals or components. Maximum fire loading within this fire area is not expected to exceed 1.2E+05 Btu/ft^2 with the primary fire hazard being the plastic and electrical insulation associated with the load center components.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-202-01 is provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is small but likely to involve energized equipment. A gaseous automatic fire suppression system is installed which is appropriate for energized equipment. Hose streams would be applied after de-energizing of the room’s equipment. Floor drains are provided to prevent excessive water buildup from fire fighting.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment in the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Class 1E Power system
- A-Safety I&C system

Since this fire area is separated from the Train B, C and D areas by 3-hour fire rated barriers, one or two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.31 FA2-203 B-Class 1E Electrical Room

Figures 9A-3 and 9A-4 show the location of FA2-203 in the east side of the non-radiologically controlled access portion of the south R/B. The fire area consists of one fire zone designated as fire zone FA2-203-01 and contains the B-Class 1E metal clad swith gear and load center. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetration into the room are protected with 3-hour fire resistive seals or components. Maximum fire loading within this fire area is not expected to exceed 8.9E+04 Btu/ft^2 with the primary fire hazard being the plastic and electrical insulation associated with the load center components.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-203-01 is provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is small but likely to involve energized equipment. A gaseous automatic fire suppression system is installed which is appropriate for energized equipment. Hose streams would be applied after de-energizing of the room's equipment. Floor drains are provided to prevent excessive water buildup from fire fighting.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown systems associated with safety train B.

- B-Class 1E Power system
- B-Safety I&C system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.32 FA2-204 C-Class 1E Electrical Room

Figures 9A-3 and 9A-4 show the location of FA2-204 in the west side of the non-radiologically controlled access portion of the south R/B. The fire area consists of one fire zone designated as fire zone FA2-204-01 and contains the C-Class 1E metal clad swith gear and load center. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetration into the room are protected with 3-hour fire resistive seals or components. Maximum fire loading within this fire area is not expected to exceed 8.9E+04 Btu/ft^2 with the primary fire hazard being the plastic and electrical insulation associated with the load center components.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-204-01 is provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is small but likely to involve energized equipment. A gaseous automatic fire suppression system is installed which is appropriate for energized equipment. Hose streams would be applied after de-energizing of the room's equipment. Floor drains are provided to prevent excessive water buildup from fire fighting.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

The fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with train C.

- C-Class 1E Power system
- C-Safety I&C system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.33 FA2-205 D-Class 1E Electrical Room

Figures 9A-3 and 9A-4 show the location of FA2-205 in the west side of the non-radiologically controlled access portion of the south R/B. The fire area consists of one fire zone designated as fire zone FA2-205-01 and contains the D-Class 1E metal clad swith gear and load center. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetration into the room are protected with 3-hour fire resistive seals or components. Maximum fire loading within this fire area is not expected to exceed 1.2E+05 Btu/ft^2 with the primary fire hazard being the plastic and electrical insulation associated with the load center components.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-205-01 is provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is small but likely to involve energized equipment. A gaseous automatic fire suppression system is installed which is appropriate for energized equipment. Hose streams would be applied after de-energizing of the room's equipment. Floor drains are provided to prevent excessive water buildup from fire fighting.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

The fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with train D.

- D-Class 1E Power system
- D-Safety I&C system

Since this fire area is separated from the Train A, B and C areas by 3-hour fire rated barriers, one or two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.34 FA2-206 FA2-206 Corridor

The FA2-206 corridor is located in the southwestern portion of the R/B as shown on Figures 9A-3 through 9A-6. The fire area consists of two fire zones, FA2-206-01 and FA2-206-02, provide corridor access between the southwest R/B elevator (FA2-110), the west power source buildings and the train C and D area on the west side of the R/B on levels 1F and 2F.

The fire area primarily contains safety-related C train cables. FA2-206-01 contains maximum expected fire load of 2.7E+04 Btu/ft^2. FA2-206-02 contains maximum expected fire load of 2.7E+04 Btu/ft^2. The borders of this fire area are constructed using reinforced concrete which results in fire resistance that exceeds a 3-hour ASTM E-119 fire exposure. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-206-01 and FA2-206-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is

provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire compartment is constructed with concrete walls in excess of 8 inches thick and provided with a fire door to the room to provide complete isolation of the room. All openings and penetrations into the fire area are protected to provide complete isolation in the event of a fire. The major fire threat to this room is from the cables and the transient combustibles associated with maintenance activities during equipment outages. The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations.

The room is provided with automatic fire detection which alarms upon high smoke concentration and summons plant fire brigade. Based on the expected fire hazards within the compartment during normal operation and the maximum expected during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

The fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Safety I&C system
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the structure which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.35 FA2-207 FA2-207 Buttress Shaft

FA2-207 is one of two buttress shafts associated with the US-APWR containment structure. FA2-207 is located on the east side of the R/B at reference location 90 degree. The room extends up the side of the containment to provide a space with clearance for the building buttress that extends up the side of the reactor containment. The buttress shaft is an un-occupied area that only accessed for occasional inspection of the buttress. Access to the buttress shaft is though a fire door installed on the 1F elevation and by removing the roof panels. There are no electric circuits, instruments, controls or equipment installed within the buttress shaft and the space contains no identified combustible materials resulting in negligible combustible fire loading. The boundaries of the fire area are of substantial concrete construction that provides in excess of 3-hour fire exposure as defined by ASTM E-119. There are no openings or penetrations into the area.

FA2-207 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-207-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke could be removed from the area with portable fan and ducting if required although there are no credible fire scenarios for this area.

Fire Protection Adequacy Evaluation

The walls forming the boundaries of this area are very substantial concrete construction that is capable of several hours of fire exposure to an ASTM E-119 fire exposure. There is no credible fire scenario for this inaccessible area that contains no combustible material. Even so, should a fire occur within this space, no damage to any plant function or adverse impact to plant safety would result.

Fire Protection System Integrity

There is not equipment located to be damaged by inadvertent fire suppression system activation in this area. There are no fire protections systems to inadvertently actuate.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. There are no piping systems containing radiological materials or other sources of radioactive materials within the buttress shaft. The potential for radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur significant uncontrolled leakage. There are no fuel sources within the buttress shaft to support a fire and therefore no event that could release radiological material is credible. Should a fire occur during an inspection when the buttress shaft is open for buttress inspection, a fire involving transient material could occur. This would incur at most light surface contamination and no significant airborne release of material. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.36 FA2-208 FA2-208 Buttress Shaft

FA2-208 is one of two buttress shafts associated with the US-APWR containment structure. FA2-208 is located on the west side of the R/B at reference location 270 degree. The room extends up the side of the containment to provide a space with clearance for the building buttress that extends up the side of the reactor containment. The buttress shaft is an un-occupied area that only accessed for occasional inspection of the buttress. Access to the buttress shaft is thought a fire door installed on the 1F elevation and by removing the roof panels. There are no electric circuits, instruments, controls or equipment installed within the buttress shaft and the space contains no identified combustible materials resulting in negligible combustible fire loading. The boundaries of the fire area are of substantial concrete construction that provides in excess of 3-hours fire exposure as defined by ASTM E-119. There are no openings or penetrations into the area.

FA2-207 is the non-safe-shutdown area for US-APWR.

Fire Detection and Suppression Features

FA2-208-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke could be removed from the area with portable fan and ducting if required although there are no credible fire scenarios for this area.

Fire Protection Adequacy Evaluation

The walls forming the boundaries of this area are very substantial concrete construction that is capable of several hours of fire exposure to an ASTM E-119 fire exposure. There is no credible fire scenario for this inaccessible area that contains no combustible material. Even so, should a fire occur within this space, no damage to any plant function or adverse impact to plant safety would result.

Fire Protection System Integrity

There is not equipment located to be damaged by inadvertent fire suppression system activation in this area. There are no fire protections systems to inadvertently actuate.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This fire area is within the radiologically controlled access area of the R/B. There are no piping systems containing radiological materials or other sources of radioactive materials within the buttress shaft. The potential for radiological material within this area is most likely associated with transient material or potential contamination if piping systems containing radiological materials in the adjacent fire area and fire zones incur significant uncontrolled leakage. There are no fuel sources within the buttress shaft to support a fire and therefore no event that could release radiological material is credible. Should a fire occur during an inspection when the buttress shaft is open for buttress inspection, a fire involving transient material could occur. This would incur at most light surface contamination and no significant airborne release of material. Any water discharge for fire fighting purposes would be confined to the R/B and appropriate treatment would occur before release to the environment. There is therefore, no credible radioactive release from a fire in this fire area.

9A.3.37 FA2-301 FA2-301 Area

FA2-301 is a duct space area in the southeast corner of the R/B as shown on Figures 9A-5 and 9A-6. This fire area consists of a single zone designated as FA2-301-01. The area has a transient fire loading only. The expected fire loading of this area is 2.3E+03 Btu/ft^2.

The area is identified as being associated with safety train A although there are no electric circuits installed within the area.

Fire Detection and Suppression Features

FA2-301-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

There are no special smoke removal provisions made for this area. Should a fire occur within the area, it would be small and involve transient material brought into the space. As the area is surrounded by 3-hour fire rated boundaries, smoke intrusion or release from the area would be prevented. If smoke removal was required from the space, portable equipment could be used for the task.

Fire Protection Adequacy Evaluation

A fire in this area would involve a limited amount of transient material only. The structural fire protection provided by the 3-hour rated fire area boundaries is adequate to protect the area from being affected by a fire in adjacent areas or to allow a fire in this are to impact other areas.

Fire Protection System Integrity

There is not equipment located to be damaged by inadvertent fire suppression system activation in this area. There are no fire protections systems to inadvertently actuate.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.38 FA2-302 A-Class 1E UPS Room

The FA2-302 train A Class 1E UPS room fire area is located on the east side of the non-radiologically controlled access portion of the R/B as depicted in Figures 9A-5 and 9A-6. The room, which is designated as a single fire zone, FA2-302-01, contains the train A Inverter Unit, UPS for MOV, Solenoid Distribution Panel, and Safety AC120V Switch Board and so forth. The fire loading due to this combustible content is not expected to exceed 3.9E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-302-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In

the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Class 1E Power system
- A-Safety I&C system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.39 FA2-303 B-Class 1E UPS Room

The FA2-303 train B Class 1E UPS room fire area is located on the east side of the non-radiologically controlled access portion of the R/B as depicted in Figures 9A-5 and 9A-6. The room, which is designated as a single fire zone, FA2-303-01, contains the train B Inverter Unit, UPS for MOV, Solenoid Distribution Panel, and Safety AC120V Switch Board and so forth. The fire loading due to this combustible content is not expected to exceed 4.0E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-303-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Class 1E Power system
- B-Safety I&C system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.40 FA2-304 A-Class 1E I&C Room

Figures 9A-5 and 9A-6 show the location of this fire area in the eastern half of the non-radiologically controlled access portion of the R/B. The fire area consists of two fire zones, FA2-304-01 A-Class 1E I&C room and FA2-304-02, A-Class 1E I& C room raised-floor zone. Maximum anticipated fire loading in FA2-304-01 is 4.2E+04 Btu/ft^2 and comprised of combustible materials from control and instrumentation electrical cables, electrical and instrumentation panels, and miscellaneous instrumentation. The sub-floor zone, FA2-304-02, is heavily loaded with electrical cables resulting in a maximum anticipated fire loading to the compartment of 3.7E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-304-01 and FA2-304-02 are provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Safety I&C system
- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.41 FA2-307 B-Class 1E I&C Room

Figures 9A-5 and 9A-6 show the location of this fire area in the eastern half of the non-radiologically controlled access portion of the R/B. The fire area consists of two fire zones, FA2-307-01 B-Class 1E I&C room and FA2-307-02, B-Class 1E I& C room raised-floor zone. Maximum anticipated fire loading in FA2-307-01 is 4.3E+04 Btu/ft^2 and comprised of combustible materials from control and instrumentation electrical cables, electrical and instrumentation panels, and miscellaneous instrumentation. The sub-floor zone, FA2-307-02, is heavily loaded with electrical cables resulting in a maximum anticipated fire loading to the compartment of 4.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-307-01 and FA2-307-02 are provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room

and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Safety I&C system
- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.42 FA2-308 Main Control Room

Figures 9A-5 and 9A-6 show the location of this fire area in the middle of the non-radiolocically controlled access portion of the R/B. The fire area consists of three individual fire zones which are the FA2-308-01 main control room, FA2-308-02 staff room, and FA2-308-03 main control room raised-floor zone. Maximum anticipated fire loading in FA2-308-01 is 9.3E+03 Btu/ft^2 and comprised of combustible materials from low voltage, control and instrumentation electrical cables, control consoles, display boards, and miscellaneous instrumentation. The staff room, FA2-308-02 has a very light maximum anticipated fire loading of 1.7E+02 Btu/ft^2 while the sub-floor zone, FA2-308-03, is moderately loaded with electrical cables resulting in a maximum anticipated fire loading to the compartment of 7.0E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. The wall separating the main control room and staff areas is of substantial construction with a minimum fire resistance rating of 1-hour in accordance with guidance provide in RG 1.189, Rev. 1, position 6.1.2. This allows significant separation during a fire between the two fire zones. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A, B, C, D and non-safety train.

Fire Detection and Suppression Features

FA2-308-01 is provided with automatic smoke detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA2-308-02 is staff room. This zone is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from LP water mist. Secondary suppression is provided from manual fire hose stations.

FA2-308-03 is raised floor. This zone is provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

During normal operation, cold shutdown, and refueling, the MCR air handling units and the MCR exhaust fan are actuated and perform ventilation and air conditioning inside the main control room envelop. In case of a fire generating smoke within the main control room, the smoke removal is accomplished by manual actuation of the MCR smoke purge fan.

Fire Protection Adequacy Evaluation

This main control room fire area is contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to the main control room fire zone is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for the control room complex serves to provide automatic notification of a fire to the plant fire brigade. The control room operators would most likely notice a fire before fire detection actuation but defense-in-depth smoke detection is provided for the above floor area of the control room. The fire detection system for the sub floor zone provides very early incipient notification of any potential fire allowing the fire brigade or control room operators to respond but also provides automatic fire suppression activation in the event of a faster growing fire.

A high degree of assurance exists that any fire would be identified early in the incipient stage and manually suppressed. Automatic detection to the sub floor area provides defense-in-depth. The control room staff area is provided with a low pressure water mist fire suppression system that is capable of controlling or suppressing class A and B fires. The water mist system uses approximately 10% to 15% of the water from a normal fire sprinkler system which minimizes water removal requirements and reduces concern for water intrusion into the MCR. Should no fire suppression occur of any type such that a fire could grow unmitigated, the boundaries of the fire area are adequate to contain the total fire loading of the room.

Fire Protection System Integrity

The primary fire response for the control room fire is expected to be manual response by either the control room staff or plant fire brigade. The clean agent fire extinguishing system for the sub floor zone is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. The automatic fire detection system for the sub compartment is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. Even if agent is inadvertently discharged within the sub floor compartment, the fire suppression agent is of the clean type and safe for human exposure. Since the primary component within the sub floor compartment is electrical cable, no adverse impact from the fire suppression agent would be expected.

A low pressure water mist fire suppression system is provide for the MCR staff area and does not release the amount of water that a normal sprinkler system would. The water mist system has been proven appropriate for the type of fire hazards that exist within the staff area. The air aspirating fire alarm system and release mechanism for the clean agent or water mist system are designed for industrial environments and not subject to easy inadvertent actuation.

Safe Shutdown Evaluation

The main control room fire area contains equipment from all four plant safety trains as well as non-divisional. A fire in this area that is not extinguished very early in the incipient phase will likely create the need to evacuate the main control room. The remote shutdown console, located in FA2-504, is installed so that safe-shutdown can be achieved should control room evacuation be necessary.

In order to achieve and maintain the reactor in the cold shutdown condition (safe-shutdown state), it is necessary to remove excess heat to control the temperature, pressure and volume of the reactor coolant, and to supply boric acid, etc. Therefore, the operating controls, of the plant systems for these functions can be operated from the remote shutdown console.

These controls are switched over from the main control room (MCR) to the remote shutdown console (RSC) by MCR/RSC transfer systems. These transfer systems are appropriately fire separated and protected. The transfer is initiated by redundant transfer switches (each with four contact switches) located outside the main control room fire area and convenient to the transfer of plant control to the remote shutdown console room, FA2-504.

When the transfer actions from the main control room to remote shutdown console are initiated from these switches, the selecting signals for the remote shutdown console are logically latched. Any subsequent damage to these transfer switches or damage caused by a fire in the main control room does not affect the functions of the remote shutdown console. Transfer from the RSC back to the MCR is activated separately for each of the four transfer systems from each of the safety I&C rooms. Access to the remote shutdown console, the MCR/RSC transfer systems and the transfer switches is administratively controlled through closed areas with key access.

The transfer systems and the remote shutdown console provide the necessary defense-in-depth capability to assure safe plant shutdown in the event of a fire in the main control room area that requires control room evacuation.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.43 FA2-309 D-Class 1E I&C Room

Figures 9A-5 and 9A-6 show the location of this fire area in the western half of the non-radiologically controlled access portion of the R/B. The fire area consists of two fire zones, FA2-309-01 D-Class 1E I&C room and FA2-309-02, D-Class 1E I& C room raised-floor zone. Maximum anticipated fire loading in FA2-309-01 is 4.2E+04 Btu/ft^2 and comprised of combustible materials from control and instrumentation electrical cables, electrical and instrumentation panels, and miscellaneous instrumentation. The sub-floor zone, FA2-309-02, is heavily loaded with electrical cables resulting in a maximum anticipated fire loading to the compartment of 3.7E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-309-01 and FA2-309-02 are provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown function associated with safety train D.

- D-Safety I&C system
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.44 FA2-312 C-Class 1E I&C Room

Figures 9A-5 and 9A-6 show the location of this fire area in the western half of the non-radiologically controlled access portion of the R/B. The fire area consists of two fire zones, FA2-312-01 C-Class 1E I&C room and FA2-312-02, C-Class 1E I& C room raised-floor zone. Maximum anticipated fire loading in FA2-312-01 is 4.3E+04 Btu/ft^2 and comprised of combustible materials from control and instrumentation electrical cables, electrical and instrumentation panels, and miscellaneous instrumentation. The sub-floor zone, FA2-312-02, is heavily loaded with electrical cables resulting in a maximum anticipated fire loading to the compartment of 4.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-312-01 and FA2-312-02 are provided with air aspirating VESDA, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from clean gaseous agent. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown.

- C-Safety I&C system
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.45 FA2-313 D-Class 1E UPS Room

The FA2-313 train D Class 1E UPS room fire area is located on the west side of the non-radiologically controlled access portion of the R/B as depicted in Figures 9A-5 and 9A-6. The room, which is designated as a single fire zone, FA2-313-01, contains the train D Inverter Unit, UPS for MOV, Solenoid Distribution Panel and Safety AC120V Switch Board and so forth. The fire loading due to this combustible content is not expected to exceed 3.9E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-313-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical system and safe-shutdown functions associated with safety train D.

- D-Safety I&C system
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.46 FA2-314 C-Class 1E UPS Room

The FA2-314 train C Class UPS room fire area is located on the west side of the non-radiologically controlled access portion of the R/B as depicted in Figures 9A-5 and 9A-6. The room, which is designated as a single fire zone, FA2-314-01, contains the train C Inverter Unit, UPS for MOV, Solenoid Distribution Panel and Safety AC120V Switch Board and so forth. The fire loading due to this combustible content is not expected to exceed 4.0E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-314-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In

the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Safety I&C system
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.47 FA2-315 FA2-315 Area

FA2-315 is a duct space area in the southwest corner of the R/B as shown on Figures 9A-5 and 9A-6. This fire area consists of a single zone designated as FA2-315-01. The area has a transient fire loading only. The expected fire loading of this area is 2.3E+03 Btu/ft^2.

The area is identified as being associated with safety train D although there are no electric circuits installed within the area.

Fire Detection and Suppression Features

FA2-315-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

There are no special smoke removal provisions made for this area. Should a fire occur within the area, it would be small and involve transient material brought into the space. As the area is surrounded by 3-hour fire rated boundaries, smoke intrusion or release from the area would be prevented. If smoke removal was required from the space, portable equipment could be used for the task.

Fire Protection Adequacy Evaluation

A fire in this area would involve a limited amount of transient material only. The structural fire protection provided by the 3-hour rated fire area boundaries is adequate to protect the area from being affected by a fire in adjacent areas or to allow a fire in this are to impact other areas.

Fire Protection System Integrity

The fire protection provided this fire area is structural confinement only. This is more than adequate for the relative hazards of the area.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.48 FA2-401 B-Class 1E Electrical Room & MCR HVAC Equipment Room

Figure 9A-7 shows the location of this fire area in the southeast corner of the R/B in the non-radiologically controlled access portion of the R/B in the east section. The area consists of a single fire zone designated as FA2-401-01. This area houses B-Class 1E Electrical Room and MCR HVAC equipment and also houses instrumentation and control cables. Combustible material associated with this equipment is dominated by HVAC filter media and low voltage, control, and instrumentation electrical cable giving rise to a combustible fire loading for the room the is anticipated to not exceed 3.7E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-401-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following systems and safe-shutdown functions associated with safety train B.

- B-MCR HVAC system
- B-Class 1E Electrical Room HVAC system

- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.49 FA2-402 A-Class 1E Electrical Room & MCR HVAC Equipment Room

Figure 9A-7 shows the location of this fire area in the southeast corner of the R/B in the non-radiologically controlled access portion of the R/B in the east section. The area consists of a single fire zone designated as FA2-402-01. This area houses A-Class 1E Electrical Room and MCR HVAC equipment and also houses instrumentation and control cables. Combustible material associated with this equipment is dominated by HVAC filter media and low voltage, control, and instrumentation electrical cable giving rise to a combustible fire loading for the room the is anticipated to not exceed 3.7E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-402-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following systems and safe-shutdown functions associated with safety train A.

- A-MCR HVAC system
- A-Class 1E Electrical Room HVAC system
- A-Class 1E Power system
- A-Safety I&C system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.50 FA2-403 C-Class 1E Electrical Room & MCR HVAC Equipment Room

Figure 9A-7 shows the location of this fire area in the southwest corner of the R/B in the non-radiologically controlled access portion of the R/B in the west section. The area consists of a single fire zone designated as FA2-403-01. This area houses C-Class 1E Electrical Room and MCR HVAC system and also houses instrumentation and control cables. Combustible material associated with this equipment is dominated by HVAC filter media and low voltage, control, and instrumentation electrical cable giving rise to a combustible fire loading for the room the is anticipated to not exceed 3.7E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-403-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the

expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following systems and safe-shutdown functions associated with safety train C.

- C-MCR HVAC systems
- C-Class 1E Electrical Room HVAC system
- C-Class 1E Power system
- C-Safety I&C system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.51 FA2-404 D-Class 1E Electrical Room & MCR HVAC Equipment Room

Figure 9A-7 shows the location of this fire area in the southwest corner of the R/B in the non-radiologically controlled access portion of the R/B in the west section. The area consists of a single fire zone designated as FA2-404-01. This area houses D-Class 1E Electrical Room and MCR HVAC system and also houses instrumentation and control cables. Combustible material associated with this equipment is dominated by HVAC filter media and low voltage, control, and instrumentation electrical cable giving rise to a combustible fire loading for the room the is anticipated to not exceed 3.7E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-404-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following systems and safe-shutdown functions associated with safety train D.

- D-MCR HVAC system
- D-Class 1E Electrical Room HVAC system
- D-Class 1E Power system
- D-Safety I&C system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two (or one) safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.52 FA2-405 A-MCR Emergency Filtration Unit and Fan Room

Figure 9A-7 shows the location of this fire area in the east half of the non-radiologically controlled access portion of the R/B. The fire area consists of a single fire zone designated as FA2-405-01. Combustible content associated with the room's contents is primarily attributed to HVAC filter media and results in a maximum anticipated fire loading for the room of 4.3E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

Fire Detection and Suppression Features

FA2-405-01 is provided with automatic smoke/heat detection, and manual fire alarm pull station is installed as secondary detection. Charcoal filter Unit has water spray, and primary fire suppression for this zone is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

A fire in this area is not expected but would be alarmed in the main control room and the fire brigade would respond to extinguish the fire. A fixed water suppression system and automatic fire detection is provided for the charcoal filter in the MCR filter unit. The overall combustible loading in this area is very small and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible. The fire protection features of this area are adequate to assure that any unsuppressed fire that may occur in this area will not threaten the confinement capability to the adjacent fire areas.On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.53 FA2-406 B-MCR Emergency Filtration Unit and Fan Room

Figure 9A-7 shows the location of this fire area in the west half of the non-radiologically controlled access portion of the R/B. The fire area consists of a single fire zone designated as FA2-406-01. Combustible content associated with the room's contents is primarily attributed to HVAC filter media and results in a maximum anticipated fire loading for the room of 4.3E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

Fire Detection and Suppression Features

FA2-406-01 is provided with automatic smoke/heat detection, and manual fire alarm pull station is installed as secondary detection. Charcoal filter Unit has water spray, and primary fire suppression for this zone is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

A fire in this area is not expected but would be alarmed in the main control room and the fire brigade would respond to extinguish the fire. A fixed water suppression system and automatic fire detection is provided for the charcoal filter in the MCR filter unit. The overall combustible loading in this area is very small and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible. The fire protection features of this area are adequate to assure that any unsuppressed fire that may occur in this area will not threaten the confinement capability to the adjacent fire areas. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.54 FA2-407 FA2-407 Area

Figure 9A-7 shows the location of this fire area in the south portion of the R/B in non-radiologically controlled access portion of the R/B. The fire area extends from east to west across the south portion of the R/B and has 2 fire zones of corridor on the east and west sides. Two rooms for the MCR monitoring rooms are included as part of this fire area. The four fire zones of the area are designated as FA2-407-01 and FA2-404-04 corridors and FA2-407-02 & 03, MCR monitor rooms. The fire area contains primarily electrical cable and miscellaneous panels and I&C which is classified as non-divisionally associated. There are a few protected safety train circuits installed within the area. FA2-407-01 has an overall fire loading not expected to exceed 2.7E+04 Btu/ft^2. FA2-407-02 and -03 have an overall fire loading not expected to exceed 5.1E+03 Btu/ft^2. FA2-407-04 has an overall fire loading not expected to exceed 2.7E+04 Btu/ft^2

The borders of this fire area and fire zones are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-407-01 is identified as being associated with safety train D, and FA2-407-02 and 03 are identified as being associated with non-safety train. FA2-407-04 is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-407-01~FA2-407-04 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A and D.

- A-Safety I&C system
- D-Safety I&C system

A fire in this fire area also has the potential to cause the functional damage of systems of mitigation functions and safe-shutdown functions. Fire zone separation helps mitigate the impact of the adverse impact to safe-shutdown functions, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.55 FA2-408 R/B-3F A-Electrical Penetration Area

Figure 9A-7 shows the location of this fire area in the north portion of the R/B adjacent to the containment wall. This fire area consists of a single fire zone designated as FA2-408-01. This room contains panels and a few electrical cables associated with safety train A and non-divisional or channel associated circuits. The maximum expected fire loading for the room is 2.8E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-408 is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA2-408-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Safety I&C system
- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two (or one) safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

There are no piping systems that could contain radiological materials located within this room. While this room is within the radiologically controlled access area of the R/B, no radiological material is expected to be within this room. There is a remote possibility that unexpected and uncontrolled leakage from a piping system in an adjacent area or loose radiological contamination on transient material could be within this room. If a fire did occur within this room, the fire released particulate matter would be contained within the room and if released form the room would be processed by the R/B ventilation systems before being released to the environment. Any water used for fire suppression would be contained within the R/B and would not be released to the environment until it was processed to remove any radioactive material. As such, it is not credible that a fire event within this room would result in an unacceptable radioactive release from this fire area.

9A.3.56 FA2-409 R/B-3F B-Electrical Penetration Area

Figure 9A-7 shows the location of this fire area in the southeast quadrant of the R/B adjacent to the containment wall. This fire area consists of a single fire zone designated as FA2-409-01. This room contains high voltage, low voltage, control and instrumentation electrical cable associated with safety train B. This electrical cable results in a maximum anticipated fire loading for the room of 2.8E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-409 is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA2-409-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be

expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Safety I&C system
- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

There are no piping systems that could contain radiological materials located within this room. While this room is within the radiologically controlled access area of the R/B, no radiological material is expected to be within this room. There is a remote possibility that unexpected and uncontrolled leakage from a piping system in an adjacent area or loose radiological contamination on transient material could be within this room. If a fire did occur within this room, the fire released particulate matter would be contained within the room and if released form the room would be processed by the R/B ventilation systems before being released to the environment. Any water used for fire suppression would be contained within the R/B and would not be released to the environment until it was processed to remove any radioactive material. As such, it is not credible that a fire event within this room would result in an unacceptable radioactive release from this fire area.

9A.3.57 FA2-410 R/B-3F C-Electrical Penetration Area

Figure 9A-7 shows the location of this fire area in the southwest quadrant of the R/B adjacent to the containment wall. This fire area consists of a single fire zone designated as FA2-410-01. This room contains high voltage, low voltage, control and instrumentation electrical cable associated with safety train C. This electrical cable results in a maximum anticipated fire loading for the room of 2.8E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-410 is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA2-410-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Safety I&C system
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

There are no piping systems that could contain radiological materials located within this room. While this room is within the radiologically controlled access area of the R/B, no radiological material is expected to be within this room. There is a remote possibility that unexpected and uncontrolled leakage from a piping system in an adjacent area or loose radiological contamination on transient material could be within this room. If a fire did occur within this room, the fire released particulate matter would be contained within the room and if released form the room would be processed by the R/B ventilation systems before being released to the environment. Any water used for fire suppression would be contained within the R/B and would not be released to the environment until it was processed to remove any radioactive material. As such, it is not credible that a fire event within this room would result in an unacceptable radioactive release from this fire area.

9A.3.58 FA2-411 R/B-3F D-Electrical Penetration Area

Figure 9A-7 shows the location of this fire area in the northwest quadrant of the R/B adjacent to the containment wall. This fire area consists of a single fire zone designated as FA2-411-01. This room contains high voltage, low voltage, control and instrumentation electrical cable associated with safety train D. This electrical cable results in a maximum anticipated fire loading for the room of 2.8E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-411 is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA2-411-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical system and safe-shutdown functions associated with safety train D.

- D-Safety I&C system
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

There are no piping systems that could contain radiological materials located within this room. While this room is within the radiologically controlled access area of the R/B, no radiological material is expected to be within this room. There is a remote possibility that unexpected and uncontrolled leakage from a piping system in an adjacent area or loose radiological contamination on transient material could be within this room. If a fire did occur within this room, the fire released particulate matter would be contained within the room and if released form the room would be processed by the R/B ventilation systems before being released to the environment. Any water used for fire suppression would be contained within the R/B and would not be released to the environment until it was processed to remove any radioactive material. As such, it is not credible that a fire event within this room would result in an unacceptable radioactive release from this fire area.

9A.3.59 FA2-412 FA2-412 Duct Space Area

Figure 9A-7 shows the location of this fire area in the south portion of the R/B in non-radiologically controlled access portion. This fire area consists of a single fire zone designated as FA2-416-01. The room contains various electrical panels and I&C and safety train A and B circuits which result in a maximum anticipated fire loading for the room of 2.9E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-412 is identified as being associated with safety train A and B.

Fire Detection and Suppression Features

FA2-412-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following system of safe-shutdown functions associated with safety train A.

- A,B-MCR HVAC system

Since this fire area is separated from train D areas by 3-hour fire rated barriers, the other safety train equipment in train D fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.60 FA2-413 FA2-413 Duct Space Area

Figure 9A-7 shows the location of this fire area in the south portion of the R/B in non-radiologically controlled access portion. This fire area consists of a single fire zone designated as FA2-417-01. The room contains various electrical panels and I&C and safety train C and D circuits which result in a maximum anticipated fire loading for the room of 2.9E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

FA2-413 is identified as being associated with safety train C and D.

Fire Detection and Suppression Features

FA2-413-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following system of safe-shutdown functions associated with safety train D.

- C,D-MCR HVAC system

Since this fire area is separated from train A areas by 3-hour fire rated barriers, the other safety train equipment in train A fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.61 FA2-414 FA2-414 MSFW Piping Room

Figures 9A-7 through 9A-10 show the location of this fire area in the east half of the south R/B area in non-radiologically controlled access area. This fire area consists of a single fire zone designated as FA2-414-01. The room contains main steam & feedwater piping, HVAC ducts and combustible material associated with I&C and control, instrumentation, and low voltage electrical cable which results in a maximum anticipated fire loading of 3.3E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

This area is identified as being associated with safety train A and B.

Fire Detection and Suppression Features

FA2-414-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to damage the following typical systems and safe-shutdown functions associated with safety train A and B.

- A,B-Main Feedwater Isolation Valve
- A,B-Main Steam Relief Isolation Valve
- A,B-Main Steam Relief Control Valve
- A-Emergency Feed Water Pump (T/D) Startup Valve
- A,B-Main Feedwater Isolation Valve
- A,B-Main Steam Bypass Isolation Valve
- A,B-Main Steam Power Operated Relief Valve (MOV)

Since this area is separated from train C and D by 3-hour fire barriers, two trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.62 FA2-415 FA2-415 MSFW Piping Room

Figures 9A-7 through 9A-10 show the location of this fire area in the west half of the south R/B area in non-radiologically controlled access area. This fire area consists of a single fire zone designated as FA2-415-01. The room contains main steam & feedwater piping, HVAC ducts and combustible material associated with I&C and control, instrumentation, and low voltage electrical cable which results in a maximum anticipated fire loading of 3.1E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

This area is identified as being associated with safety train C and D.

Fire Detection and Suppression Features

FA2-415-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area also has the potential to damage the following typical systems and safe-shutdown functions associated with safety train C and D.

- C,D-Main Feedwater Isolation Valve
- C,D-Main Steam Relief Isolation Valve
- C,D-Main Steam Relief Control Valve
- D-Emergency Feed Water Pump (T/D) Startup Valve
- C,D-Main Feedwater Isolation Valve
- C,D-Main Feedwater Bypass Isolation Valve
- C,D-Main Steam Relief Isolation Valve
- C,D-Main Steam Relief Control Valve

Since this area is separated from train A and B by 3-hour fire barriers, two trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.63 FA2-501 Emergency Feedwater Pit Room, MG Set Room Area

Figures 9A-8 and 9A-9 show the location of this fire area in the south portion in non-radiologically controlled access area of the R/B. The fire area spans the entire east to west area of this south R/B section and is subdivide into nine individual fire zones. The following listing provides the individual designation, number of the fire zones, and maximum expected fire load for each fire zone associated with FA2-501.

Fire Zone No.	Designation	Fire Loading (Btu/ft^2)
FA2-501-01	FA2-501-01 Non-Radioactive Zone Eastside Corridor	2.8E+04
FA2-501-02	A-Emergency Feedwater Pit	7.2E+01
FA2-501-03	SGBD Water Radiation Monitor Room	5.1E+04
FA2-501-04	LRT Room	1.1E+03
FA2-501-05	CRDM Cabinet Room	3.4E+04
FA2-501-06	MG Set Room	3.1E+04
FA2-501-07	MG Set Control Panel Room	5.2E+03
FA2-501-08	B-Emergency Feedwater Pit	7.2E+01
FA2-501-09	C/V Purge Air Handling Unit Room	3.1E+04
FA2-501-10	FA2-501-10 Zone	3.7E+02

Fire Zone No.	Designation	Fire Loading (Btu/ft^2)
FA2-501-11	FA2-501-01 Non-Radioactive Zone Westside Corridor	2.8E+04

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

And, this fire area is appropriately divided into a few fire zone groups. The boundaries of each fire zone group is rated to provide 3-hour fire resistance to the adjacent fire zone group although each fire zone have the structural barriers of reinforced concrete with some open spaces to the adjacent fire zones within the same group.

The area is identified as being associated with non-safety train N.

Fire Detection and Suppression Features

FA2-501-01, FA2-501-03~07 and FA2-501-09 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA2-501-02 and FA2-501-08 are provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the

expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this fire area has the potential to cause the functional damage of systems safe-shutdown functions. Fire zone group separation helps mitigate the impact of the adverse impact to the safe-shutdown functions, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.64 FA2-502 Reactor Trip Breaker Cabinet-1 Room

Figure 9A-8 shows the location of this fire area on the west side of the south R/B section in non-radiologically controlled access portion. This fire area consists of fire zone designated as FA2-502-01. The room is identified as being associated with the group-1 cables of the reactor trip breaker. The cabinet results in a maximum anticipated fire loading for the room of 6.5E+03 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A, B, C and D.

Fire Detection and Suppression Features

FA2-502-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions.

- Reactor Trip Breakcer Cabinet-1
- A, B, C, D-Reactor Protection System

Since the fire in this area will not adversely impact the ability of ensuring plant safety. For reactor trip breaker-1, the control cables of A, B, C, D trains are damaged. However, because it can be tripped by reactor trip breaker-2, the fire in this fire area will not impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.65 FA2-503 Reactor Trip Breaker Cabinet-2 Room

Figure 9A-8 shows the location of this fire area on the west side of the south R/B section in non-radiologically controlled access portion. This fire area consists of fire zone designated as FA2-503-01. The room is identified as being associated with the group-2 cables of the reactor trip breaker. The cabinet results in a maximum anticipated fire loading for the room of 6.5E+03 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A, B, C and D.

Fire Detection and Suppression Features

FA2-503-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

This room and its sub-floor are contained within 3-hour fire rated barriers which provide substantial confinement of any fire. The sub-floor to room is separated by floor panels of aluminum or steel which provide an effective seal. The fire detection system for this area provides very early incipient notification of any potential fire allowing the fire brigade to respond but also provides automatic fire suppression activation in the event of a faster growing fire. The automatic system is designed to actuate sufficient early is fire development such that a sub-floor compartment cable fire does not become deep seated prior to suppression.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from and automatic gaseous system and manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is supported to seismic criteria to prevent its falling on safety-related equipment and causing damage during a SSE. The clean agent fire extinguishing system is of the type typically used around electrical equipment such as computer rooms which has been proven to not cause excessive damage of equipment or direct equipment malfunctions. Even so, the automatic fire detection system is installed such that the normal first response to an alarm will normally be the plant fire brigade and that only upon a definite fire signal will agent be discharged. The air aspirating fire alarm system and release mechanism for the clean agent are designed for industrial environments and not subject to inadvertent actuation.

Unintended operation of the fire hose suppression activity is not expected since deliberate manual activation is required. In the event of a fire, the equipment is the room would be administratively de-energized prior to administering of fire hose streams. To prevent excessive water buildup on this level from fire fighting, the room is equipped with loop sealed floor drains to remove excessive water.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions..

- Reactor Trip Breakcer Cabinet-2
- A,B,C,D-Reactor Protection System

Since the fire in this area will not adversely impact the ability of ensuring plant safety. For reactor trip breaker-2, the control cables of A, B, C, D trains are damaged. However, because it can be tripped by reactor trip breaker-1, the fire in this fire area will not impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.66 FA2-504 Remote Shutdown Console Room

Figure 9A-8 shows the location of this fire area in the northeast portion on the non-radiologically controlled access portion of the R/B (southern portion of the building). This fire area consists of a single fire zone designated as FA2-504-01.The room houses the remote shutdown console, shutdown control change board. Combustible loading from this equipment and associated control and instrumentation electrical cables result in a maximum anticipated fire loading for the room of 4.2E+04 Btu/ft^2. The remote shutdown console is used for alternate plant shutdown when a fire or other event results in a need to abandon the main control room. This room then contains equipment and controls that can be associated with all four safety trains of plant equipment.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A, B, C and D.

Fire Detection and Suppression Features

FA2-504-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

The main control room fire area contains equipment from all four plant safety trains as well as non-divisional. A fire in this area that is not extinguished very early in the incipient phase will likely create the need to evacuate the main control room. The remote shutdown console, located in FA2-504, is installed so that safe-shutdown can be achieved should control room evacuation be necessary.

In order to achieve and maintain the reactor in the cold shutdown condition (safe-shutdown state), it is necessary to remove excess heat to control the temperature, pressure and volume of the reactor coolant, and to supply boric acid, etc. Therefore, the operating controls, of the plant systems for these functions can be operated from the remote shutdown console.

These controls are switched over from the main control room (MCR) to the remote shutdown console (RSC) by MCR/RSC transfer systems. These transfer systems are located in the four safety I&C rooms which are appropriately fire separated and protected. The transfer is initiated by redundant transfer switches (each with four contact switches) located outside the main control room fire area and convenient to the transfer of plant control to the remote shutdown console room, FA2-504.

When the transfer actions from the main control room to remote shutdown console are initiated from these switches, the selecting signals for the remote shutdown console are logically latched. Any subsequent damage to these transfer switches or damage caused by a fire in the main control room does not affect the functions of the remote shutdown console. Transfer from the RSC back to the MCR is activated separately for each of the four transfer systems from each of the safety I&C rooms. Access to the remote shutdown console, the MCR/RSC transfer systems and the transfer switches is administratively controlled through closed areas with key access.

The transfer systems and the remote shutdown console provide the necessary defense-in-depth capability to assure safe plant shutdown in the event of afire in the main control room area that requires control room evacuation. Since control is not transferred to the remote shutdown console except for main control room evacuation, a fire in the remote shutdown board room will not impact plant operation from the main control room or the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.67 FA2-505 FA2-505 Stairwell

Figure 9A-8 through 9A-10 show the location of this fire area in the southwest corner of the R/B. The stairwell does not have any electrical circuits other than lighting installed within it. Maximum expected fire loading within the stairwell is 9.3E+02 Btu/ft^2 and is due solely to potential transient materials within the stairwell.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance. This exceeds the fire resistive requirements of NFPA 101 for a stairway of this type.

Fire Detection and Suppression Features

FA2-505-01 is provided with manual fire alarm pull station. Fire suppression is provided from manual fire hose stations.

Smoke Control Features

Fire doors installed in accordance with NFPA 80 help to reduce the introduction of smoke into the stairwell from adjacent fire areas. Should additional smoke removal capacity be required, the plant fire brigade can assist the smoke removal for the stairwell utilizing portable equipment.

Fire Protection Adequacy Evaluation

The fire loading within the stairwell is low and is of ordinary combustibles that can be extinguished by portable fire extinguishers or fire hose streams. The boundaries of the stairwell are rated for 3-hour fire resistance and all penetrations into the fire area or openings to it are appropriately addressed for fire protection. There is therefore adequate fire protection for this area.

Fire Protection System Integrity

The fire boundaries of the stairwell are of substantial construction and provide protection of at least 3-hour of an ASTM E119 exposure. While there is no automatic fire detection or suppression systems located within the stairwell, the extremely low expected maximum fire loading is not capable of compromising the structural integrity of the stairwell boundaries. This provides more than adequate assurance of fire protection system integrity for the stairwell.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown..

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.68 FA2-601 A-CCW Surge Tank Room

Figure 9A-9 shows the location of this fire area in the R/B roof in the southeast corner. This fire area consists of a single fire zone designated as FA2-601-01. This room contains the A CCW surge tank and the associated instrument, controls, and electrical circuits. Fire loading within the room as a result of the combustibles associated with these contents result in a maximum anticipated fire loading of 2.9E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with no-safety train.

Fire Detection and Suppression Features

FA2-601-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.69 FA2-602 B-CCW Surge Tank Room

Figures 9A-9 and 9A-10 show the location of this fire area in the R/B roof in the southwest corner. The fire area consists of two individual fire zones, FA2-602-01 and FA2-602-02. FA2-602-01 contains the B-CCW surge tank and the associated instrument, controls, and electrical circuits. Fire loading within the room as a result of the combustibles associated with these contents result in a maximum anticipated fire loading of 2.9E+04 Btu/ft^2 within the zone. FA2-602-02 does not have any electrical circuits other than lighting installed within it. Fire loading within this room as a result of these contents is not expected to exceed 2.9E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA2-602-01 and FA2-602-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the south R/B portion of the plant which is within the non-radiologically controlled access area of the R/B. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.70 FA3-101 A-Essential Chiller Unit & Pump Room

Figure 9A-11 shows the location of this fire area on the west side of the east PS/B. This fire area consists of a single fire zone designated as FA3-101-01. This room contains A-essential chilled water system equipment. There is sufficient combustible fire loading from the electrical cables, lube oil, and panels associated with the chilled water unit to result in a maximum anticipated fire loading of 3.1E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA3-101-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be

expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Essential Chilled Water system
- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.71 FA3-102 B-Essential Chiller Unit & Pump Room

Figure 9A-11 shows the location of this fire area on the west side of the east PS/B. This fire area consists of a single fire zone designated as FA3-102-01. This room contains B-essential chilled water system equipment. There is sufficient combustible fire loading from the electrical cables, lube oil, and panels associated with the chilled water unit to result in a maximum anticipated fire loading of 3.1E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA3-102-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following system and safe-shutdown functions associated with safety train B.

- B-Essential Chilled Water system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.72 FA3-103 B-Class 1E GTG Room

Figures 9A-11 and 9A-12 show the location of this fire area on the west side of the east PS/B adjacent to the south portion of the R/B. This fire area consists of three individual fire zones, FA3-103-01, B-GTG Auxiliary Component room, FA3-103-02 zone, and FA3-103-03, B-Class 1E GTG room. B-GTG Auxiliary Component room has combustible fire loading that is not expected to exceed 8.1E+02 Btu/ft^2. FA3-103-02 zone has combustible loading not expected to exceed 1.9E+02 Btu/ft^2. B-Class 1E GTG room has combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading of 2.5E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA3-103-01 and FA3-103-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-103-03 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown function associated with safety train B.

- B-GTG system
- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.73 FA3-104 A-Class 1E GTG Room

Figures 9A-11 and 9A-12 show the location of this fire area on the west side of the east PS/B adjacent to the south portion of the R/B. This fire area consists of four individual fire zones, FA3-104-01, A-GTG Auxiliary Component room, FA3-104-02 zone, FA3-104-03 zone, FA3-104-04 A-Class 1E GTG room. A-GTG Auxiliary Component room has combustible fire loading that is not expected to exceed 9.5E+02 Btu/ft^2. FA3-104-02 has combustible fire loading not expected to exceed 6.2E+02 Btu/ft^2. FA3-104-03 has combustible fire loading not expected to exceed 4.7E+02 Btu/ft^2. A-Class 1E GTG room has combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading of 2.5E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA3-104-01 and FA3-104-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is

provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-104-04 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-GTG system
- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.74 FA3-105 A-AAC GTG Room

Figures 9A-11 and 9A-12 show the location of this fire area on the east side of the east PS/B. This fire area consists of two individual fire zones, FA3-105-01, A-AAC Power Source Starter Battery Room and FA3-105-02 A-AAC GTG room. The FA3-105-01 zone has the combustible fire loading that is not expected to exceed 1.1E+04 Btu/ft^2. FA3-105-02 has the combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading for the room of 3.2E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA3-105-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-105-02 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.75 FA3-106 FA3-106 Area

Figures 9A-11 and 9A-12 show the location of this fire area on the east PS/B. The FA3-106 provides access from the R/B to the train A and B essential chiller unit and pump room, the train A and B GTG auxiliary component rooms. The corridor has the combustible fire loading due to potential transient material that is not expected to exceed 8.5E+01 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA3-106-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The fire area is formed with 3-hour fire rated barriers whose penetrations and openings that are compatible with the 3-hour fire rating. This provides confinement for any smoke generated within the area and prevents smoke intrusion into the area from adjacent areas. Should smoke removal be required from the area, the plant fire brigade has the necessary portable equipment to accomplish this.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems functions and safe-shutdown functions associated with safety train B.

- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.76 FA3-107 FA3-107 Hatch Area

The FA3-107 hatch area is an access from grade level to the B1F plant level and the east power source corridor are and through this area to other R/B B1F areas. The location of the hatch area is depicted on Figures 9A-11. This area contains negligible combustible materials.

The area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA3-107-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke could be removed from the area with portable fan and ducting if required although there are no credible fire scenarios for this area.

Fire Protection Adequacy Evaluation

Since no combustibles are present and this area is only accessed infrequently during plant maintenance, the fire protection provided by the 3-hour fire boundary surrounding this area is adequate fire protection.

Fire Protection System Integrity

There is not equipment located to be damaged by inadvertent fire suppression system activation in this area. There are no fire protections systems to inadvertently actuate.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is not a radiological area. Radiological material is not allowed within this area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.77 FA3-108 C-Essential Chiller Unit & Pump Room

Figure 9A-11 shows the location of this fire area on the east side of the west PS/B. This fire area consists of a single fire zone designated as FA3-108-01. This room contains C-essential chilled water system equipment. There is sufficient combustible fire loading from the electrical cables, lube oil, and panels associated with the chilled water unit to result in a maximum anticipated fire loading of 3.1E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features providing at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA3-108-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Essential Chiller Water system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.78 FA3-109 C-Class 1E GTG Room

Figure 9A-11 and 9A-12 show the location of this fire area on the east side of the west PS/B adjacent to the south portion of the R/B. This fire area consists of three individual fire zones, FA3-109-01, C-GTG Auxiliary Component room, FA3-109-02 zone, and FA3-109-03 C-Class 1E GTG room. C-GTG Auxiliary Component room has combustible fire loading that is not expected to exceed 8.1E+02 Btu/ft^2. FA3-109-02 zone has combustible loading not expected to exceed 1.9E+02 Btu/ft^2. C-Class 1E GTG room has combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading of 2.5E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA3-109-01 and FA3-109-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-109-03 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-GTG system
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.79 FA3-110 D-Essential Chiller Unit & Pump Room

Figure 9A-11 shows the location of this fire area on the west side of the east PS/B. This fire area consists of a single fire zone designated as FA3-109-01. This room contains D-essential chilled water system equipment. There is sufficient combustible fire loading from the electrical cables, lube oil, and panels associated with the chilled water unit to result in a maximum anticipated fire loading of 3.1E+04 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features providing at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA3-110-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-Essential Chilled Water system
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.80 FA3-111 D-Class 1E GTG Room

Figures 9A-11 and 9A-12 show the location of this fire area on the east side of the west PS/B adjacent to the south portion of the R/B. This fire area consists of four individual fire zones, FA3-111-01, D-GTG Auxiliary Component room, FA3-111-02 zone, FA3-111-03 zone, and FA3-111-04, D-Class 1E GTG room. D-GTG Auxiliary Component room has combustible fire loading that is not expected to exceed 9.5E+02 Btu/ft^2. FA3-111-02 has combustible fire loading not expected to exceed 6.2E+02 Btu/ft^2. FA3-111-03 has combustible fire loading not expected to exceed 4.7E+02 Btu/ft^2. D-Class 1E GTG room has combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading of 2.5E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA3-111-01, FA3-111-02 and FA3-111-03 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-111-04 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-GTG system
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.81 FA3-112 FA3-112 Area

Figure 9A-11 shows the location of this fire area on the west PS/B. The FA3-112 provides access from the R/B to the train C and D essential chiller unit and pump room, the train C and D GTG Auxiliary Component rooms. The corridor has the combustible fire loading due to potential transient material that is not expected to exceed 8.5E+01 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA3-112-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. The fire protection piping is seismically supported so that any failure will not cause the piping to impact any safety-related equipment. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required to operate a hose station valve and release water. In the event of a fire, the equipment within the area is protected from significant water intrusion since wiring is located in overhead areas and the small amount of panels, controls and instrumentation are located off the floor by a distance that allows for some water buildup on the floor.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.82 FA3-113 B-AAC GTG Room

Figures 9A-11 and 9A-12 show the location of this fire area on the west side of the west power source buildeing. This fire area consists of two individual fire zones, FA3-113-01 B-AAC Power Source Starter Battery Room and FA3-113-02 B-AAC GTG room. The FA3-113-01 zone has the combustible fire loading that is not expected to exceed 1.1E+04 Btu/ft^2. FA3-113-02 has the combustible loading from the gas turbine package (including fuel in the day tank) results in a maximum anticipated fire loading for the room of 3.2E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA3-113-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA3-113-02 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The potential fire loading from the gas turbine package is addressed with a wet-pipe sprinkler system as recommended by code and regulatory guidance. The fire area has substantial concrete reinforced walls that are designed to seismic category I criteria and are rated for a minimum of 3-hour fire resistance. Additional fire suppression capability is provided with fire hose streams and portable fire extinguishers. In addition both zones of the area are provided with automatic fire detection and manual alarm notification as backup. The combination of structural confinement, automatic fire suppression, automatic fire alarm notification and manual backup provides a defense-in-depth approach toward assuring the fire protection adequacy of this fire area.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The sprinkler system within the room is designed to NFPA 13 and is seismically supported to prevent the sprinkler piping from falling on the safety-related equipment during a design basis earthquake. The manual fire hose are in an alternate area and can only discharge water by deliberate manual action. The fire suppression system is designed to contain the pressure of the water and sprinkler heads are designed to only discharge water if their thermal element indicated a fire condition. Should the sprinkler system inadvertently discharge, the gas turbine is protected by its enclosure. On this basis, there is little potential for an unintended actuation of the fire suppression system adversely affecting the operation of the plant.

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.83 FA3-114 Cable Tray Space

Figure 9A-12 shows the location of this fire area on the west PS/B. This fire area consists of a single fire zone designated as FA3-11401. This room is used for cable tray routing within the PS/B. The high voltage, low voltage, control and instrumentation cables routed through the fire area are non-divisional cables associated with main turbine operation. Overall fire loading within the area is not expected to exceed 1.0E+05 Btu/ft^2.

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train.

Fire Detection and Suppression Features

FA3-114-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The combustible fire loading within the area low and corridor is extremely low and not deemed capable of supporting a fire that could compromise the structural boundaries of the corridor. The fire loading is evenly distributed within the fire area and not concentrated in a single location. Automatic fire detection is provided to alert the main control room and initiate fire brigade response to an event in this area. Since there are only qualified electrical cables installed in this area, ignition sources are limited and the potential for a fire to occur consequently low. As a fire in the area would not compromise safety-related equipment and would be confined to the area, manual fire suppression is deemed an adequate fire suppression strategy for this corridor area.

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The PS/B is a non-radiological area and no radiological material is located in this fire zone. Therefore, a fire within the cable tray space area would not result in a radioactive release to the environment.

9A.3.84 FA3-115 A-Class 1E Battery Room

Figure 9A-11 shows the location of this fire area on the east side of east PS/B. This fire area consists of a single fire zone designated as FA3-115-01. This room contains the train A batteries. The fire loading due to this combustible content is not expected to exceed 1.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA3-115-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In

the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical system functions and safe-shutdown function associated with safety train A.

- A-Class 1E Battery
- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.85 FA3-116 B-Class 1E Battery Room

Figure 9A-11 shows the location of this fire area on the east side of east PS/B. This fire area consists of a single fire zone designated as FA3-116-01. This room contains the train B batteries. The fire loading due to this combustible content is not expected to exceed 1.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA3-116-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Class 1E Battery
- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.86 FA3-117 A-Class 1E Battery Charger Room

Figure 9A-11 shows the location of this fire area on the east side of the east PS/B. This fire area consists of a single fire zone designated as FA3-117-01. This room contains the train A DC control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.0E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA3-117-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the

expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train A.

- A-Class 1E Power system

Since this fire area is separated from the Train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.87 FA3-118 B-Class 1E Battery Charger Room

Figure 9A-11 shows the location of this fire area on the east side of the east PS/B. This fire area consists of a single fire zone designated as FA3-118-01. This room contains the train B DC control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.1E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating.

Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train B.

Fire Detection and Suppression Features

FA3-118-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train B.

- B-Class 1E Power system

Since this fire area is separated from the Train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.88 FA3-119 Spare Battery Charger-1 Room

Figure 9A-11 shows the location of this fire area on the middle of the east PS/B. This fire area consists of a single fire zone designated as FA3-119-01. This room contains the train N dc control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.3E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train N

Fire Detection and Suppression Features

FA3-119-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. All fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.89 FA3-120 C-Class 1E Battery Room

Figure 9A-11 shows the location of this fire area on the west side of west PS/B. This fire area consists of a single fire zone designated as FA3-120-01. This room contains the train C batteries. The fire loading due to this combustible content is not expected to exceed 1.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA3-120-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown funtions associated with safety train C.

- C-Class 1E Battery
- C-Class 1E Power system

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.90 FA3-121 D-Class 1E Battery Room

Figure 9A-11 shows the location of this fire area on the west side of west PS/B. This fire area consists of a single fire zone designated as FA3-121-01. This room contains the train D batteries. The fire loading due to this combustible content is not expected to exceed 1.4E+05 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA3-121-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-Class 1E Battery
- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.91 FA3-122 C-Class 1E Battery Charger Room

Figure 9A-11 shows the location of this fire area on the west side of the west PS/B. This fire area consists of a single fire zone designated as FA3-122-01. This room contains the train C DC control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.1E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA3-122-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room

and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train C.

- C-Class 1E Power sysytem

Since this fire area is separated from the Train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.92 FA3-123 D-Class 1E Battery Charger Room

Figure 9A-11 shows the location of this fire area on the west side of the west PS/B. This fire area consists of a single fire zone designated as FA3-123-01. This room contains the train D dc control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.0E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA3-123-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. Since this is a safety-related area, all fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will damage the following typical systems and safe-shutdown functions associated with safety train D.

- D-Class 1E Power system

Since this fire area is separated from the Train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.93 FA3-124 Spare Battery Charger-2 Room

Figure 9A-11 shows the location of this fire area on the middle of the west PS/B. This fire area consists of a single fire zone designated as FA3-124-01. This room contains the train N DC control center, inverter and transformer (battery charger) electrical panel, instruments and controls, with low voltage and control electrical cables associated with battery charging. The fire loading due to this combustible content is not expected to exceed 5.3E+04 Btu/ft^2.

The borders of this fire area are constructed using construction techniques and material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train N

Fire Detection and Suppression Features

FA3-124-01 is provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from

manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Any HVAC ductwork passing into the area is provided with automatic closing fire dampers at fire area boundaries as required by NFPA 90A. Smoke migration into the area is mitigated by appropriately sealed penetrations and openings of the fire area boundaries. Smoke removal as required due to fire within the area can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from manual hose streams applied by the plant fire brigade. The standpipe is designed to code (NFPA 14) and unlikely to release water except after extreme seismic events. All fire protection system piping is seismically supported to prevent its falling on safety-related equipment during an event and causing damage. Unintended operation of the fire suppression activity is not expected since deliberate manual activation is required. In the event of a fire, electrical cables and equipment in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not impact any safe-shutdown functions, and the equipment in 4 safety trains will remain unaffected by the fire. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown..

Radioactive Release to Environment Evaluation

This area is located in the PS/B which is not a radiological area. Radiological material is not allowed within this building area by administrative controls. There are no piping systems in the area that could contain fluids with radiological content. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

9A.3.94 FA4-101 Auxiliary Building

The A/B is classified as one fire area consisting of twenty four fire zones which do not contain any safety train cables, equipment, or functions associated with safe-shutdown. The A/B layout and associated fire zones is shown in Figures 9A-13 through 9A-17. The following listing provides the indivisual designation, number of the fire zone, and maximum expected fire load for each A/B fire zone.

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA4-101-01	Auxiliary Building B1F Floor	3.1E+04
FA4-101-02	FA4-101-02 Stairwell (B1F～3F)	6.2E+02
FA4-101-03	Boric Acid Tank Room	7.7E+02
FA4-101-04	Auxiliary Building 1F Floor	3.2E+04
FA4-101-05	FA4-101-05 Stairwell (2F～Roof)	9.3E+02
FA4-101-06	Non-Class 1E Electrical Room (FA4-101-06)	3.3E+05
FA4-101-07	Computer Room	8.2E+03
FA4-101-08	Non-Class 1E I&C Room (FA4-101-08)	3.5E+04
FA4-101-09	Radwaste Control Room	5.7E+04
FA4-101-10	FA4-101-10 Corridor	2.7E+04
FA4-101-11	Non-Class 1E I&C Room (FA4-101-11)	3.3E+04
FA4-101-12	Non-Class 1E I&C Room (FA4-101-12)	3.8E+04
FA4-101-13	Non-Class 1E Electrical Room (FA4-101-13)	2.6E+04
FA4-101-14	Communication System Equipment Room	9.8E+03
FA4-101-15	Resin Fill Tank Room	2.7E+04
FA4-101-16	Non-Class1E Battery Room	9.0E+04
FA4-101-17	Boric Acid Batching Tank Room	5.8E+02
FA4-101-18	HVAC Equipment Room (FA4-101-18)	2.9E+04
FA4-101-19	TSC Emergency Filtration Unit & Fan Room	3.9E+04
FA4-101-20	HVAC Equipment Room (FA4-101-20)	2.8E+04
FA4-101-21	C/V Low Volume Purge Exhaust Filtration Unit Room	4.0E+04
FA4-101-22	Hold Up Tank Room	2.9E+02

FA4-101-23	Instrument Maintenance Shop (Cold)	5.0E+01
FA4-101-24	Auxiliary Building Roof	2.4E+01

The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hour fire resistance.

The area is identified as being associated with non-safety train N.

Fire Detection and Suppression Features

FA4-101-07, FA4-101-08, FA4-101-11 and FA4-101-12 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

FA4-101-19 and FA4-101-21 are provided with automatic smoke/heat detection, and manual fire alarm pull station is installed as secondary detection. Filter Unit has water spray, and primary fire suppression for this zone is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

FA4-101-03 and FA4-101-22 are provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Other fire zones are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

Smoke migration between fire zones is mitigated by appropriately sealed penetrations and openings between zones. Smoke removal as required due to fire within the area to support manual fire fighting efforts is normally vented by the A/B ventilation system and released after appropriate filtration to remove radioactive particulates. Smoke removal from individual zones can be assisted by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

The combustible loading in this area is moderate and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from automatic sprinkler systems and manual hose streams applied by the plant fire brigade. The sprinkler system is designed to code (NFPA 13), the standpipe is designed to code (NFPA 14). These systems have high integrity to guard against inadvertent discharge. Should a fire suppression system discharge, no safety-related equipment would be impacted and no radiological release would be incurred. In the event of a fire, electrical cables, equipment, and instruments in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

Because the safe-shutdown functions are separated from this fire zone, the fire in this area will not impact the ability to achieve and maintain safe plant shutdown.

Radioactive Release to Environment Evaluation

The A/B is used to process radwaste resulting from plant operation, and from refueling and maintenance outages. As such, a fire within the Radwaste areas has the potential to release radioactive material. Smoke release from a fire within the A/B is via a filtered exhaust path that will remove radiological material prior to release. Any fire suppression system water discharge would be contained within the A/B and could be processed prior to release to the environment. The A/B is a separate fire area with complete 3-hour fire separation from adjacent safety-related areas. The reinforced concrete construction of most Radwaste handling areas, the fire barrier confinement, automatic fire suppression, and filtered exhaust path provide defense-in-depth assurance that a fire within the A/B would not result is adverse radioactive release to the environment.

9A.3.95 FA5-101 Access Control Building

The FA5-101 AC/B is located adjacent to the west side of the A/B. The AC/B is a three story building providing plant support functions such as security access control to the plant, hot and cold locker rooms for plant personnel, health physics office, radio chemistry laboratory, and miscellaneous support activities. The AC/B is classified as one fire area consisting of two fire zones which do not contain any safety train cables, equipment, or functions associated with safe-shutdown. The maximum fire loading in

FA5-101-01 is 2.9E+04 Btu/ft^2 and the maximum fire loading in FA5-101-02 is 2.7E+04 Btu/ft^2

The border of this fire area with the adjacent A/B is constructed using reinforced concrete and other material which results in fire resistance that provides at least a 3-hour ASTM E-119 fire rating. Openings and penetrations with this border wall are protected with fire protection features provide at least 3-hour fire resistance. The other walls of the AC/B are not assigned a fire rating.

The area is identified as being associated with non-safety train N.

Fire Detection and Suppression Features

FA5-101-01 and FA5-101-02 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

Smoke Control Features

Smoke migration into the area is mitigated by appropriately sealed penetrations and openings into the fire area. Smoke removal as required due to fire within the area to support manual fire fighting efforts can be accomplished by the plant fire brigade utilizing portable fans and flexible ducting.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls in excess of 8 inches thick and 3-hour rated fire doors and protected penetrations and openings are provided for fire confinement. HVAC ductwork providing cooling and exhaust to and from the pump room and cooling unit room is equipped with fire dampers in accordance with the guidance of NFPA 90A.

If the fire were of sufficient intensity, the automatic wet-pipe sprinkler system would operate to control or extinguish the fire. Fire brigade response can be supported from adjacent fire hydrants or hose stations within the A/B. The combustible loading in this area is light and a fire of sufficient size and intensity to compromise the fire barrier boundaries is not deemed credible.

The fire protection system for this room is designed in accordance with NFPA 72 and 14, and is the combination of smoke detectors and manual hose stations. Based on the expected fire hazards within the compartment during normal operation and the maximum expected fire during equipment maintenance, the 3-hour fire rated boundaries of the compartment are more than sufficient to contain any unsuppressed fire that can be expected to occur within the compartment. On this basis, there is adequate fire protection provided for this compartment (fire area).

Fire Protection System Integrity

The fire protection capability for this area is provided from an automatic sprinkler system and manual hose streams applied by the plant fire brigade. The sprinkler system is designed to code (NFPA 13) the standpipe is designed to code (NFPA 14), and the fire main is designed to code (NFPA 24). These systems have high integrity to guard against inadvertent discharge. Should the fire suppression system discharge, no safety-related equipment would be impacted and no radiological release would be incurred. In the event of a fire, electrical cables, equipment, and instruments in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Safe Shutdown Evaluation

A fire in this area will not adversely impact the ability of safe-shutdown functions. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The AC/B serves as a controlled access to the radiological areas of the plant. Radiological materials are not contained within the AC/B. The AC/B is separated form the adjacent A/B containing radiological materials by 3-hour fire rated boundaries. The fire load in the AC/B is very low, automatic wet-pipe sprinkler protection is provided, and equipment to support manual fire suppression is provided. These defense-in-depth measures provide adequate assurance that a fire occurrence within the AC/B would not lead to a radioactive release.

9A.3.96 FA6-101 Turbine Building

Figures 9A-20 through 9A-26 show the twenty three fire zones associated with the T/B fire area, FA6-101. The T/B contains no equipment classified as safety-related or important to safety and is considered to be one fire area throughout to isolate the building from the adjacent R/B and PS/B which contain safety-related equipment. The following listing provides the individual designation, number of the fire zones, and maximum expected fire load for each T/B fire zone.

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA6-101-01	Turbine Building B1F Floor	2.7E+04
FA6-101-02	Turbine Building 1F Floor	2.8E+04
FA6-101-03	Electric Room (1F)	3.5E+04
FA6-101-04	FA6-101-04 Zone	2.7E+04
FA6-101-05	FA6-101-05 Stairwell	9.3E+02
FA6-101-06	FA6-101-06 Stairwell	9.3E+02
FA6-101-07	FA6-101-07 E.V Shaft	4.7E+02
FA6-101-08	FA6-101-08 Stairwell	9.3E+02

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA6-101-09	FA6-101-09 Stairwell	9.3E+02
FA6-101-10	FA6-101-10 Stairwell	9.3E+02
FA6-101-11	FA6-101-11 Stairwell	9.3E+02
FA6-101-12	Sampling Room	4.0E+01
FA6-101-13	Turbine Building 2F Floor	2.8E+04
FA6-101-14	Electrical Room (2F)	3.3E+04
FA6-101-15	FA6-101-15 Zone	2.7E+04
FA6-101-16	Turbine Lube Oil Tank Room	2.9E+06
FA6-101-17	Turbine Building 3F Floor	2.8E+04
FA6-101-18	Security Room (FA6-101-18)	6.2E+02
FA6-101-19	Turbine Building Operation Floor	2.8E+04
FA6-101-20	Tool Room (FA6-101-20)	9.3E+01
FA6-101-21	Tool Room (FA6-101-21)	4.4E+01
FA6-101-22	Security Room (FA6-101-22)	6.2E+02
FA6-101-23	Security Room (FA6-101-23)	6.2E+02

Fire Detection and Suppression Features

FA6-101-01, FA6-101-02, FA6-101-13, FA6-101-17 FA6-101-04 FA6-101-15 and FA6-101-16 are provided with manual fire alarm pull station. Primary fire suppression is provided from wet-pipe automatic sprinkler system. Secondary suppression is provided from manual fire hose station.

FA6-101-19 is provided with UV/IR flame detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from manual fire hose station. Secondary suppression is provided from portable fire extinguishers.

FA6-101-03 and FA6-101-14 are provided with automatic smoke detection, and manual fire alarm pull station is installed as secondary detection. Primary fire suppression is provided from preaction sprinkler.

Other fire zones are provided with manual fire alarm pull station. Primary fire suppression is provided from manual fire hose stations. Secondary suppression is provided from portable fire extinguishers.

Smoke Control Features

The T/B is provides with automatic opening smoke vents in the building roof. Supplementary smoke removal can be accomplished by the plant fire brigade using portable fans and ducting. Except for isolated rooms, smoke accumulation is not expected to be a problem due to the tremendous internal volume of the building.

Fire Protection Adequacy Evaluation

The overall fire loading within the T/B is low. Special hazards are protected and a general area fire sprinkler system that is provided for all floor level below the turbine deck will actuate to suppress the a turbine lube oil fire. The structural wall between the T/B and the adjacent R/B is of substantial reinforced concrete construction which provides a fire resistance in excess of a 3-hour ASTM E-119 fire exposure.

Fire Protection System Integrity

The fire protection capability for this area is provided from an automatic sprinkler system and manual hose streams applied by the plant fire brigade. The sprinkler system is designed to code (NFPA 13) the standpipe is designed to code (NFPA 14), and the fire main is designed to code (NFPA 24). These systems have high integrity to guard against inadvertent discharge. Should the fire suppression system discharge, no safety-related equipment would be impacted and no radiological release would be incurred. In the event of a fire, electrical cables, equipment, and instruments in the area would be protected from significant water intrusion since they are installed above the floor elevation above expected flooding levels.

Critical equipment within the T/B is protected with spray shields or similar protective features from an inadvertent suppression system discharge.

Safe Shutdown Evaluation

Because the safe-shutdown functions are separated from this fire zone, the fire in this area will not impact the ability to achieve and maintain safe plant shutdown.

Radioactive Release to Environment Evaluation

The T/B is anon-radiological area that contains no radioactive material within the building or its systems. A fire in these areas therefore deemed not credible of causing a radiological release.

9A.3.97 FA7-101 A-Essential Service Water Piping Tunnel

Figure 9A-27 shows the location of this fire area. This area is provided for the routing of cooling water piping between the ultimate heat sink and the component cooling water heat exchanger and associated safety train A components. The tunnel is constructed of reinforced concrete to maintain structural soundness and appropriate fire separation from adjacent piping tunnels and the R/B. All penetrations into this tunnel are appropriately sealed for 3-hour fire resistance. The tunnel has minimal fire loading but does contain high voltage and instrumentation cable associate with essential service water pump A.

The area is identified as being associated with safety train A.

Fire Detection and Suppression Features

FA7-101-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from portable fire extinguishers.

Smoke Control Features

Any smoke generated within the tunnel would be confined to the tunnel area. The fire brigade could provide ventilation of any smoke from the tunnel using portable equipment.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area since there is minimal fire load to support it. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

Since there are no automatic or manual system within the tunnel, the fire protection system integrity for this area is assured by the the structural fire protection.

Safe Shutdown Evaluation

A fire in this area will damage the following systems and safe-shutdown functions associated with safety train A.

- A-ESWS

Since this fire area is separated from the train B, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

The essential service water piping tunnel is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the piping tunnel is not deemed capable of producing a radioactive release.

9A.3.98 FA7-102 B-Essential Service Water Piping Tunnel

Figure 9A-27 shows the location of this fire area. This area is provided for the routing of cooling water piping between the ultimate heat sink and the component cooling water heat exchanger and associated safety train B components. The tunnel is constructed of reinforced concrete to maintain structural soundness and appropriate fire separation from adjacent piping tunnels and the R/B. All penetrations into this tunnel are appropriately sealed for 3-hour fire resistance. The tunnel has minimal fire loading but does contain high voltage and instrumentation cable associated with essential service water pump B.

The area is identified as being associated with safety train B

Fire Detection and Suppression Features

FA7-102-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from portable fire extinguishers.

Smoke Control Features

Any smoke generated within the tunnel would be confined to the tunnel area. The fire brigade could provide ventilation of any smoke from the tunnel using portable equipment.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area since there is minimal fire load to support it. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

Since there are no automatic or manual system within the tunnel, the fire protection system integrity for this area is assured by the significant protection provide by the structural fire protection provided.

Safe Shutdown Evaluation

A fire in this area will damage the following system and safe-shutdown functions associated with safety train B.

- B-ESWS

Since this fire area is separated from the train A, C, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

The essential service water piping tunnel is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the piping tunnel is not deemed capable of producing a radioactive release.

9A.3.99 FA7-103 C-Essential Service Water Piping Tunnel

Figure 9A-27 shows the location of this fire area. This area is provided for the routing of cooling water piping between the ultimate heat sink and the component cooling water heat exchanger and associated safety train C components. The tunnel is constructed of reinforced concrete to maintain structural soundness and appropriate fire separation from adjacent piping tunnels and the R/B. All penetrations into this tunnel are appropriately sealed for 3-hour fire resistance. The tunnel has minimal fire loading but does contain high voltage and instrumentation cable associate with essential service water pump C.

The area is identified as being associated with safety train C.

Fire Detection and Suppression Features

FA7-103-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from portable fire extinguishers.

Smoke Control Features

Any smoke generated within the tunnel would be confined to the tunnel area. The fire brigade could provide ventilation of any smoke from the tunnel using portable equipment.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area since there is minimal fire load to support it. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

Since there are no automatic or manual system within the tunnel, the fire protection system integrity for this area is assured by the significant protection provide by the structural fire protection provided.

Safe Shutdown Evaluation

A fire in this area will damage the following system and safe-shutdown functions associated with safety train C.

- C-ESWS

Since this fire area is separated from the train A, B, and D areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

The essential service water piping tunnel is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the piping tunnel is not deemed capable of producing a radioactive release.

9A.3.100 FA7-104 D-Essential Service Water Piping Tunnel

Figure 9A-27 shows the location of this fire area. This area is provided for the routing of cooling water piping between the ultimate heat sink and the component cooling water heat exchanger and associated safety train D components. The tunnel is constructed of reinforced concrete to maintain structural soundness and appropriate fire separation from adjacent piping tunnels and the R/B. All penetrations into this tunnel are appropriately sealed for 3-hour fire resistance. The tunnel has minimal fire loading but does contain high voltage and instrumentation cable associate with essential service water pump D.

The area is identified as being associated with safety train D.

Fire Detection and Suppression Features

FA7-104-01 is provided with manual fire alarm pull station. Primary fire suppression is provided from portable fire extinguishers.

Smoke Control Features

Any smoke generated within the tunnel would be confined to the tunnel area. The fire brigade could provide ventilation of any smoke from the tunnel using portable equipment.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area since there is minimal fire load to support it. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

Since there are no automatic or manual system within the tunnel, the fire protection system integrity for this area is assured by the significant protection provide by the structural fire protection provided.

Safe Shutdown Evaluation

A fire in this area will damage the following system and safe-shutdown functions associated with safety train D.

- D-ESWS

Since this fire area is separated from the train A, B, and C areas by 3-hour fire rated barriers, two safety trains of equipment in other fire areas can achieve and maintain safe-shutdown from full power, and the fire in this fire area, therefore, will not adversely impact the ability of achieving safe-shutdown.

Radioactive Release to Environment Evaluation

The essential service water piping tunnel is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the piping tunnel is not deemed capable of producing a radioactive release.

9A.4 References

9A-1 "Fire Protection for Nuclear Power Plants," Regulatory Guide 1.189, Revision 1 U.S. Nuclear Regulatory Commission, Washington, DC March 2007

9A-2 "Fire Protection," Energy Title 10 Code of Federal Regulations Part 50, Appendix A, GDC 3, U.S. Nuclear Regulatory Commission, Washington, DC.

9A-3 "Standard Test methods for Fire Test of Building Construction and Materials", ASTM E-119-07, ASTM International, West Conshohocken, PA, 2007.

9A-4 "Fire Protection Handbook", 19th Edition, National Fire Protection Association (NFPA), Quincy, MA, 2003.

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 1 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
C/V		FA1-101		FA1-101-01	C/V Reactor Coolant Drain Pump Room
C/V		FA1-101		FA1-101-02	Header Compartment
C/V		FA1-101		FA1-101-03	Reactor Cavity
C/V		FA1-101		FA1-101-04	C/V 2F Southeastern Part Floor Zone
C/V		FA1-101		FA1-101-05	C/V 2F Southwestern Part Floor Zone
C/V		FA1-101		FA1-101-06	C/V 2F Northwestern Part Floor Zone
C/V		FA1-101		FA1-101-07	C/V 2F Northeastern Part Floor Zone
C/V		FA1-101		FA1-101-08	B-Loop Room
C/V		FA1-101		FA1-101-09	C-Loop Room
C/V		FA1-101		FA1-101-10	D-Loop Room
C/V		FA1-101		FA1-101-11	A-Loop Room
C/V		FA1-101		FA1-101-12	C/V Reactor Coolant Drain Tank Room
C/V	A,B,C,D ,N	FA1-101	C/V Area	FA1-101-13	FA1-101-13 Zone
C/V		FA1-101		FA1-101-14	FA1-101-14 E.V Shaft
C/V		FA1-101		FA1-101-15	C/V 3F Southeastern Part Floor Zone
C/V		FA1-101		FA1-101-16	C/V 3F Southwestern Part Floor Zone
C/V		FA1-101		FA1-101-17	C/V 3F Northwestern Part Floor Zone
C/V		FA1-101		FA1-101-18	C/V 3F Northeastern Part Floor Zone
C/V		FA1-101		FA1-101-19	Regenerative Hx room
C/V		FA1-101		FA1-101-20	FA1-101-20 Zone
C/V		FA1-101		FA1-101-21	Pressurizer Room
C/V		FA1-101		FA1-101-22	Excess Letdown Hx Room
C/V		FA1-101		FA1-101-23	C/V 4F Southeastern Part Floor Zone
C/V		FA1-101		FA1-101-24	C/V 4F Southwestern Part Floor Zone
C/V		FA1-101		FA1-101-25	C/V 4F Northwestern Part Floor Zone
C/V		FA1-101		FA1-101-26	C/V 4F Northeastern Part Floor Zone
R/B	N	FA2-101	FA2-101 Stairwell (B1F～Roof)	FA2-101-01	FA2-101-01 Stairwell (B1F～Roof)
R/B	A	FA2-102	A-Emergency Feedwater Pump (T/D) Room	FA2-102-01	A-Emergency Feedwater Pump (T/D) Room
R/B	B	FA2-103	B-Emergency Feedwater Pump (M/D) Room	FA2-103-01	B-Emergency Feedwater Pump (M/D) Room

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 2 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	A	FA2-104	A-Component Cooling Water Pump Room	FA2-104-01	A-Component Cooling Water Pump Room
R/B	B	FA2-105	B-Component Cooling Water Pump Room	FA2-105-01	B-Component Cooling Water Pump Room
R/B	C	FA2-106	C-Component Cooling Water Pump Room	FA2-106-01	C-Component Cooling Water Pump Room
R/B	D	FA2-107	D-Component Cooling Water Pump Room	FA2-107-01	D-Component Cooling Water Pump Room
R/B	D	FA2-108	D-Emergency Feedwater Pump (T/D) Room	FA2-108-01	D-Emergency Feedwater Pump (T/D) Room
R/B	C	FA2-109	C-Emergency Feedwater Pump (M/D) Room	FA2-109-01	C-Emergency Feedwater Pump (M/D) Room
R/B	N	FA2-110	FA2-110 E.V Shaft	FA2-110-01	FA2-110-01 E.V Shaft
R/B	A	FA2-111	FA2-111 Corridor	FA2-111-01	FA2-111-01 Corridor
R/B	D	FA2-112	FA2-112 Corridor	FA2-112-01	FA2-112-01 Corridor
R/B	A	FA2-113	A-SI Pump Room, CS/RHR Pump Room Area	FA2-113-01	A-SI Pump Room
R/B	A	FA2-113		FA2-113-02	A-CS/RHR Pump Room
R/B	A	FA2-113		FA2-113-03	FA2-113-03 Corridor
R/B	B	FA2-114	B-SI Pump Room, CS/RHR Pump Room Area	FA2-114-01	B-SI Pump Room
R/B	B	FA2-114		FA2-114-02	B-CS/RHR Pump Room
R/B	B	FA2-114		FA2-114-03	FA2-114-03 Corridor
R/B	C	FA2-115	C-SI Pump Room, CS/RHR Pump Room Area	FA2-115-01	C-SI Pump Room
R/B	C	FA2-115		FA2-115-02	C-CS/RHR Pump Room
R/B	C	FA2-115		FA2-115-03	FA2-115-03 Corridor
R/B	D	FA2-116	D-SI Pump Room, CS/RHR Pump Room Area	FA2-116-01	D-SI Pump Room
R/B	D	FA2-116		FA2-116-02	D-CS/RHR Pump Room
R/B	D	FA2-116		FA2-116-03	FA2-116-03 Corridor
R/B	N	FA2-117	FA2-117 Area	FA2-117-01	FA2-117-01 Corridor
R/B	A	FA2-117		FA2-117-02	A-Charging Pump Room
R/B	D	FA2-117		FA2-117-03	B-Charging Pump Room
R/B	N	FA2-117		FA2-117-04	Piping Room for Charging Pump
R/B	D	FA2-117		FA2-117-05	FA2-117-05 Corridor
R/B	N	FA2-117		FA2-117-06	Seal Water Hx Room
R/B	D	FA2-117		FA2-117-07	FA2-117-07 Corridor
R/B	A	FA2-117		FA2-117-08	FA2-117-08 Corridor

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 3 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	N	FA2-117	FA2-117 Area	FA2-117-09	Refueling Water Recirculation Pump Room
R/B	N	FA2-117		FA2-117-10	FA2-117-10 Piping Room
R/B	A	FA2-117		FA2-117-11	A-Spent Fuel Pit Pump Room
R/B	A	FA2-117		FA2-117-12	A-Spent Fuel Pit Hx Room
R/B	D	FA2-117		FA2-117-13	B-Spent Fuel Pit Hx Room
R/B	D	FA2-117		FA2-117-14	B-Spent Fuel Pit Pump Room
R/B	N	FA2-117		FA2-117-15	FA2-117-15 Truck Access
R/B	N	FA2-117		FA2-117-16	FA2-117-16 Piping Room
R/B	N	FA2-117		FA2-117-17	FA2-117-17 Corridor
R/B	N	FA2-117		FA2-117-18	FA2-117-18 Zone
R/B	A	FA2-117		FA2-117-19	FA2-117-19 2F Eastside Corridor
R/B	N	FA2-117		FA2-117-20	Volume Control Tank Room
R/B	N	FA2-117		FA2-117-21	FA2-117-21 Piping Room
R/B	N	FA2-117		FA2-117-22	FA2-117-22 Zone
R/B	N	FA2-117		FA2-117-23	FA2-117-23 Piping Room
R/B	N	FA2-117		FA2-117-24	FA2-117-24 Piping Room
R/B	N	FA2-117		FA2-117-25	FA2-117-25 Piping Room
R/B	N	FA2-117		FA2-117-26	FA2-117-26 Piping Room
R/B	N	FA2-117		FA2-117-27	Spent Fuel Handling Zone
R/B	N	FA2-117		FA2-117-28	FA2-117-28 Corridor
R/B	N	FA2-117		FA2-117-29	B-Annulus Emergency Exhaust Filtration Unit & Fan Room
R/B	N	FA2-117		FA2-117-30	FA2-117-30 Piping Room
R/B	A	FA2-117		FA2-117-31	FA2-117-31 3F Eastside Corridor
R/B	N	FA2-117		FA2-117-32	A-Annulus Emergency Exhaust Filtration Unit & Fan Room
R/B	A	FA2-117		FA2-117-33	FA2-117-33 Piping Room
R/B	B	FA2-117		FA2-117-34	R/B-4F Electrical Penetration Area (FA2-117-34)
R/B	N	FA2-117		FA2-117-35	C/V Equipment Hatch R/B side Room
R/B	N	FA2-117		FA2-117-36	C/V Radiation Gas Monitor Room

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 4 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	N	FA2-117	FA2-117 Area	FA2-117-37	Pass Sampling Rack Room
R/B	N	FA2-117		FA2-117-38	Plant Vent Radiation Gas Monitor Room
R/B	N	FA2-117		FA2-117-39	Fuel Inspection Room
R/B	N	FA2-117		FA2-117-40	R/B-4F Penetration Area (FA2-117-40)
R/B	C	FA2-117		FA2-117-41	R/B-4F Electrical Penetration Area (FA2-117-41)
R/B	A	FA2-117		FA2-117-42	FA2-117-42 2F Westside Corridor
R/B	D	FA2-117		FA2-117-43	FA2-117-43 3F Westside Corridor
R/B	N	FA2-117		FA2-117-44	FA2-117-44 4F Westside Corridor
R/B	N	FA2-118	FA2-118 E.V Shaft	FA2-118-01	FA2-118-01 E.V Shaft
R/B	N	FA2-119	FA2-119 Stairwell	FA2-119-01	FA2-119-01 Stairwell
R/B	A	FA2-120	A-RHR Piping Room Area	FA2-120-01	R/B Sump Tank Room
R/B	A	FA2-120		FA2-120-02	A-RHR Piping Room
R/B	A	FA2-120		FA2-120-03	FA2-120-03 Corridor
R/B	A	FA2-120		FA2-120-04	A-CS/RHR Hx Room
R/B	A	FA2-120		FA2-120-05	A-Safeguard Component Area AHU Room
R/B	A	FA2-120		FA2-120-06	R/B-2F A-Piping Penetration Area (FA2-120-06)
R/B	A	FA2-120		FA2-120-07	C/V Personel Airlock Zone
R/B	N	FA2-121	FA2-121 Corridor	FA2-121-01	FA2-121-01 Corridor
R/B	N	FA2-121		FA2-121-02	FA2-121-02 Corridor
R/B	N	FA2-122	FA2-122 Stairwell (B1F～Roof)	FA2-122-01	FA2-122-01 Stairwell (B1F～Roof)
R/B	N	FA2-123	Tendon Gallery Access Hatch Area	FA2-123-01	Tendon Gallery Access Hatch Area
R/B	N	FA2-124	FA2-124 Corridor	FA2-124-01	FA2-124 -01 Corridor
R/B	B	FA2-151	B-RHR Piping Room Area	FA2-151-01	B-RHR Piping Room
R/B	B	FA2-151		FA2-151-02	B-Safeguard Component Area AHU Room
R/B	B	FA2-151		FA2-151-03	B-CS/RHR Hx Room
R/B	B	FA2-151		FA2-151-04	FA2-151-04 Corridor
R/B	B	FA2-151		FA2-151-05	FA2-151-05 Zone
R/B	B	FA2-151		FA2-151-06	R/B 2F B-Piping Penetration Area (FA2-151-06)
R/B	C	FA2-152	C-RHR Piping Room Area	FA2-152-01	C-RHR Piping Room
R/B	C	FA2-152		FA2-152-02	C-Safeguard Component Area AHU Room

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 5 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	C	FA2-152	C-RHR Piping Room Area	FA2-152-03	C-CS/RHR Hx Room
R/B	C	FA2-152		FA2-152-04	FA2-152-04 Corridor
R/B	C	FA2-152		FA2-152-05	R/B-2F C-Piping Penetration Area (FA2-152-05)
R/B	C	FA2-152		FA2-152-06	R/B-2F C-Piping Penetration Area (FA2-152-06)
R/B	D	FA2-153	D-RHR Piping Room Area	FA2-153-01	D-RHR Piping Room
R/B	D	FA2-153		FA2-153-02	FA2-153-02 Corridor
R/B	D	FA2-153		FA2-153-03	D-CS/RHR Hx Room
R/B	D	FA2-153		FA2-153-04	D-Safeguard Component Area AHU Room
R/B	D	FA2-153		FA2-153-05	R/B-2F D-Piping Penetration Area (FA2-153-05)
R/B	B	FA2-201	FA2-201 Corridor	FA2-201-01	FA2-201-01 Corridor
R/B	B	FA2-201		FA2-201-02	FA2-201-02 Corridor
R/B	A	FA2-202	A-Class 1E Electrical Room	FA2-202-01	A-Class 1E Electrical Room
R/B	B	FA2-203	B-Class 1E Electrical Room	FA2-203-01	B-Class 1E Electrical Room
R/B	C	FA2-204	C-Class 1E Electrical Room	FA2-204-01	C-Class 1E Electrical Room
R/B	D	FA2-205	D-Class 1E Electrical Room	FA2-205-01	D-Class 1E Electrical Room
R/B	C	FA2-206	FA2-206 Corridor	FA2-206-01	FA2-206-01 Corridor
R/B	C	FA2-206		FA2-206-02	FA2-206-02 Corridor
R/B	N	FA2-207	FA2-207 Buttress Shaft	FA2-207-01	FA2-207-01 Buttress Shaft (east side)
R/B	N	FA2-208	FA2-208 Buttress Shaft	FA2-208-01	FA2-208-01 Buttress Shaft (west side)
R/B	A	FA2-301	FA2-301 Area	FA2-301-01	FA2-301-01 Zone
R/B	A	FA2-302	A-Class 1E UPS Room	FA2-302-01	A-Class 1E UPS Room
R/B	B	FA2-303	B-Class 1E UPS Room	FA2-303-01	B-Class 1E UPS Room
R/B	A	FA2-304	A-Class 1E I&C Room	FA2-304-01	A-Class 1E I&C Room
R/B	A	FA2-304		FA2-304-02	A-Class 1E I&C Room Raised Floor
R/B	-	FA2-305	Deleted	-	-
R/B	-	FA2-306	Deleted	-	-
R/B	B	FA2-307	B-Class 1E I&C Room	FA2-307-01	B-Class 1E I&C Room
R/B	B	FA2-307		FA2-307-02	B-Class 1E I&C Room Raised Floor

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 6 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	A,B,C,D	FA2-308	Main Control Room	FA2-308-01	Main Control Room
R/B	A,B,C,D	FA2-308		FA2-308-02	Staff Room
R/B	A,B,C,D	FA2-308		FA2-308-03	Main Control Room Raised Floor
R/B	D	FA2-309	D-Class 1E I&C Room	FA2-309-01	D-Class 1E I&C Room
R/B	D	FA2-309		FA2-309-02	D-Class 1E I&C Room Raised Floor
R/B	-	FA2-310	Deleted	-	-
R/B	-	FA2-311	Deleted	-	-
R/B	C	FA2-312	C-Class 1E I&C Room	FA2-312-01	C-Class 1E I&C Room
R/B	C	FA2-312		FA2-312-02	C-Class 1E I&C Room Raised Floor
R/B	D	FA2-313	D-Class 1E UPS Room	FA2-313-01	D-Class 1E UPS Room
R/B	C	FA2-314	C-Class 1E UPS Room	FA2-314-01	C-Class 1E UPS Room
R/B	D	FA2-315	FA2-315 Area	FA2-315-01	FA2-315-01 Zone
R/B	B	FA2-401	B-Class 1E Electrical Room & MCR HVAC Equipment Room	FA2-401-01	B-Class 1E Electrical Room & MCR HVAC Equipment Room
R/B	A	FA2-402	A-Class 1E Electrical Room & MCR HVAC Equipment Room	FA2-402-01	A-Class 1E Electrical Room & MCR HVAC Equipment Room
R/B	C	FA2-403	C-Class 1E Electrical Room & MCR HVAC Equipment Room	FA2-403-01	C-Class 1E Electrical Room & MCR HVAC Equipment Room
R/B	D	FA2-404	D-Class 1E Electrical Room & MCR HVAC Equipment Room	FA2-404-01	D-Class 1E Electrical Room & MCR HVAC Equipment Room
R/B	A	FA2-405	A-MCR Emergency Filtration Unit & Fan Room	FA2-405-01	A-MCR Emergency Filtration Unit & Fan Room
R/B	D	FA2-406	B-MCR Emergency Filtration Unit & Fan Room	FA2-406-01	B-MCR Emergency Filtration Unit & Fan Room
R/B	D	FA2-407	FA2-407 Area	FA2-407-01	FA2-407-01 3F Non-Radioactive Area Westside Corridor
R/B	N	FA2-407		FA2-407-02	MCR Monitor Room (FA2-407-02)
R/B	N	FA2-407		FA2-407-03	MCR Monitor Room (FA2-407-03)
R/B	A	FA2-407		FA2-407-04	FA2-407-04 3F Non-Radioactive Area Eastside Corridor
R/B	A	FA2-408	R/B-3F A-Electrical Penetration Area	FA2-408-01	R/B-3F A-Electrical Penetration Area

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 7 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
R/B	B	FA2-409	R/B-3F B-Electrical Penetration Area	FA2-409-01	R/B-3F B-Electrical Penetration Area
R/B	C	FA2-410	R/B-3F C-Electrical Penetration Area	FA2-410-01	R/B-3F C-Electrical Penetration Area
R/B	D	FA2-411	R/B-3F D-Electrical Penetration Area	FA2-411-01	R/B-3F D-Electrical Penetration Area
R/B	A,B	FA2-412	FA2-412 Duct Space Area	FA2-412-01	FA2-412-01 Duct Space Zone
R/B	C,D	FA2-413	FA2-413 Duct Space Area	FA2-413-01	FA2-413-01 Duct Space Zone
R/B	A,B	FA2-414	FA2-414 MSFW Piping Room	FA2-414-01	FA2-414-01 MSFW Piping Room
R/B	C,D	FA2-415	FA2-415 MSFW Piping Room	FA2-415-01	FA2-415-01 MSFW Piping Room
R/B	N	FA2-501	Emergency Feedwater Pit, MG Set Room Area	FA2-501-01	FA2-501-01 Non-Radioactive Zone Eastside Corridor
R/B	N	FA2-501		FA2-501-02	A-Emergency Feedwater Pit
R/B	N	FA2-501		FA2-501-03	SGBD Water Radiation Monitor Room
R/B	N	FA2-501		FA2-501-04	LRT Room
R/B	N	FA2-501		FA2-501-05	CRDM Cabinet Room
R/B	N	FA2-501		FA2-501-06	MG Set Room
R/B	N	FA2-501		FA2-501-07	MG Set Control Panel Room
R/B	N	FA2-501		FA2-501-08	B-Emergency Feedwater Pit
R/B	N	FA2-501		FA2-501-09	C/V Purge Air Handling Unit Room
R/B	N	FA2-501		FA2-501-10	FA2-501-10 Zone
R/B	N	FA2-501		FA2-501-11	FA2-501-11 Non-Radioactive Zone Westside Corridor
R/B	A,B,C,D	FA2-502	Reactor Trip Breaker Cabinet-1 Room	FA2-502-01	Reactor Trip Breaker Cabinet-1 Room
R/B	A,B,C,D	FA2-503	Reactor Trip Breaker Cabinet-2 Room	FA2-503-01	Reactor Trip Breaker Cabinet-2 Room
R/B	A,B,C,D	FA2-504	Remote Shutdown Console Room	FA2-504-01	Remote Shutdown Console Room
R/B	N	FA2-505	FA2-505 Stairwell	FA2-505-01	FA2-505-01 Stairwell
R/B	N	FA2-601	A-CCW Surge Tank Room	FA2-601-01	A-CCW Surge Tank Room
R/B	N	FA2-602	B-CCW Surge Tank Room	FA2-602-01	B-CCW Surge Tank Room
R/B	N	FA2-602		FA2-602-02	FA2-602-02 Zone
PS/B	A	FA3-101	A-Essential Chiller Unit & Pump Room	FA3-101-01	A-Essential Chiller Unit & Pump Room
PS/B	B	FA3-102	B-Essential Chiller Unit & Pump Room	FA3-102-01	B-Essential Chiller Unit & Pump Room
PS/B	B	FA3-103	B-Class 1E GTG Room	FA3-103-01	B-GTG Auxiliary Component Room
PS/B	B	FA3-103		FA3-103-02	FA2-103-02 Zone
PS/B	B	FA3-103		FA3-103-03	B-Class 1E GTG Room

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 8 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
PS/B	A	FA3-104	A-Class 1E GTG Room	FA3-104-01	A-GTG Auxiliary Component Room
PS/B	A	FA3-104		FA3-104-02	FA3-104-02 Zone
PS/B	A	FA3-104		FA3-104-03	FA3-104-03 Zone
PS/B	A	FA3-104		FA3-104-04	A-Class 1E GTG Room
PS/B	N	FA3-105	A-AAC GTG Room	FA3-105-01	A-AAC Power Source Starter Buttery Room
PS/B	N	FA3-105		FA3-105-02	A-AAC GTG Room
PS/B	B	FA3-106	FA3-106 Area	FA3-106-01	FA3-106-01 Corridor
PS/B	N	FA3-107	FA3-107 Hatch Area	FA3-107-01	FA3-107-01 Hatch Zone
PS/B	C	FA3-108	C-Essential Chiller Unit & Pump Room	FA3-108-01	C-Essential Chiller Unit & Pump Room
PS/B	C	FA3-109	C-Class 1E GTG Room	FA3-109-01	C-GTG Auxiliary Component Room
PS/B	C	FA3-109		FA3-109-02	FA3-109-02 Zone
PS/B	C	FA3-109		FA3-109-03	C-Class 1E GTG Room
PS/B	D	FA3-110	D-Essential Chiller Unit & Pump Room	FA3-110-01	D-Essential Chiller Unit & Pump Room
PS/B	D	FA3-111	D-Class 1E GTG Room	FA3-111-01	D-GTG Auxiliary Component Room
PS/B	D	FA3-111		FA3-111-02	FA3-111-02 Zone
PS/B	D	FA3-111		FA3-111-03	FA3-111-03 Zone
PS/B	D	FA3-111		FA3-111-04	D-Class 1E GTG Room
PS/B	C	FA3-112	FA3-112 Area	FA3-112-01	FA3-112-01 Corridor
PS/B	N	FA3-113	B-AAC GTG Room	FA3-113-01	B-AAC Power Source Starter Buttery Room
PS/B	N	FA3-113		FA3-113-02	B-AAC GTG Room
PS/B	N	FA3-114	Cable Tray Space	FA3-114-01	Cable Tray Space
PS/B	A	FA3-115	A-Class 1E Battery Room	FA3-115-01	A-Class 1E Battery Room
PS/B	B	FA3-116	B-Class 1E Battery Room	FA3-116-01	B-Class 1E Battery Room
PS/B	A	FA3-117	A-Class 1E Battery Charger Room	FA3-117-01	A-Class 1E Battery Charger Room
PS/B	B	FA3-118	B-Class 1E Battery Charger Room	FA3-118-01	B-Class 1E Battery Charger Room
PS/B	A	FA3-119	Spare Battery Charger-1 Room	FA3-119-01	Spare Battery Charger-1 Room
PS/B	C	FA3-120	C-Class 1E Battery Room	FA3-120-01	C-Class 1E Battery Room
PS/B	D	FA3-121	D-Class 1E Battery Room	FA3-121-01	D-Class 1E Battery Room

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 9 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
PS/B	C	FA3-122	C-Class 1E Battery Charger Room	FA3-122-01	C-Class 1E Battery Charger Room
PS/B	D	FA3-123	D-Class 1E Battery Charger Room	FA3-123-01	D-Class 1E Battery Charger Room
PS/B	D	FA3-124	Spare Battery Charger-2 Room	FA3-124-01	Spare Battery Charger-2 Room
A/B	N	FA4-101	Auxiliary Building	FA4-101-01	Auxiliary Building B1F Floor
A/B	N	FA4-101		FA4-101-02	FA4-101-02 Stairwell (B1F～3F)
A/B	N	FA4-101		FA4-101-03	Boric Acid Tank Room
A/B	N	FA4-101		FA4-101-04	Auxiliary Building 1F Floor
A/B	N	FA4-101		FA4-101-05	FA4-101-05 Stairwell (2F～Roof)
A/B	N	FA4-101		FA4-101-06	Non-Class 1E Electrical Room (FA4-101-06)
A/B	N	FA4-101		FA4-101-07	Computer Room
A/B	N	FA4-101		FA4-101-08	Non-Class 1E I&C Room (FA4-101-08)
A/B	N	FA4-101		FA4-101-09	Radwaste Control Room
A/B	N	FA4-101		FA4-101-10	FA4-101-10 Corridor
A/B	N	FA4-101		FA4-101-11	Non-Class 1E I&C Room (FA4-101-11)
A/B	N	FA4-101		FA4-101-12	Non-Class 1E I&C Room (FA4-101-12)
A/B	N	FA4-101		FA4-101-13	Non-Class 1E Electrical Room (FA4-101-13)
A/B	N	FA4-101		FA4-101-14	Communication System Equipment Room
A/B	N	FA4-101		FA4-101-15	Resin Fill Tank Room
A/B	N	FA4-101		FA4-101-16	Non-Class 1E Battery Room
A/B	N	FA4-101		FA4-101-17	Boric Acid Batching Tank Room
A/B	N	FA4-101		FA4-101-18	HVAC Equipment Room (FA4-101-18)
A/B	N	FA4-101		FA4-101-19	TSC Emergency Filtration Unit & Fan Room
A/B	N	FA4-101		FA4-101-20	HVAC Equipment Room (FA4-101-20)
A/B	N	FA4-101		FA4-101-21	C/V Low Volume Purge Exhaust Filtration Unit Room
A/B	N	FA4-101		FA4-101-22	Hold Up Tank Room
A/B	N	FA4-101		FA4-101-23	Instrument Maintenance Shop (Cold)
A/B	N	FA4-101		FA4-101-24	Auxiliary Building Roof
AC/B	N	FA5-101	Access Control Building Area	FA5-101-01	Access Control Building
AC/B	N	FA5-101		FA5-101-02	Technical Support Center

Table 9A-1 US-APWR Fire Areas and Fire Zones (Sheet 10 of 10)

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
T/B	N	FA6-101	Turbine Building	FA6-101-01	Turbine Building B1F Floor
T/B	N	FA6-101		FA6-101-02	Turbine Building 1F Floor
T/B	N	FA6-101		FA6-101-03	Electrical Room (1F)
T/B	N	FA6-101		FA6-101-04	FA6-101-04 Zone
T/B	N	FA6-101		FA6-101-05	FA6-101-05 Stairwell
T/B	N	FA6-101		FA6-101-06	FA6-101-06 Stairwell
T/B	N	FA6-101		FA6-101-07	FA6-101-07 E.V Shaft
T/B	N	FA6-101		FA6-101-08	FA6-101-08 Stairwell
T/B	N	FA6-101		FA6-101-09	FA6-101-09 Stairwell
T/B	N	FA6-101		FA6-101-10	FA6-101-10 Stairwell
T/B	N	FA6-101		FA6-101-11	FA6-101-11 Stairwell
T/B	N	FA6-101		FA6-101-12	Sampling Room
T/B	N	FA6-101		FA6-101-13	Turbine Building 2F Floor
T/B	N	FA6-101		FA6-101-14	Electrical Room (2F)
T/B	N	FA6-101		FA6-101-15	FA6-101-15 Zone
T/B	N	FA6-101		FA6-101-16	Turbine Lube Oil Tank Room
T/B	N	FA6-101		FA6-101-17	Turbine Building 3F Floor
T/B	N	FA6-101		FA6-101-18	Security Room (FA6-101-18)
T/B	N	FA6-101		FA6-101-19	Turbine Building Operation Floor
T/B	N	FA6-101		FA6-101-20	Tool Room (FA6-101-20)
T/B	N	FA6-101		FA6-101-21	Tool Room (FA6-101-21)
T/B	N	FA6-101		FA6-101-22	Security Room (FA6-101-22)
T/B	N	FA6-101		FA6-101-23	Security Room (FA6-101-23)
O/B	A	FA7-101	ESW Piping Tunnel	FA7-101-01	A-ESW Piping Tunnel
O/B	B	FA7-102		FA7-102-01	B-ESW Piping Tunnel
O/B	C	FA7-103		FA7-103-01	C-ESW Piping Tunnel
O/B	D	FA7-104		FA7-104-01	D-ESW Piping Tunnel

Table 9A-2 Fire Hazard Analysis Summary (Sheet 1 of 277)

Fire Zone:	**FA1-101-01**
Building:	**Containment**
Floor(s):	**1F, 1MF**
Fig:	**9A-3**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V Reactor Coolant Drain Pump Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-02	**FA2-117-16**	**FA1-101-02**
FA1-101-03		**FA1-101-06**
FA2-117-09		**FA1-101-07**
FA2-117-10		**FA1-101-12**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with an open stairway to FA1-101-03 located below this zone. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire to the zone

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.3E+06**
Lube Oil	**1.1E+05**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
450

Table 9A-2 Fire Hazard Analysis Summary (Sheet 2 of 277)

Fire Zone:	**FA1-101-02**
Building:	**Containment**
Floor(s):	**1MF**
Fig:	**9A-4**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**Header Compartment**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-01 **FA1-101-03**	**FA1-101-01** **See Table 9A-3**	**FA1-101-08** **FA1-101-09** **FA1-101-10** **FA1-101-11**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire to the zone of influence within this zone.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**3.5E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.7E+02**
Maximum Anticipated Combustible Loading:	**2.5E+02**

Floor Area (ft^2)
2,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 3 of 277)

Fire Zone:	**FA1-101-03**
Building:	**Containment**
Floor(s):	**B1MF to 3F**
Fig:	**9A-2**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**Reactor Cavity**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall r	Ceiling
FA1-101-01	**FA1-101-08**	**FA1-101-13**
FA1-101-02	**FA1-101-09**	**FA1-101-23**
FA1-101-04	**FA1-101-10**	**FA1-101-24**
FA1-101-05	**See Table 9A-3**	**FA1-101-25**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open stairway to FA1-101-07. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this zone.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**3.1E+02**

Floor Area (ft^2)
300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage safe-shutdown functions of 4 trains of NIS. Alternative RPS function of NIS are separated from this fire zone.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 4 of 277)

Fire Zone: **FA1-101-04**

Building:	**Containment**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**C/V 2F Southeastern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-03	**FA1-101-11**	**FA1-101-15**
FA1-101-05	**FA1-101-13**	**FA1-101-18**
FA1-101-07	**FA1-101-14**	
FA1-101-08	**See Table 9A-3**	

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire to the zone of influence within this zone.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**4.6E+06**
Instruments	**9.0E+06**
Lighting Transformer	**1.3E+06**
Lube Oil	**9.9E+05**
Panels	**4.2E+05**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.5E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+04**
Maximum Anticipated Combustible Loading:	**3.7E+04**

Floor Area (ft^2)
1,900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 5 of 277)

Fire Zone:	**FA1-101-05**
Building:	**Containment**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 2F Southwestern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-03	**FA1-101-10**	**FA1-101-16**
FA1-101-04	**FA1-101-13**	**FA1-101-17**
FA1-101-06	**FA2-152-05**	
FA1-101-09	**See Table 9A-3**	

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**5.3E+06**
Instruments	**4.6E+07**
Lighting Transformer	**1.3E+06**
Lube Oil	**9.9E+05**
Panels	**4.2E+05**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.5E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**5.1E+04**
Maximum Anticipated Combustible Loading:	**6.1E+04**

Floor Area (ft^2)
1,900

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains of safe-shutdown functions remain free from fire damage. Althouh C Accumulator Outlet valves cables has the potential to be damaged, it would be unaffected by providing with appropriate fire barriers**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 6 of 277)

Fire Zone: **FA1-101-06**

Building:	**Containment**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.1**

Area Designation: **C/V Area**

Zone Designation: **C/V 2F Northwestern Part Floor Zone**

Associated Safety Division(s): **A,B,C,D,N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-05	FA1-101-25	FA1-101-17
FA1-101-07	FA2-120-07	FA1-101-19
FA1-101-10	FA2-153-05	FA1-101-20
FA1-101-25	FA2-208-01	

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles

Item	Heat Release (Btu)
Grease	3.1E+06
Instruments	6.1E+06
Lighting Transformer	1.3E+06
Lube Oil	9.9E+05
Lube Oil	4.7E+04
Panels	1.4E+06
High Voltage Cables	9.3E+06
Low Voltage Cables	6.9E+06
Control Cables	1.2E+07
Instrumentation Cables	1.1E+07

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	3.0E+04
Maximum Anticipated Combustible Loading:	3.6E+04

Floor Area (ft^2)
1,750

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 or 2 safe-shutdown trains. 3 or 2 remain free from the fire damage. C & D Accumulator Outlet valves cables would be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 7 of 277)

Fire Zone: **FA1-101-07**

Building:	**Containment**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**C/V 2F Northeaster Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-04 FA1-101-06 FA1-101-11 FA1-101-14	**FA1-101-01** **See Table 9A-3**	**FA1-101-18 FA1-101-22**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**2.7E+05**
Grease	**6.3E+06**
Instruments	**3.9E+07**
Lighting Transformer	**1.3E+06**
Lube Oil	**9.9E+05**
Panels	**7.4E+05**
High Voltage Cables	**8.5E+06**
Low Voltage Cables	**6.3E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**5.3E+04**
Maximum Anticipated Combustible Loading:	**6.3E+04**

Floor Area (ft^2)
1,600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**The fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage. A & D Accumulator Outlet valve cable would be unaffected by providing with the appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 8 of 277)

Fire Zone:	**FA1-101-08**
Building:	**Containment**
Floor(s):	**2F to Roof**
Fig:	**9A-5 to 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**B-Loop Room**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-03 **FA1-101-04** **FA1-101-11** **FA1-101-13**	**FA1-101-02** **See Table 9A-3**	**FA1-101-23**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**2.9E+06**
Hydrualic fluid	**5.3E+06**
Instruments	**2.6E+06**
Lube Oil	**4.9E+07**
High Voltage Cables	**5.3E+06**
Low Voltage Cables	**4.0E+06**
Control Cables	**7.1E+06**
Instrumentation Cables	**6.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**8.3E+04**
Maximum Anticipated Combustible Loading:	**9.9E+04**

Floor Area (ft^2)
1,000

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 9 of 277)

Fire Zone:	**FA1-101-09**
Building:	**Containment**
Floor(s):	**2F to Roof**
Fig:	**9A-5 to 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C-Loop Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-03 **FA1-101-05** **FA1-101-10** **FA1-101-13**	**FA1-101-02** **See Table 9A-3**	**FA1-101-24**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles

Item	Heat Release (Btu)
Grease	**2.9E+06**
Hydrualic fluid	**5.3E+06**
Instruments	**2.6E+06**
Lube Oil	**4.9E+07**
High Voltage Cables	**5.3E+06**
Low Voltage Cables	**4.0E+06**
Control Cables	**7.1E+06**
Instrumentation Cables	**6.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**8.3E+04**
Maximum Anticipated Combustible Loading:	**9.9E+04**

Floor Area (ft^2)
1,000

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 10 of 277)

Fire Zone:	**FA1-101-10**
Building:	**Containment**
Floor(s):	**2F to Roof**
Fig:	**9A-5 to 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**D-Loop Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-03 **FA1-101-05** **FA1-101-06** **FA1-101-09**	**FA1-101-02** **See Table 9A-3**	**FA1-101-25**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles

Item	Heat Release (Btu)
Grease	**2.2E+06**
Hydrualic fluid	**5.3E+06**
Instruments	**2.5E+06**
Lube Oil	**4.9E+07**
High Voltage Cables	**5.0E+06**
Low Voltage Cables	**3.8E+06**
Control Cables	**6.7E+06**
Instrumentation Cables	**5.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**8.5E+04**
Maximum Anticipated Combustible Loading:	**1.0E+05**

Floor Area (ft^2)
950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 11 of 277)

Fire Zone:	**FA1-101-11**
Building:	**Containment**
Floor(s):	**2F to Roof**
Fig:	**9A-5 to 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**A-Loop Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-03 **FA1-101-04** **FA1-101-07** **FA1-101-08**	**FA1-101-02** **See Table 9A-3**	**FA1-101-26**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**7.2E+05**
Hydrualic fluid	**5.3E+06**
Instruments	**2.8E+06**
Lube Oil	**4.9E+07**
High Voltage Cables	**5.0E+06**
Low Voltage Cables	**3.8E+06**
Control Cables	**6.7E+06**
Instrumentation Cables	**5.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher.**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**8.4E+04**
Maximum Anticipated Combustible Loading:	**1.0E+05**

Floor Area (ft^2)
950

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 12 of 277)

Fire Zone: **FA1-101-12**

Building:	**Containment**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**C/V Reactor Coolant Drain Tank Room**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-03 **FA1-101-10** **FA1-101-11**	**FA1-101-01** **FA1-101-02** **See Table 9A-3**	**FA1-101-25** **FA1-101-26**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**3.5E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**8.8E+02**
Maximum Anticipated Combustible Loading:	**1.3E+03**

Floor Area (ft^2)
400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 13 of 277)

Fire Zone:	**FA1-101-13**
Building:	**Containment**
Floor(s):	**2F to 3F**
Fig:	**9A-5 to 9A-6**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**FA1-101-13 Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-03	**FA1-101-02**	**FA1-101-21**
FA1-101-04	**FA1-101-03**	**FA1-101-23**
FA1-101-05		**FA1-101-24**
FA1-101-08	**See Table 9A-3**	

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection – Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression – Backup
Fire Hose Station	**Portable Fire Extinguisher.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**2.7E+02**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**Fire in this zone has the potential to damage safe-shutdown equipment like Pressurizer backup heaters. Four safety trains will remain unaffected by the fire.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 14 of 277)

Fire Zone:	**FA1-101-14**
Building:	**Containment**
Floor(s):	**2F to Roof**
Fig:	**9A-5 to 9A-8**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**FA1-101-14 E.V. Shaft**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-04 **FA1-101-07** **FA1-101-18** **FA1-101-23**	**FA1-101-26**	**FA1-101-26**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of concrete providing minimum 2 hour fire resistance capability. Rated elevator doors are used for openings.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+03**

Floor Area (ft^2)
50

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 15 of 277)

Fire Zone:	**FA1-101-15**
Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 3F Southeastern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-08 **FA1-101-16** **FA1-101-18** **FA1-101-21**	**FA1-101-04** **See Table 9A-3**	**FA1-101-23** **FA1-101-24**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**3.6E+06**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.7E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.** **Three trains of pressurizer level instrumentation have the potential to be damaged, but 1 train remains free from fire damage.** **A & D Accumulator Outlet valve cable would be unaffected by providing with the appropriate fire barriers**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 16 of 277)

Fire Zone:	**FA1-101-16**
Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 3F Southeastern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-09 **FA1-101-15** **FA1-101-17** **FA1-101-21**	**FA1-101-05** **See Table 9A-3**	**FA1-101-24**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**2.9E+06**
Instruments	**2.5E+06**
Panels	**3.1E+05**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.7E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage. Three trains of Pressurizer level instrumentation have the potential to be damaged, but 1 train remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 17 of 277)

Fire Zone:	**FA1-101-17**
Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 3F Northwestern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-10	**FA1-101-05**	**FA1-101-25**
	FA1-101-16	**FA1-101-06**	**FA1-101-24**
	FA1-101-18	**FA1-101-19**	
	FA1-101-19	**See Table 9A-3**	

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles	
Item	Heat Release (Btu)
Crane	**8.0E+06**
Gasket	**4.0E+04**
Grease	**2.2E+06**
Instruments	**3.0E+06**
Lighting Transformer	**1.6E+05**
Panels	**3.1E+05**
High Voltage Cables	**7.9E+06**
Low Voltage Cables	**6.0E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.3E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.2E+04**
Maximum Anticipated Combustible Loading:	**3.8E+04**

Floor Area (ft^2)
1,500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 or 2 safe-shutdown trains. 3 or 2 trains remain free from fire damage. A, B, C & D- Accumulator Outlet valves cables would be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 18 of 277)

Fire Zone: **FA1-101-18**

Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 3F Northwestern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-11	**FA1-101-04**	**FA1-101-23**
FA1-101-14	**FA1-101-07**	**FA1-101-26**
FA1-101-15		
FA1-101-17	**See Table 9A-3**	

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**2.2E+06**
Instruments	**3.0E+06**
Lighting Transformer	**1.6E+05**
Panels	**4.7E+05**
High Voltage Cables	**8.7E+06**
Low Voltage Cables	**6.5E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,650

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 19 of 277)

Fire Zone: **FA1-101-19**

Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**Regenerative Hx Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-10 **FA1-101-17** **FA1-101-20**	**FA1-101-06**	**FA1-101-17**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Tansient Only	**9.3E+4**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 20 of 277)

Fire Zone: **FA1-101-20**

Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**FA1-101-20 Zone**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-17 **FA1-101-19**	**FA1-101-06**	**FA1-101-17**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**2.6E+05**
Panels	**1.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.7E+03**
Maximum Anticipated Combustible Loading:	**6.7E+03**

Floor Area (ft^2)
90

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 21 of 277)

Fire Zone:	**FA1-101-21**
Building:	**Containment**
Floor(s):	**3F to Roof**
Fig:	**9A-7 to 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**Pressurizer Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-08 **FA1-101-09** **FA1-101-15** **FA1-101-16**	**FA1-101-13** **See Table 9A-3**	**FA1-101-23** **FA1-101-24**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**6.4E+03**
Grease	**1.3E+06**
Instruments	**2.2E+06**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.7E+04**
Maximum Anticipated Combustible Loading:	**4.4E+04**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with RCS pressure boundaries. This would be prevented by providing with appropriate fire barriers to either cables of RCS-MOV-116A and B, or RCS-MOV-117A and B**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 22 of 277)

Fire Zone:	**FA1-101-22**
Building:	**Containment**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**Excess Letdown Hx Room**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-11 **FA1-101-18**	**FA1-101-07**	**FA1-101-26**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**9.7E+04**
Instruments	**8.8E+04**
Lighting Transformer	**6.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.7E+04**
Maximum Anticipated Combustible Loading:	**2.2E+04**

Floor Area (ft^2)
50

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 23 of 277)

Fire Zone:	**FA1-101-23**
Building:	**Containment**
Floor(s):	**2MF to Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 4F Southeastern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Floor
FA1-101-08	**FA1-101-26**	**FA1-101-03**
FA1-101-14	**FA2-117-34**	**FA1-101-08**
FA1-101-21	**FA2-207-01**	**FA1-101-13**
FA1-101-24	**See Table 9A-3**	**FA1-101-15**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Air Rock	**4.8E+04**
Cable	**2.4E+07**
Gasket	**2.7E+05**
Grease	**1.2E+07**
Instruments	**3.3E+06**
Lube Oil	**3.3E+07**
Panels	**1.8E+06**
High Voltage Cables	**1.3E+07**
Low Voltage Cables	**1.0E+07**
Control Cables	**1.8E+07**
Instrumentation Cables	**1.6E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**5.2E+04**
Maximum Anticipated Combustible Loading:	**6.2E+04**

Floor Area (ft^2)
2,550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains of safe-shutdown except SG Water Level instrumentation remain free from fire damage. 1 train of SG W. L. cables remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 24 of 277)

Fire Zone: **FA1-101-24**

Building:	**Containment**
Floor(s):	**2MF to Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**C/V Southwestern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Floor
FA1-101-09	**FA2-117-41**	**FA1-101-03**
FA1-101-21	**FA2-208-01**	**FA1-101-09**
FA1-101-23	**FA2-414-01**	**FA1-101-13**
FA1-101-25	**See Table 9A-3**	**FA1-101-15**

Fire Barrier Description:
Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**4.3E+06**
Instruments	**6.5E+06**
Lube Oil	**1.3E+06**
Panels	**9.1E+03**
High Voltage Cables	**1.9E+07**
Low Voltage Cables	**1.4E+07**
Control Cables	**2.5E+07**
Instrumentation Cables	**2.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
3,500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage. Four trains damage of SG water level and Pressurizer pressure instrumentation could be recovered by alternative PRS functions. RCS pressure boundaries damage could be prevented by providing with fire barriers to either cables of RCS-MOV-116A and B, or RCS-MOV-117A and B.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 25 of 277)

Fire Zone:	**FA1-101-25**
Building:	**Containment**
Floor(s):	**2MF to Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.1**
Area Designation:	**C/V Area**
Zone Designation:	**C/V 4F Northwestern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Floor
FA1-101-03	**FA1-101-24**	**FA1-101-03**
FA1-101-06	**FA1-101-26**	**FA1-101-10**
FA1-101-10	**FA2-117-35**	**FA1-101-12**
FA1-101-17	**See Table 9A-3**	**FA1-101-17**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**7.2E+05**
Grease	**3.5E+05**
Instruments	**3.4E+06**
Fuel Transfer Devices	**1.7E+05**
Lube Oil	**2.5E+06**
Panels	**2.1E+06**
High Voltage Cables	**1.9E+07**
Low Voltage Cables	**1.4E+07**
Control Cables	**2.6E+07**
Instrumentation Cables	**2.3E+07**
Crane	**7.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
3,650

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains of them remain free from fire damage. 4 trains damage of SG water level instrumentation could be recovered by alternative PRS functions.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 26 of 277)

Fire Zone: **FA1-101-26**

Building:	**Containment**
Floor(s):	**2MF to Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.1**

Area Designation:	**C/V Area**
Zone Designation:	**C/V 4F Northeastern Part Floor Zone**
Associated Safety Division(s)	**A,B,C,D,N**

Applicable Regulatory and Code Ref(s):

IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Floor
FA1-101-03	**FA1-101-23**	**FA1-101-03**
FA1-101-07	**FA1-101-25**	**FA1-101-11**
FA1-101-11	**FA2-117-35**	**FA1-101-12**
FA1-101-14	**See Table 9A-3**	**FA1-101-14**

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of reinforced concrete with some open spaces to the surrounding fire zones. The spatial separation between combustibles combined with the reinforced concrete construction serves to confine any fire influence within this fire zone.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**3.6E+05**
Grease	**7.2E+05**
Instruments	**3.6E+06**
Lube Oil	**2.7E+06**
Panels	**9.1E+03**
High Voltage Cables	**1.8E+07**
Low Voltage Cables	**1.3E+07**
Control Cables	**2.4E+07**
Instrumentation Cables	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic Fire Detection System	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
3,400

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains of safe-shutdown except SG water level instrumentation remain free from fire damage. 1 train of water level instrumentation remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 27 of 277)

Fire Zone:	**FA2-101-01**
Building:	**Reactor**
Floor(s):	**B1F-Roof**
Fig:	**9A-1 to 9A-10**
Sect:	**3.2**
Area Designation:	**FA2-101 Stairwell (B1F~Roof)**
Zone Designation:	**FA2-101-01 Stairwell (B1F~Roof)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Wall	Ceiling
	FA2-111-01	**FA2-501-01**	**-**
	FA2-201-01	**FA2-501-09**	
	FA2-201-02	**FA3-101-01**	
	FA2-407-04	**FA3-103-03**	

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of primarily concrete walls providing 3-hour fire resistant barrier for the stairwell. Fire doors are provide for each entry to the stairwell and all penetrations into the stairwell are protected for 3-hour fire resistance to assure no fire propagation into or out of the stairwell.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.6E+02**

Floor Area (ft^2)
140

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 28 of 277)

Fire Zone: **FA2-102-01**

Building:	**Reactor**
Floor(s):	**B1F to 1MF**
Fig:	**9A-1 to 9A-4**
Sect:	**3.3**

Area Designation:	**A-Emergency Feedwater Pump (T/D) Room**
Zone Designation:	**A-Emergency Feedwater Pump (T/D) Room**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 13, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-103-01	**FA2-202-01**	**FA2-201-01**
FA2-104-01	**FA3-101-01**	**FA2-201-02**
FA2-111-01	**FA3-104-04**	**FA2-202-01**
FA2-201-01	**FA6-101-04**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Hydrualic fluid	**6.1E+04**
Instruments	**2.4E+06**
Panels	**3.2E+05**
Lube oil	**1.3E+07**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**5.1E+04**
Maximum Anticipated Combustible Loading:	**6.2E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 29 of 277)

Fire Zone:	**FA2-103-01**
Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.4**
Area Designation:	**B-Emergency Feedwater Pump (M/D) Room**
Zone Designation:	**B-Emergency Feedwater Pump (M/D) Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-102-01 **FA2-104-01** **FA2-111-01**	**-**	**FA2-202-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**1.2E+05**
Instruments	**1.3E+06**
Panels	**3.2E+05**
Rubber	**7.6E+05**
Lube oil	**3.7E+04**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading:	**3.5E+04**

Floor Area (ft^2)
400

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 30 of 277)

Fire Zone:	**FA2-104-01**
Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.5**
Area Designation:	**A-Component Cooling Water Pump Room**
Zone Designation:	**A-Component Cooling Water Pump Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Wall	Ceiling
	FA2-102-01 FA2-103-01 FA2-105-01 FA2-111-01	**FA7-101-01**	**FA2-202-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**2.5E+06**
Instruments	**2.0E+06**
Lube Oil	**5.1E+05**
Panels	**5.7E+03**
Rubber	**1.7E+05**
High Voltage Cables	**7.4E+06**
Low Voltage Cables	**5.6E+06**
Control Cables	**9.9E+06**
Instrumentation Cables	**8.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 31 of 277)

Fire Zone:	**FA2-105-01**
Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.6**
Area Designation:	**B-Component Cooling Water Pump Room**
Zone Designation:	**B-Component Cooling Water Pump Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-104-01 **FA2-106-01** **FA2-111-01** **FA7-102-01**	**-**	**FA2-203-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**1.1E+06**
Instruments	**2.2E+06**
Lube Oil	**5.1E+05**
Panels	**5.7E+03**
Rubber	**1.7E+05**
High Voltage Cables	**9.5E+06**
Low Voltage Cables	**7.1E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
1,800

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 32 of 277)

Fire Zone: **FA2-106-01**

Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.7**

Area Designation:	**C-Component Cooling Water Pump Room**
Zone Designation:	**C-Component Cooling Water Pump Room**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-105-01 **FA2-107-01** **FA2-112-01** **FA7-103-01**	**-**	**FA2-204-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**1.1E+06**
Instruments	**2.2E+06**
Lube Oil	**5.1E+05**
Panels	**5.7E+03**
Rubber	**1.7E+05**
High Voltage Cables	**9.5E+06**
Low Voltage Cables	**7.1E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
1,800

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 33 of 277)

Fire Zone:	**FA2-107-01**
Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.8**
Area Designation:	**D-Component Cooling Water Pump Room**
Zone Designation:	**D-Component Cooling Water Pump Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-106-01 FA2-108-01 FA2-109-01 FA2-112-01	**FA7-104-01**	**FA2-205-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**2.6E+06**
Instruments	**2.0E+06**
Lube Oil	**5.1E+05**
Panels	**5.7E+03**
Rubber	**1.7E+05**
High Voltage Cables	**7.4E+06**
Low Voltage Cables	**5.6E+06**
Control Cables	**9.9E+06**
Instrumentation Cables	**8.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.2E+04**

Floor Area (ft^2)
1,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 34 of 277)

Fire Zone: **FA2-108-01**

Building:	**Reactor**
Floor(s):	**B1F to 1MF**
Fig:	**9A-1 to 9A-4**
Sect:	**3.9**

Area Designation:	**D-Emergency Feedwater Pump (T/D) Room**
Zone Designation:	**D-Emergency Feedwater Pump (T/D) Room**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 13, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-107-01	**FA2-206-01**	**FA2-205-01**
FA2-109-01	**FA3-110-01**	**FA2-206-01**
FA2-112-01	**FA3-111-04**	**FA2-206-02**
FA2-205-01	**FA6-101-04**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Hydraulic fluid	**6.1E+04**
Instruments	**2.6E+07**
Lube oil	**1.3E+07**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**
Panels	**3.2E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**9.4E+04**
Maximum Anticipated Combustible Loading:	**1.1E+05**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the firte damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 35 of 277)

Fire Zone: **FA2-109-01**

Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.10**

Area Designation:	**C-Emergency Feedwater Pump (M/D) Room**
Zone Designation:	**C-Emergency Feedwater Pump (M/D) Room**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-107-01 **FA2-108-01** **FA2-112-01**	**-**	**FA2-205-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**1.2E+05**
Instruments	**1.2E+06**
Rubber	**7.6E+05**
Lube oil	**3.7E+04**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading:	**3.5E+04**

Floor Area (ft^2)
400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 36 of 277)

Fire Zone: **FA2-110-01**

Building:	**Reactor**
Floor(s):	**B1F to Roof**
Fig:	**9A-1 to 9A-10**
Sect:	**3.11**

Area Designation:	**FA2-110 E.V. Shaft**
Zone Designation:	**FA2-110-01 E.V. Shaft**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Wall
FA2-112-01	**FA2-501-11**	**FA3-109-03**
FA2-206-01	**FA2-505-01**	**FA3-110-01**
FA2-206-02	**FA2-602-01**	**FA3-114-01**
FA2-407-01	**FA2-602-02**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Elevator doors fire resistant per elevator code. All penetration and other opening are protected to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.2E+03**

Floor Area (ft^2)
80

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There are no safe-shutdown circuit in this area to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 37 of 277)

Fire Zone: **FA2-111-01**

Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.12**

Area Designation:	**FA2-111 Corridor**
Zone Designation:	**FA2-111-01 Corridor**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-101-01	**FA2-105-01**	**FA2-201-01**
FA2-102-01	**FA2-112-01**	
FA2-103-01	**FA2-114-02**	**See Table 9A-3**
FA2-104-01	**FA2-114-03**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**8.8E+05**
Panels	**6.8E+05**
High Voltage Cables	**7.7E+06**
Low Voltage Cables	**5.8E+06**
Control Cables	**1.0E+07**
Instrumentation Cables	**8.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 38 of 277)

Fire Zone: **FA2-112-01**

Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.13**

Area Designation:	**FA2-112 Corridor**
Zone Designation:	**FA2-112-01 Corridor**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-106-01	**FA2-110-01**	**FA2-206-01**
FA2-107-01	**FA2-111-01**	
FA2-108-01	**FA2-115-02**	**See Table 9A-3**
FA2-109-01	**FA2-115-03**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	**Heat Release (Btu)**
Instruments	**1.4E+06**
Lube Oil	**8.5E+03**
Panels	**7.6E+05**
High Voltage Cables	**8.2E+06**
Low Voltage Cables	**6.1E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 39 of 277)

Fire Zone:	**FA2-113-01**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.14**
Area Designation:	**A-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**A-SI Pump Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-113-02 **FA2-113-03** **FA2-123-01**	**-**	**FA2-120-02**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Lube Oil	**9.4E+06**
Panels	**5.7E+03**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.8E+04**
Maximum Anticipated Combustible Loading:	**4.6E+04**

Floor Area (ft^2)
600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 40 of 277)

Fire Zone:	**FA2-113-02**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.14**
Area Designation:	**A-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**A-CS/RHR Pump Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-113-01 **FA2-113-03** **FA2-121-01** **FA2-120-01**	**-**	**FA2-120-02**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**9.4E+05**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 41 of 277)

Fire Zone: **FA2-113-03**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.14**

Area Designation:	**A-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**FA2-113-03 Corridor**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-113-01 FA2-113-02 FA2-121-01	**-**	**FA2-120-02 FA2-120-03**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
550

Table 9A-2 Fire Hazard Analysis Summary (Sheet 42 of 277)

Fire Zone: **FA2-114-01**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.15**

Area Designation:	**B-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**B-SI Pump Room**
Associated Safety Division(s)	**B**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-114-02 **FA2-114-03** **FA2-123-01**	**-**	**FA2-151-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**9.4E+06**
Panels	**5.7E+03**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.8E+04**
Maximum Anticipated Combustible Loading:	**4.6E+04**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 43 of 277)

Fire Zone:	**FA2-114-02**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.15**
Area Designation:	**B-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**B-CS/RHR Pump Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-111-01 **FA2-114-01** **FA2-114-03** **FA2-123-01**	**-**	**FA2-151-01**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**9.4E+05**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 44 of 277)

Fire Zone:	**FA2-114-03**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.15**
Area Designation:	**B-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**FA2-114-03 Corridor**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-111-01 **FA2-114-01** **FA2-114-02** **FA2-121-01**	**-**	**FA2-120-03** **FA2-151-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.1E+06**
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 45 of 277)

Fire Zone:	**FA2-115-01**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.16**
Area Designation:	**C-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**C-SI Pump Room**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-115-02 **FA2-115-03** **FA2-123-01**	**-**	**FA2-152-01**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Lube Oil	**9.4E+06**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.8E+04**
Maximum Anticipated Combustible Loading:	**4.6E+04**

Floor Area (ft^2)
600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 46 of 277)

Fire Zone: **FA2-115-02**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.16**

Area Designation: **C-SI Pump Room, CS/RHR Pump Room Area**

Zone Designation: **C-CS/RHR Pump Room**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-112-01 **FA2-115-01** **FA2-115-03** **FA2-123-01**	**-**	**FA2-152-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**9.4E+05**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 47 of 277)

Fire Zone:	**FA2-115-03**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.16**
Area Designation:	**C-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**FA2-115-03 Corridor**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-112-01 **FA2-115-01** **FA2-115-02** **FA2-124-01**	**FA4-101-01**	**FA2-153-02** **FA2-152-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 48 of 277)

Fire Zone: **FA2-116-01**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.17**

Area Designation:	**D-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**D-SI Pump Room**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-116-02 **FA2-116-03** **FA2-123-01**	**-**	**FA2-153-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**9.4E+06**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.8E+04**
Maximum Anticipated Combustible Loading:	**4.6E+04**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 49 of 277)

Fire Zone:	**FA2-116-02**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.17**
Area Designation:	**D-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**D-CS/RHR Pump Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-116-01 **FA2-116-03** **FA2-117-01** **FA2-123-01**	**FA2-117-02**	**FA2-153-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**9.4E+05**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
550

Table 9A-2 Fire Hazard Analysis Summary (Sheet 50 of 277)

Fire Zone:	**FA2-116-03**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.17**
Area Designation:	**D-SI Pump Room, CS/RHR Pump Room Area**
Zone Designation:	**FA2-116-03 Corridor**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-116-01	**FA4-101-01**	**FA2-153-01**
FA2-116-02	**FA4-101-02**	**FA2-153-02**
FA2-117-01		
FA2-124-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**2.0E+06**
Instruments	**1.2E+06**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.8E+04**
Maximum Anticipated Combustible Loading:	**3.4E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 51 of 277)

Fire Zone:	**FA2-117-01**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-01 Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-116-02 **FA2-116-03** **FA2-117-02** **FA2-117-03**	**FA2-118-01** **FA2-119-01** **FA4-101-03**	**FA2-117-04** **FA2-117-05**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**9.1E+04**
Instruments	**1.5E+06**
Panels	**5.7E+06**
High Voltage Cables	**3.4E+06**
Low Voltage Cables	**2.6E+06**
Control Cables	**4.6E+06**
Instrumentation Cables	**4.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.4E+04**
Maximum Anticipated Combustible Loading:	**4.1E+04**

Floor Area (ft^2)
650

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 52 of 277)

Fire Zone: **FA2-117-02**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.18**

Area Designation:	**FA2-117 Area**
Zone Designation:	**A-Charging Pump Room**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 13, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-116-02		**FA2-117-04**
FA2-117-01		**FA2-117-07**
FA2-117-03		**FA2-117-13**
FA2-123-01		**FA2-117-14**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**5.3E+05**
High Voltage Cables	**5.0E+06**
Low Voltage Cables	**3.8E+06**
Control Cables	**6.7E+06**
Instrumentation Cables	**5.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 53 of 277)

Fire Zone:	**FA2-117-03**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**B-Charging Pump Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-01 **FA2-117-02**	**-**	**FA2-117-04**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**5.3E+05**
Lube Oil	**1.6E+07**
Panels	**5.7E+03**
High Voltage Cables	**3.4E+06**
Low Voltage Cables	**2.6E+06**
Control Cables	**4.6E+06**
Instrumentation Cables	**4.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.8E+04**
Maximum Anticipated Combustible Loading:	**5.8E+04**

Floor Area (ft^2)
650

Table 9A-2 Fire Hazard Analysis Summary (Sheet 54 of 277)

Fire Zone:	**FA2-117-04**
Building:	**Reactor**
Floor(s):	**B1MF to 1MF**
Fig:	**9A-2 to 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**Piping Room for Charging Pump**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-05	**FA2-117-01**	**FA2-117-06**
FA2-117-06	**FA2-117-02**	**FA2-117-07**
FA2-117-07	**FA2-117-03**	**FA2-117-20**
FA2-117-17	**See Table 9A-3**	**FA2-117-21**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-6, 9, 10, 16, 17) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**5.5E+05**
High Voltage Cables	**4.8E+06**
Low Voltage Cables	**3.6E+06**
Control Cables	**6.3E+06**
Instrumentation Cables	**5.6E+06**
Instruments	**8.8E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 55 of 277)

Fire Zone: **FA2-117-05**

Building:	**Reactor**
Floor(s):	**B1MF**
Fig:	**9A-2**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **FA2-117-05 Corridor**

Associated Safety Division(s): **D**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-04 **FA2-118-01** **FA2-119-01** **FA2-153-01**	**FA2-117-01** **See Table 9A-3**	**FA2-117-07**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
450

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 56 of 277)

Fire Zone: **FA2-117-06**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **Seal Water Hx Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07 **FA2-117-04**	**FA2-117-04**	**FA2-117-04** **FA2-117-20** **FA2-117-21**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-4, 9, 10, 16, 17) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.6E+02**
Maximum Anticipated Combustible Loading:	**5.6E+02**

Floor Area (ft^2)
250

Table 9A-2 Fire Hazard Analysis Summary (Sheet 57 of 277)

Fire Zone:	**FA2-117-07**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-07 Corridor**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-04	**FA2-117-02**	**FA2-117-04**
FA2-117-06	**FA2-117-04**	**FA2-117-17**
FA2-117-08	**FA2-117-05**	**FA2-117-19**
FA2-117-10	**See Table 9A-3**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-13, 14) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**4.0E+05**
Instruments	**3.8E+06**
Panels	**1.8E+04**
High Voltage Cables	**1.4E+07**
Low Voltage Cables	**1.0E+07**
Control Cables	**1.8E+07**
Instrumentation Cables	**1.6E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading	**2.9E+04**

Floor Area (ft^2)
2,600

Table 9A-2 Fire Hazard Analysis Summary (Sheet 58 of 277)

Fire Zone:	**FA2-117-08**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-08 Corridor**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-117-07	**FA2-121-02**	**FA2-117-19**
	FA2-117-09	**FA2-120-01**	**FA2-151-03**
	FA2-117-11	**FA2-120-03**	
	FA2-117-12	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-11, 12) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**2.8E+06**
Instruments	**2.0E+06**
Panels	**6.2E+04**
High Voltage Cables	**1.6E+07**
Low Voltage Cables	**1.2E+07**
Control Cables	**2.2E+07**
Instrumentation Cables	**1.9E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading	**2.9E+04**

Floor Area (ft^2)
3,100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 59 of 277)

Fire Zone:	**FA2-117-09**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**Refueling Water Recirculation Pump Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-01 **FA2-117-08** **FA2-117-10** **FA2-117-16**	**FA2-120-05**	**FA2-117-16** **FA2-120-07** **FA2-153-05**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-4, 6, 10, 16, 17) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**1.4E+06**
Instruments	**1.8E+05**
Lube Oil	**6.3E+05**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection – Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression – Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
450

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 60 of 277)

Fire Zone:	**FA2-117-10**
Building:	**Reactor**
Floor(s):	**1F**
Fig:	**9A-3**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-10 Piping Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-01 **FA2-117-07** **FA2-117-09** **FA2-153-04**	**FA2-123-01**	**FA2-117-16**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-4, 6, 9, 16, 17) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 61 of 277)

Fire Zone: **FA2-117-11**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **A-Spent Fuel Pit Pump Room**

Associated Safety Division(s) **A**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-08 **FA2-117-12**	**-**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-8, 12) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**3.1E+05**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 62 of 277)

Fire Zone:	**FA2-117-12**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**A-Spent Fuel Pit Hx Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-08 **FA2-117-07** **FA2-117-11** **FA2-117-13**	**-**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-8, 11) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**4.0E+04**
Instruments	**3.5E+05**
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
500

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 63 of 277)

Fire Zone:	**FA2-117-13**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**B-Spent Fuel Pit Hx Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07 **FA2-117-12** **FA2-117-14**	**FA2-117-02** **FA2-123-01**	**FA2-117-27**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-7, 14) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Instruments	**3.5E+05**
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 64 of 277)

Fire Zone:	**FA2-117-14**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**B-Spent Fuel Pit Pump Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-13 **FA2-117-07**	**FA2-117-02** **FA2-123-01**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-7, 13) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Lube Oil	**3.1E+05**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 65 of 277)

Fire Zone:	**FA2-117-15**		
Building:	**Reactor**	Area Designation:	**FA2-117 Area**
Floor(s):	**1F to 3F**	Zone Designation:	**FA2-117-15 Truck Access**
Fig:	**9A-3 to 9A-7**		
Sect:	**3.18**	Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-117-08 **FA2-117-19** **FA2-117-27** **FA2-117-31**	**FA2-122-01**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-20, 21, 27, 30, 35 ～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**7.7E+06**
Low Voltage Cables	**5.8E+06**
Control Cables	**1.0E+07**
Instrumentation Cables	**8.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic Heat Detection	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 66 of 277)

Fire Zone:	**FA2-117-16**
Building:	**Reactor**
Floor(s):	**1MF**
Fig:	**9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-16 Piping Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-01	**FA2-117-09**	**FA2-117-24**
FA2-117-07	**FA2-117-10**	**FA2-117-25**
FA2-117-08	**FA2-120-05**	**FA2-120-06**
FA2-117-09	**See Table 9A-3**	**FA2-120-07**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-4, 6, 9, 10, 17) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**6.6E+06**
Low Voltage Cables	**5.0E+06**
Control Cables	**8.8E+06**
Instrumentation Cables	**7.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 67 of 277)

Fire Zone:	**FA2-117-17**
Building:	**Reactor**
Floor(s):	**1MF**
Fig:	**9A-4**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-17 Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-04	**FA2-117-07**	**FA2-117-23**
FA2-117-07	**FA2-153-01**	**FA2-117-24**
FA2-117-16		**FA2-117-42**
FA2-153-01	**See Table 9A-3**	

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-4, 6, 9, 10, 16) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 68 of 277)

Fire Zone:	**FA2-117-18**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-18 Zone**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-42 **FA2-152-05** **FA2-152-06** **FA2-206-02**	**FA2-152-01**	**FA2-407-03**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**1.6E+06**
Low Voltage Cables	**1.2E+06**
Control Cables	**2.1E+06**
Instrumentation Cables	**1.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuits in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 69 of 277)

Fire Zone:	**FA2-117-19**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A- 6**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-19 2F Eastside Corridor**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-15	**FA2-151-04**	**FA2-117-27**
FA2-117-22	**FA2-151-03**	**FA2-117-31**
FA2-117-25	**FA2-117-08**	**FA2-120-06**
FA2-117-26	**See Table 9A-3**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**7.2E+05**
Instruments	**1.3E+06**
Panels	**6.2E+05**
Transformer	**6.6E+05**
High Voltage Cables	**2.1E+07**
Low Voltage Cables	**1.6E+07**
Control Cables	**2.8E+07**
Instrumentation Cables	**2.5E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
4,000

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 70 of 277)

Fire Zone: **FA2-117-20**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation:	**FA2-117 Area**
Zone Designation:	**Volume Control Tank Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-21	**FA2-117-04**	**FA2-117-30**
FA2-117-27	**FA2-117-06**	
FA2-117-42		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 21, 27, 30, 35 ～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**1.6E+06**
Low Voltage Cables	**1.2E+06**
Control Cables	**2.1E+06**
Instrumentation Cables	**1.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	B/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 71 of 277)

Fire Zone: **FA2-117-21**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-21 Piping Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-20 **FA2-117-27** **FA2-117-42**	**FA2-117-04** **FA2-117-06**	**FA2-117-30** **FA2-117-43**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 27, 30, 35 ～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**1.1E+06**
Low Voltage Cables	**7.9E+05**
Control Cables	**1.4E+06**
Instrumentation Cables	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 72 of 277)

Fire Zone: **FA2-117-22**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **FA2-117-22 Zone**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-19 **FA2-151-05** **FA2-151-06** **FA2-201-02**	**FA2-151-01**	**FA2-407-02**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**1.6E+06**
Low Voltage Cables	**1.2E+06**
Control Cables	**2.1E+06**
Instrumentation Cables	**1.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**A fire in this zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 73 of 277)

Fire Zone:	**FA2-117-23**
Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-23 Piping Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-24	**FA2-117-17**	**FA2-117-24**
FA2-117-42	**FA2-153-01**	
FA2-153-05		

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-24) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.8E+05**
High Voltage Cables	**7.9E+05**
Low Voltage Cables	**6.0E+05**
Control Cables	**1.1E+06**
Instrumentation Cables	**9.3E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
150

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 74 of 277)

Fire Zone: **FA2-117-24**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **FA2-117-24 Piping Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-23	**FA2-117-16**	**FA2-411-01**
FA2-117-42	**FA2-117-17**	**FA2-117-29**
FA2-153-05	**FA2-153-01**	**FA2-117-28**
	See Table 9A-3	

Fire Barrier Description: **Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-23) in this fire area.**

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**5.1E+06**
Instruments	**1.1E+06**
High Voltage Cables	**5.3E+06**
Low Voltage Cables	**4.0E+06**
Control Cables	**7.1E+06**
Instrumentation Cables	**6.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading:	**3.5E+04**

Floor Area (ft^2)
1,000

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 75 of 277)

Fire Zone: **FA2-117-25**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-25 Piping Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-19 **FA2-117-26** **FA2-120-06** **FA2-120-07**	**FA2-117-16** **FA2-120-02**	**FA2-117-33**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-26) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**7.9E+05**
Low Voltage Cables	**6.0E+05**
Control Cables	**1.1E+06**
Instrumentation Cables	**9.3E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 76 of 277)

Fire Zone: **FA2-117-26**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **FA2-117-26 Piping Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-19 **FA2-117-25** **FA2-120-06**	**FA2-120-02**	**FA2-117-32**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-25) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**3.7E+06**
Low Voltage Cables	**2.8E+06**
Control Cables	**4.9E+06**
Instrumentation Cables	**4.3E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
700

Table 9A-2 Fire Hazard Analysis Summary (Sheet 77 of 277)

Fire Zone: **FA2-117-27**

Building:	**Reactor**
Floor(s):	**2MF to Roof**
Fig:	**9A-6 to 9A-9**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **Spent Fuel Handling Zone**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-15	**FA2-117-07**	**FA2-117-43**
FA2-117-20	**FA2-117-15**	**FA2-408-01**
FA2-117-21	**FA2-117-30**	
FA2-117-30	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 30, 35 ～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Cable(Crane)	**8.0E+06**
Crane	**5.7E+06**
Grease	**2.2E+06**
Instruments	**1.5E+06**
Fuel Transfer Devices	**5.7E+05**
Lighting Transformer	**6.6E+05**
Lube Oil	**1.1E+07**
Panels	**3.2E+06**
Rack and Work Station	**3.2E+06**
Tool	**2.8E+06**
High Voltage Cables	**5.3E+07**
Low Voltage Cables	**4.0E+07**
Control Cables	**7.1E+07**
Instrumentation Cables	**6.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Linear Beam	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.2E+04**

Floor Area (ft^2)
10,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire in this area will minimize any potential damage to fuel or fuel handling equipment.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 78 of 277)

Fire Zone:	**FA2-117-28**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-28 Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-43 **FA2-408-01** **FA2-411-01**	**FA2-117-24**	**FA2-117-27** **FA2-117-35** **FA2-117-37** **FA2-117-44**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**5.3E+05**
Low Voltage Cables	**4.0E+05**
Control Cables	**7.1E+05**
Instrumentation Cables	**6.2E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 79 of 277)

Fire Zone: **FA2-117-29**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **B-Annulus Emergency Exhaust Filtration Unit & Fan Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-43 **FA2-411-01**	**FA2-117-24**	**FA2-117-36** **FA2-117-44**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**3.4E+06**
Instruments	**1.7E+06**
Particle Filters	**1.1E+06**
Rubber	**8.1E+05**
High Voltage Cables	**5.6E+06**
Low Voltage Cables	**4.2E+06**
Control Cables	**7.4E+06**
Instrumentation Cables	**6.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**There is no manual detection.**

Fire Suppression - Primary	Fire Suppression - Backup
Charcoal Spray	**There is no backup suppression system.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading:	**3.5E+04**

Floor Area (ft^2)
1,050

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire in this area will minimize any potential damage.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 80 of 277)

Fire Zone:	**FA2-117-30**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-30 Piping Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-27 **FA2-117-43**	**FA2-117-20** **FA2-117-21**	**FA2-117-38** **FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 35 ～40) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**1.6E+06**
Low Voltage Cables	**1.2E+06**
Control Cables	**2.1E+06**
Instrumentation Cables	**1.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 81 of 277)

Fire Zone: **FA2-117-31**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **FA2-117-31 3F Eastside Corridor**

Associated Safety Division(s): **A**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-15	**FA2-117-19**	**FA2-117-27**
FA2-117-27	**FA2-120-06**	**FA2-117-35**
FA2-117-32	**See Table 9A-3**	
FA2-117-33		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-33) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Panels	**6.1E+05**
High Voltage Cables	**1.5E+07**
Low Voltage Cables	**1.2E+07**
Control Cables	**2.0E+07**
Instrumentation Cables	**1.8E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
2,900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 82 of 277)

Fire Zone:	**FA2-117-32**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**A-Annulus Emergency Exhaust Filtration Unit & Fan Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-18	**FA2-117-26**	**FA2-117-27**
FA2-117-31	**FA2-120-06**	**FA2-117-35**
FA2-117-33		
FA2-207-01		

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Filters	**3.4E+06**
Instruments	**2.4E+06**
Particle Filters	**1.1E+06**
Rubber	**8.1E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**There is no manual detection.**

Fire Suppression - Primary	Fire Suppression - Backup
Charcoal Spray	**There is no backup suppression system.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.8E+04**
Maximum Anticipated Combustible Loading:	**3.4E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire in this area will minimize any potential damage.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 83 of 277)

Fire Zone:	**FA2-117-33**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-33 Piping Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-18	**FA2-117-25**	**FA2-117-27**
FA2-117-31	**FA2-120-06**	**FA2-117-35**
FA2-117-32	**FA2-120-07**	
FA2-408-01		

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-31) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**5.6E+06**
Low Voltage Cables	**4.2E+06**
Control Cables	**7.4E+06**
Instrumentation Cables	**6.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,050

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 84 of 277)

Fire Zone:	**FA2-117-34**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**R/B-4F Electrical Penetration Area (FA2-117-34)**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA1-101-23 **FA2-117-35** **FA2-207-01** **FA2-501-01**	**FA2-409-01** **See Table 9A-3**	**FA2-501-09** **Roof**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**7.0E+05**
Panels	**1.6E+05**
High Voltage Cables	**6.1E+06**
Low Voltage Cables	**4.6E+06**
Control Cables	**8.1E+06**
Instrumentation Cables	**7.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3..	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 85 of 277)

Fire Zone:	**FA2-117-35**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**C/V Equipment Hatch R/B Side Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-25	**FA2-117-31**	**FA2-117-39**
FA1-101-26	**FA2-117-32**	**FA2-501-09**
FA2-117-27	**FA2-117-33**	**Roof**
FA2-117-34	**FA2-408-01**	**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 36～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**3.3E+05**
High Voltage Cables	**2.7E+07**
Low Voltage Cables	**2.0E+07**
Control Cables	**3.6E+07**
Instrumentation Cables	**3.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
5,150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator..	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 86 of 277)

Fire Zone:	**FA2-117-36**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**C/V Radiation Gas Monitor Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-37 **FA2-117-40** **FA2-117-44**	**FA2-117-29** **FA2-411-01**	**FA2-117-44**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 35, 37～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+03**
Maximum Anticipated Combustible Loading:	**2.8E+03**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 87 of 277)

Fire Zone:	**FA2-117-37**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**Pass Sampling Rack Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-25 **FA2-117-35** **FA2-117-36** **FA2-117-40**	**FA2-117-28** **FA2-411-01**	**FA2-117-44**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 35, 36, 38～40) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**8.9E+05**
Panels	**4.0E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**6.2E+03**
Maximum Anticipated Combustible Loading:	**8.0E+03**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 88 of 277)

Fire Zone:	**FA2-117-38**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**Plant Vent Radiation Gas Monitor Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-27 **FA2-117-44**	**FA2-117-30** **FA2-117-43**	**Roof**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 35～37, 39, 40) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+03**
Maximum Anticipated Combustible Loading:	**3.0E+03**

Floor Area (ft^2)
500

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 89 of 277)

Fire Zone:	**FA2-117-39**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**Fuel Inspection Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-25	**FA2-117-35**	**Roof**
FA1-101-26		
FA2-117-27		
FA2-117-35	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 35～38, 40) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**9.6E+05**
Lube Oil	**2.3E+05**
Panels	**2.1E+06**
Rack	**2.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**6.4E+03**
Maximum Anticipated Combustible Loading:	**7.9E+03**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 90 of 277)

Fire Zone:	**FA2-117-40**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**R/B-4F Penetration Area (FA2-117-40)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-25 **FA2-117-36** **FA2-117-37** **FA2-117-44**	**FA2-411-01** **See Table 9A-3**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-117-15, 20, 21, 27, 30, 35～39) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**3.3E+06**
High Voltage Cables	**4.2E+06**
Low Voltage Cables	**3.2E+06**
Control Cables	**5.6E+06**
Instrumentation Cables	**4.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.2E+04**

Floor Area (ft^2)
800

Table 9A-2 Fire Hazard Analysis Summary (Sheet 91 of 277)

Fire Zone: **FA2-117-41**

Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**

Area Designation: **FA2-117 Area**

Zone Designation: **R/B-4F Electrical Penetration Area (FA2-117-41)**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-24 **FA2-117-44** **FA2-208-01** **FA2-501-04**	**FA2-410-01** **See Table 9A-3**	**Roof**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**3.4E+06**
Low Voltage Cables	**2.6E+06**
Control Cables	**4.6E+06**
Instrumentation Cables	**4.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
650

Table 9A-2 Fire Hazard Analysis Summary (Sheet 92 of 277)

Fire Zone:	**FA2-117-42**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-42 2F Westside Corridor**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-18	**FA2-117-04**	**FA2-117-27**
FA2-117-19	**FA2-117-07**	**FA2-117-43**
FA2-117-20	**FA2-117-17**	**FA2-153-05**
FA2-117-21	**FA2-152-03**	**See Table 9A-3**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**4.3E+06**
Instruments	**3.1E+06**
Panels	**6.9E+05**
High Voltage Cables	**1.5E+07**
Low Voltage Cables	**1.1E+07**
Control Cables	**2.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
2,800

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is not safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 93 of 277)

Fire Zone:	**FA2-117-43**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-43 3F Westside Corridor**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-117-27	**FA2-117-21**	**FA2-117-27**
	FA2-117-28	**FA2-117-27**	**FA2-117-38**
	FA2-117-29	**FA2-117-42**	**FA2-117-44**
	FA2-117-30	**See Table 9A-3**	**FA2-501-05**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+05**
Panels	**6.1E+05**
High Voltage Cables	**1.7E+07**
Low Voltage Cables	**1.3E+07**
Control Cables	**2.3E+07**
Instrumentation Cables	**2.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
3,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 94 of 277)

Fire Zone:	**FA2-117-44**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.18**
Area Designation:	**FA2-117 Area**
Zone Designation:	**FA2-117-44 4F Westside Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-25	**FA2-117-28**	**Roof**
FA2-117-27	**FA2-117-29**	
FA2-117-35	**FA2-117-36**	**See Table 9A-3**
FA2-117-36	**FA2-117-37**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**2.1E+05**
Instruments	**7.1E+05**
Lube Oil	**1.5E+05**
Panels	**6.0E+04**
High Voltage Cables	**1.3E+07**
Low Voltage Cables	**1.0E+07**
Control Cables	**1.8E+07**
Instrumentation Cables	**1.6E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
2,550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 95 of 277)

Fire Zone: **FA2-118-01**

Building:	**Reactor**
Floor(s):	**B1F to 4F**
Fig:	**9A-1 to 9A-8**
Sect:	**3.19**

Area Designation:	**FA2-118 E.V. Shaft**
Zone Designation:	**FA2-118-01 E.V. Shaft**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-117-01	**FA2-117-43**	**Roof**
FA2-117-05	**FA2-117-44**	
FA2-117-07	**FA2-119-01**	
FA2-117-42	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Elevator doors fire resistant per elevator code. All penetration and other opening are protected to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+03**

Floor Area (ft^2)
50

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 96 of 277)

Fire Zone:	**FA2-119-01**
Building:	**Reactor**
Floor(s):	**B1F to 4F**
Fig:	**9A-1 to 9A-8**
Sect:	**3.20**
Area Designation:	**FA2-119 Stairwell**
Zone Designation:	**FA2-119-01 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-117-01	**FA2-117-43**	**Roof**
FA2-117-05	**FA2-117-44**	
FA2-117-07	**FA2-118-01**	
FA2-117-42	**See Table 9A-3**	

Fire Barrier Description:

Structural barriers surrounding this fire zone consist of primarily concrete walls providing 3-hour fire resistant barrier for the stairwell. Fire doors are provide for each entry to the stairwell and all penetrations into the stairwell are protected for 3-hour fire resistance to assure no fire propagation into or out of the stairwell.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 97 of 277)

Fire Zone: **FA2-120-01**

Building:	**Reactor**
Floor(s):	**B1F, B1MF**
Fig:	**9A-1, 9A-2**
Sect:	**3.21**

Area Designation: **A-RHR Piping Room Area**

Zone Designation: **R/B Sump Tank Room**

Associated Safety Division(s): **A**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-113-02 **FA2-120-02** **FA2-121-01** **FA2-121-02**	**-**	**FA2-117-08**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.1E+04**
Instruments	**1.8E+05**
Lube Oil	**8.5E+03**
High Voltage Cables	**1.1E+06**
Low Voltage Cables	**7.9E+05**
Control Cables	**1.4E+06**
Instrumentation Cables	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 98 of 277)

Fire Zone:	**FA2-120-02**
Building:	**Reactor**
Floor(s):	**B1MF to 1MF**
Fig:	**9A-2, to 9A-4**
Sect:	**3.21**
Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**A-RHR Piping Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-08	**FA2-113-01**	**FA2-117-26**
FA2-117-16	**FA2-113-02**	**FA2-120-04**
FA2-120-01	**FA2-113-03**	**FA2-120-05**
FA2-120-03	**See Table 9A-3**	

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**8.4E+05**
Instruments	**7.0E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 99 of 277)

Fire Zone: **FA2-120-03**

Building:	**Reactor**
Floor(s):	**B1MF**
Fig:	**9A-2**
Sect:	**3.21**

Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**FA2-120-03 Corridor**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-111-01	**FA2-113-03**	**FA2-117-08**
FA2-120-02	**FA2-114-03**	**FA2-151-04**
FA2-121-02	**FA2-121-01**	
FA2-151-01	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**2.6E+05**
High Voltage Cables	**9.3E+06**
Low Voltage Cables	**6.9E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 100 of 277)

Fire Zone:	**FA2-120-04**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.21**
Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**A-CS/RHR Hx Room Area**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-08 **FA2-120-02** **FA2-120-05** **FA2-207-01**	**FA2-120-02** **See Table 9A-3**	**FA2-120-06**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
High Voltage Cables	**4.5E+06**
Low Voltage Cables	**3.4E+06**
Control Cables	**6.0E+06**
Instrumentation Cables	**5.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
850

Table 9A-2 Fire Hazard Analysis Summary (Sheet 101 of 277)

Fire Zone:	**FA2-120-05**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.21**
Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**A-Safeguard Component Area AHU Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-117-08 **FA2-117-09** **FA2-117-16** **FA2-120-02**	**FA2-120-02** **See Table 9A-3**	**FA2-120-06** **FA2-120-07** **FA2-117-16**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection – Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 102 of 277)

Fire Zone:	**FA2-120-06**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.21**
Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**R/B-2F A-Piping Penetration Area (FA2-120-06)**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-07	**FA2-117-16**	**FA2-117-32**
FA2-117-19	**FA2-117-19**	**FA2-117-33**
FA2-117-25	**FA2-120-04**	**FA2-117-31**
FA2-117-26	**FA2-120-05**	**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**2.8E+06**
Instruments	**2.6E+05**
High Voltage Cables	**5.8E+06**
Low Voltage Cables	**4.4E+06**
Control Cables	**7.8E+06**
Instrumentation Cables	**6.8E+06**

Fire Detection – Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
1,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 103 of 277)

Fire Zone: **FA2-120-07**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.21**

Area Designation:	**A-RHR Piping Room Area**
Zone Designation:	**C/V Personnel Airlock Zone**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-06	**FA2-117-16**	**FA2-117-33**
FA1-101-07	**FA2-117-09**	**FA2-408-01**
FA2-117-19	**FA2-120-05**	
FA2-117-25	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is not any safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 104 of 277)

Fire Zone: **FA2-121-01**

Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.22**

Area Designation: **FA2-121 Corridor**

Zone Designation: **FA2-121-01 Corridor**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-113-02	**FA2-122-01**	**FA2-120-03**
FA2-113-03	**FA2-123-01**	**FA2-121-02**
FA2-114-03		
FA2-120-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**7.9E+05**
Panels	**3.1E+05**
High Voltage Cables	**9.8E+06**
Low Voltage Cables	**7.3E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 105 of 277)

Fire Zone: **FA2-121-02**

Building:	**Reactor**
Floor(s):	**B1MF**
Fig:	**9A-2**
Sect:	**3.22**

Area Designation:	**FA2-121 Corridor**
Zone Designation:	**FA2-121-02 Corridor**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-122-01 **FA2-120-01** **FA2-120-03** **FA2-120-02**	**FA2-121-01**	**FA2-117-08**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**8.8E+04**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
450

Table 9A-2 Fire Hazard Analysis Summary (Sheet 106 of 277)

Fire Zone: **FA2-122-01**

Building:	**Reactor**
Floor(s):	**B1F to 4F**
Fig:	**9A-1 to 9A-8**
Sect:	**3.23**

Area Designation:	**FA2-122 Stairwell (B1F~Roof)**
Zone Designation:	**FA2-122-01 Stairwell (B1F~Roof)**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-117-08 **FA2-117-15** **FA2-117-19** **FA2-117-27**	**FA2-117-31** **FA2-121-01** **FA2-121-02**	**FA2-117-27**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 107 of 277)

Fire Zone: **FA2-123-01**

Building:	**Reactor**
Floor(s):	**B1F to 1F**
Fig:	**9A-1 to 9A-3**
Sect:	**3.24**

Area Designation: **Tendon Gallery Access Hatch Area**

Zone Designation: **Tendon Gallery Access Hatch Area**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-111-01	**FA2-114-02**	**FA2-117-07**
FA2-112-01	**FA2-115-01**	**FA2-117-10**
FA2-113-01	**FA2-115-02**	**FA2-117-13**
FA2-114-01	**See Table 9A-3**	**FA2-117-14**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistance for the borders of this gallery. Any penetration into the area is protected to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.8E+01**

Floor Area (ft^2)
5,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 108 of 277)

Fire Zone:	**FA2-124-01**
Building:	**Reactor**
Floor(s):	**B1F**
Fig:	**9A-1**
Sect:	**3.25**
Area Designation:	**FA2-124 Corridor**
Zone Designation:	**FA2-124-01 Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-115-03 **FA2-116-03** **FA2-123-01** **FA4-101-01**		**FA2-153-02**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**3.7E+06**
Low Voltage Cables	**2.8E+06**
Control Cables	**4.9E+06**
Instrumentation Cables	**4.3E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
700

Table 9A-2 Fire Hazard Analysis Summary (Sheet 109 of 277)

Fire Zone:	**FA2-151-01**
Building:	**Reactor**
Floor(s):	**B1MF to 1MF**
Fig:	**9A-2 to 9A-4**
Sect:	**3.26**
Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**B-RHR Piping Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-111-01	**FA2-114-01**	**FA2-117-22**
FA2-120-03	**FA2-114-02**	**FA2-151-02**
FA2-151-02	**FA2-114-03**	**FA2-151-03**
FA2-151-03	**See Table 9A-3**	**FA2-151-06**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**8.4E+05**
Instruments	**8.8E+05**
High Voltage Cables	**6.6E+06**
Low Voltage Cables	**5.0E+06**
Control Cables	**8.8E+06**
Instrumentation Cables	**7.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 110 of 277)

Fire Zone:	**FA2-151-02**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.26**
Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**B-Safeguard Component Area AHU Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-151-01 **FA2-151-03** **FA2-151-04**	**FA2-151-01**	**FA2-151-06**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 t safe-shutdown.** **Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 111 of 277)

Fire Zone:	**FA2-151-03**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.26**
Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**B-CS/RHR Hx Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-151-01	**FA2-117-08**	**FA2-117-19**
FA2-151-02	**FA2-151-01**	**FA2-151-05**
FA2-151-04	**FA2-151-04**	
FA2-207-01	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
High Voltage Cables	**4.2E+06**
Low Voltage Cables	**3.2E+06**
Control Cables	**5.6E+06**
Instrumentation Cables	**4.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
800

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 112 of 277)

Fire Zone:	**FA2-151-04**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.26**
Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**FA2-151-04 Corridor**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-08	**FA2-120-03**	**FA2-117-19**
FA2-151-03		**FA2-151-03**
FA2-151-01	**See Table 9A-3**	**FA2-151-06**
FA2-151-02		**FA2-201-02**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.8E+06**
Panels	**3.6E+05**
High Voltage Cables	**9.0E+06**
Low Voltage Cables	**6.7E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,700

Table 9A-2 Fire Hazard Analysis Summary(Sheet 113 of 277)

Fire Zone:	**FA2-151-05**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.26**
Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**FA2-151-05 Zone**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-04 **FA2-117-19** **FA2-117-22** **FA2-120-06**	**FA2-151-03** **See Table 9A-3**	**FA2-409-01**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**2.1E+06**
Instruments	**4.4E+05**
High Voltage Cables	**4.0E+06**
Low Voltage Cables	**3.0E+06**
Control Cables	**5.3E+06**
Instrumentation Cables	**4.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
750

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 114 of 277)

Fire Zone: **FA2-151-06**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.26**

Area Designation:	**B-RHR Piping Room Area**
Zone Designation:	**R/B 2F B-Piping Penetration Area (FA2-151-06)**
Associated Safety Division(s)	**B**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-04	**FA2-151-02**	**FA2-409-01**
FA2-117-22	**FA2-151-01**	**FA2-407-04**
FA2-151-05	**FA2-151-04**	
FA2-152-06	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**8.0E+06**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**
Instruments	**8.8E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.7E+04**
Maximum Anticipated Combustible Loading:	**4.5E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 115 of 277)

Fire Zone:	**FA2-152-01**
Building:	**Reactor**
Floor(s):	**B1MF to 1MF**
Fig:	**9A-2, to 9A-4**
Sect:	**3.27**
Area Designation:	**C-RHR Piping Room Area**
Zone Designation:	**C-RHR Piping Room Area**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-112-01	**FA2-115-01**	**FA2-117-18**
FA2-152-02	**FA2-115-02**	**FA2-152-02**
FA2-152-03	**FA2-115-03**	**FA2-152-03**
FA2-152-04	**See Table 9A-3**	**FA2-152-04**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**8.4E+05**
Instruments	**5.3E+05**
High Voltage Cables	**6.6E+06**
Low Voltage Cables	**5.0E+06**
Control Cables	**8.8E+06**
Instrumentation Cables	**7.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 116 of 277)

Fire Zone: **FA2-152-02**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.27**

Area Designation: **C-RHR Piping Room Area**

Zone Designation: **C-Safeguard Component Area AHU Room**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-152-01 **FA2-152-03**	**FA2-152-01**	**FA2-152-04** **FA2-152-06**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train.** **Three trains remain free from the fire damage**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
250

Table 9A-2 Fire Hazard Analysis Summary (Sheet 117 of 277)

Fire Zone: **FA2-152-03**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.27**

Area Designation:	**C-RHR Piping Room Area**
Zone Designation:	**C-CS/RHR Hx Room**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07	**FA2-117-07**	**FA2-117-42**
FA2-152-01	**FA2-152-01**	**FA2-152-05**
FA2-152-02	**FA2-152-04**	
FA2-152-04	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
High Voltage Cables	**4.2E+06**
Low Voltage Cables	**3.2E+06**
Control Cables	**5.6E+06**
Instrumentation Cables	**4.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
800

Table 9A-2 Fire Hazard Analysis Summary (Sheet 118 of 277)

Fire Zone: **FA2-152-04**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.27**

Area Designation: **C-RHR Piping Room Area**

Zone Designation: **FA2-152-04 Corridor**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07	**FA2-152-01**	**FA2-117-42**
FA2-151-04	**FA2-153-02**	**FA2-152-03**
FA2-152-01		**FA2-152-06**
FA2-152-02	**See Table 9A-3**	**FA2-206-02**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**7.9E+05**
Instruments	**1.8E+06**
High Voltage Cables	**9.0E+06**
Low Voltage Cables	**6.7E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,700

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 119 of 277)

Fire Zone: **FA2-152-05**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.27**

Area Designation:	**C-RHR Piping Room Area**
Zone Designation:	**R/B-2F C-Piping Penetration Area (FA2-152-05)**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-05	**FA2-152-03**	**FA2-410-01**
FA2-117-18		
FA2-117-42		
FA2-152-06	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**2.1E+06**
Instruments	**4.4E+05**
High Voltage Cables	**4.0E+06**
Low Voltage Cables	**3.0E+06**
Control Cables	**5.3E+06**
Instrumentation Cables	**4.6E+06**
Grease	**2.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 120 of 277)

Fire Zone:	**FA2-152-06**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.27**
Area Designation:	**C-RHR Piping Room Area**
Zone Designation:	**R/B-2F C-Piping Penetration Area (FA2-152-06)**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-05	**FA2-152-02**	**FA2-410-01**
FA2-117-18	**FA2-152-01**	**FA2-407-01**
FA2-151-06	**FA2-152-04**	
FA2-152-05	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**9.4E+06**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**
Instruments	**1.8E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.0E+04**
Maximum Anticipated Combustible Loading:	**4.8E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 121 of 277)

Fire Zone:	**FA2-153-01**
Building:	**Reactor**
Floor(s):	**B1MF to 1MF**
Fig:	**9A-2 to 9A-4**
Sect:	**3.28**
Area Designation:	**D-RHR Piping Room Area**
Zone Designation:	**D-RHR Piping Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-04	**FA2-116-01**	**FA2-117-17**
FA2-117-05	**FA2-116-02**	**FA2-117-23**
FA2-117-07	**FA2-116-03**	**FA2-117-24**
FA2-117-16	**See Table 9A-3**	**FA2-153-03**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**8.4E+05**
Instruments	**7.0E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 122 of 277)

Fire Zone: **FA2-153-02**

Building:	**Reactor**
Floor(s):	**B1MF**
Fig:	**9A-2**
Sect:	**3.28**

Area Designation: **D-RHR Piping Room Area**

Zone Designation: **FA2-153-02 Corridor**

Associated Safety Division(s) **D**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-112-01	**FA2-124-01**	**FA2-117-07**
FA2-117-05	**FA2-115-03**	**FA2-152-04**
FA2-152-01	**FA2-116-03**	
FA2-153-01	**See Table 9A-3**	

Fire Barrier Description: **Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.**

Potential Combustibles Item	Heat Release (Btu)
Instruments	**2.6E+05**
High Voltage Cables	**9.3E+06**
Low Voltage Cables	**6.9E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2): **1,750**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 123 of 277)

Fire Zone:	**FA2-153-03**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.28**
Area Designation:	**D-RHR Piping Room Area**
Zone Designation:	**D-CS/RHR Hx Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07 **FA2-152-03** **FA2-153-01** **FA2-153-04**	**FA2-153-01** **See Table 9A-3**	**FA2-153-05**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
High Voltage Cables	**4.5E+06**
Low Voltage Cables	**3.4E+06**
Control Cables	**6.0E+06**
Instrumentation Cables	**5.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 124 of 277)

Fire Zone:	**FA2-153-04**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.28**
Area Designation:	**D-RHR Piping Room Area**
Zone Designation:	**D-Safeguard Component Area AHU Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07	**FA2-153-01**	**FA2-117-24**
FA2-117-10		**FA2-117-16**
FA2-117-16	**See Table 9A-3**	**FA2-153-05**
FA2-153-01		

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**3.0E+04**

Floor Area (ft^2)
450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 train safe-shutdown. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 125 of 277)

Fire Zone:	**FA2-153-05**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.28**
Area Designation:	**D-RHR Piping Room Area**
Zone Designation:	**R/B-2F D-Piping Penetration Area (FA2-153-05)**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-06	**FA2-153-03**	**FA2-117-27**
FA1-101-07	**FA2-153-04**	**FA2-117-43**
FA2-117-19	**FA2-117-16**	**FA2-408-01**
FA2-117-23	**See Table 9A-3**	**FA2-411-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**4.3E+06**
Instruments	**3.5E+05**
High Voltage Cables	**6.6E+06**
Low Voltage Cables	**5.0E+06**
Control Cables	**8.8E+06**
Instrumentation Cables	**7.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.2E+04**

Floor Area (ft^2)
1,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone could damage the few functions of 1 safe-shutdown. Three trains remain free from the fire damage..**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 126 of 277)

Fire Zone:	**FA2-201-01**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.29**
Area Designation:	**FA2-201 Corridor**
Zone Designation:	**FA2-201-01 Corridor**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-101-01	**FA2-111-01**	**FA2-201-02**
FA2-102-01	**FA2-102-01**	**FA2-202-01**
FA2-151-04		**FA2-303-01**
FA2-202-01	**See Table 9A-3**	**FA2-307-02**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**9.5E+04**
High Voltage Cables	**8.5E+06**
Low Voltage Cables	**6.3E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 127 of 277)

Fire Zone: **FA2-201-02**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.29**

Area Designation:	**FA2-201 Corridor**
Zone Designation:	**FA2-201-02 Corridor**
Associated Safety Division(s)	**B**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-04	**FA2-102-01**	**FA2-407-04**
FA2-101-01	**FA2-151-04**	
FA2-117-19	**FA2-201-01**	
FA2-117-22	**FA2-202-01**	**See Table 9A-3**

Fire Barrier Description: **Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.**

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**7.9E+06**
Low Voltage Cables	**6.0E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.3E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,500

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 128 of 277)

Fire Zone:	**FA2-202-01**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.30**
Area Designation:	**A-Class 1E Electrical Room**
Zone Designation:	**A-Class 1E Electrical Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-102-01	**FA2-104-01**	**FA2-201-02**
FA2-201-01	**FA2-102-01**	**FA2-203-01**
FA2-203-01	**FA2-103-01**	**FA2-301-01**
FA3-104-04	**See Table 9A-3**	**FA2-302-01**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Switchgear and Control Centers	**4.8E+07**
Panels	**1.1E+06**
Instruments	**1.8E+05**
High Voltage Cables	**5.7E+06**
Low Voltage Cables	**1.0E+08**
Control Cables	**5.1E+07**
Instrumentation Cables	**7.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**9.9E+04**
Maximum Anticipated Combustible Loading:	**1.2E+05**

Floor Area (ft^2)
2,200

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 129 of 277)

Fire Zone:	**FA2-203-01**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.31**
Area Designation:	**B-Class 1E Electrical Room**
Zone Designation:	**B-Class 1E Electrical Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-01	**FA2-105-01**	**FA2-307-01**
FA2-202-01	**FA2-202-01**	**FA2-308-03**
FA2-204-01		
FA6-101-04		

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Switchgear and Control Centers	**3.9E+07**
Panels	**5.1E+06**
Instruments	**1.8E+05**
High Voltage Cables	**3.0E+07**
Low Voltage Cables	**3.1E+07**
Control Cables	**2.4E+07**
Instrumentation Cables	**6.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**7.4E+04**
Maximum Anticipated Combustible Loading:	**8.9E+04**

Floor Area (ft^2)
1,850

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 130 of 277)

Fire Zone: **FA2-204-01**

Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.32**

Area Designation:	**C-Class 1E Electrical Room**
Zone Designation:	**C-Class 1E Electrical Room**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-203-01	**FA2-106-01**	**FA2-308-03**
FA2-205-01	**FA2-205-01**	**FA2-312-01**
FA2-206-01		
FA6-101-04		

Fire Barrier Description: **Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

Potential Combustibles	
Item	Heat Release (Btu)
Switchgear and Control Centers	**3.9E+07**
Panels	**5.1E+06**
High Voltage Cables	**3.0E+07**
Low Voltage Cables	**3.1E+07**
Control Cables	**2.4E+07**
Instrumentation Cables	**6.7E+06**
Instruments	**1.8E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**7.4E+04**
Maximum Anticipated Combustible Loading:	**8.9E+04**

Floor Area (ft^2)
1,850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 131 of 277)

Fire Zone:	**FA2-205-01**
Building:	**Reactor**
Floor(s):	**1F. 1MF**
Fig:	**9A-3, 9A-4**
Sect:	**3.33**
Area Designation:	**D-Class 1E Electrical Room**
Zone Designation:	**D-Class 1E Electrical Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-108-01	**FA2-107-01**	**FA2-204-01**
FA2-204-01	**FA2-108-01**	**FA2-206-02**
FA2-206-01	**FA2-109-01**	**FA2-309-02**
FA3-111-04	**See Table 9A-3**	**FA2-312-02**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Switchgear and Control Centers	**4.7E+07**
Panels	**1.1E+06**
High Voltage Cables	**3.8E+06**
Low Voltage Cables	**9.9E+07**
Control Cables	**6.1E+07**
Instrumentation Cables	**1.3E+07**
Instruments	**1.8E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**9.8E+04**
Maximum Anticipated Combustible Loading:	**1.2E+05**

Floor Area (ft^2)
2,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 132 of 277)

Fire Zone:	**FA2-206-01**
Building:	**Reactor**
Floor(s):	**1F, 1MF**
Fig:	**9A-3,9A-4**
Sect:	**3.34**
Area Designation:	**FA2-206 Corridor**
Zone Designation:	**FA2-206-01 Corridor**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-108-01	**FA2-112-01**	**FA2-205-01**
FA2-110-01	**FA2-108-01**	**FA2-206-02**
FA2-152-04		**FA2-308-03**
FA2-201-01	**See Table 9A-3**	**FA2-312-02**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**2.7E+05**
High Voltage Cables	**8.2E+06**
Low Voltage Cables	**6.1E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 133 of 277)

Fire Zone:	**FA2-206-02**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5,9A-6**
Sect:	**3.34**
Area Designation:	**FA2-206 Corridor**
Zone Designation:	**FA2-206-02 Corridor**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-05	**FA2-108-01**	**FA2-407-01**
FA2-110-01	**FA2-152-04**	
FA2-117-18	**FA2-205-01**	
FA2-117-42	**FA2-206-01**	**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**1.8E+04**
High Voltage Cables	**9.0E+06**
Low Voltage Cables	**6.7E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,700

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 134 of 277)

Fire Zone: **FA2-207-01**

Building:	**Reactor**
Floor(s):	**1F to 4F**
Fig:	**9A-3 to 9A-8**
Sect:	**3.35**

Area Designation: **FA2-207 Buttress Shaft**

Zone Designation: **FA2-207-01 Buttress Shaft (East Side)**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA1-101-04	**FA1-101-23**	**Roof**
FA1-101-07	**FA1-101-26**	
FA1-101-15	**FA2-117-08**	
FA1-101-18	**See Table 9A-3**	

Fire Barrier Description: **Reinforced concrete providing a minimum of 3-hour fire resistance forms this unoccupied shaft area. The door to the shaft is fire rated for 3-hour and all penetrations for lighting, etc. are protected for 3-hour fire resistance.**

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+02**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 135 of 277)

Fire Zone:	**FA2-208-01**
Building:	**Reactor**
Floor(s):	**1F to 4F**
Fig:	**9A-3 to 9A-8**
Sect:	**3.36**
Area Designation:	**FA2-208 Buttress Shaft**
Zone Designation:	**FA2-208-01 Buttress Shaft (West Side)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Wall
FA1-101-05	**FA1-101-24**	**Roof**
FA1-101-06	**FA1-101-25**	
FA1-101-16	**FA2-117-07**	
FA1-101-17	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete providing a minimum of 3-hour fire resistance forms this unoccupied shaft area. The door to the shaft is fire rated for 3-hour and all penetrations for lighting, etc. are protected for 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+02**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There are safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 136 of 277)

Fire Zone:	**FA2-301-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.37**
Area Designation:	**FA2-301 Area**
Zone Designation:	**FA2-301-01 Zone**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02 **FA2-302-01** **FA6-101-15**	**FA2-202-01**	**FA2-407-04**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**2.3E+03**

Floor Area (ft^2)
40

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 137 of 277)

Fire Zone: **FA2-302-01**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.38**

Area Designation:	**A-Class 1E UPS Room**
Zone Designation:	**A-Class 1E UPS Room**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02 **FA2-301-01** **FA2-303-01** **FA2-304-01**	**FA2-202-01** **See Table 9A-3**	**FA2-402-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**3.8E+06**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.2E+04**
Maximum Anticipated Combustible Loading:	**3.9E+04**

Floor Area (ft^2)
400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 138 of 277)

Fire Zone:	**FA2-303-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.39**
Area Designation:	**B-Class 1E UPS Room**
Zone Designation:	**B-Class 1E UPS Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02	**FA2-201-01**	**FA2-401-01**
FA2-302-01	**FA2-202-01**	
FA2-307-01		
FA2-307-02		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**3.8E+06**
High Voltage Cables	**1.9E+06**
Low Voltage Cables	**1.4E+06**
Control Cables	**2.5E+06**
Instrumentation Cables	**2.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.3E+04**
Maximum Anticipated Combustible Loading:	**4.0E+04**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train.** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 139 of 277)

Fire Zone:	**FA2-304-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.40**
Area Designation:	**A-Class 1E I&C Room**
Zone Designation:	**A-Class 1E I&C Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-302-01 **FA2-307-01** **FA2-308-02** **FA6-101-15**	**FA2-304-02**	**FA2-307-01** **FA2-402-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**1.1E+07**
High Voltage Cables	**4.8E+06**
Low Voltage Cables	**3.6E+06**
Control Cables	**6.3E+06**
Instrumentation Cables	**5.6E+06**
Instruments	**1.8E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Statio**
Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.5E+04**
Maximum Anticipated Combustible Loading:	**4.2E+04**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 140 of 277)

Fire Zone:	**FA2-304-02**
Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.40**
Area Designation:	**A-Class 1E I&C Room**
Zone Designation:	**A-Class 1E I&C Room Raised Floor**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-302-01 **FA2-307-01** **FA2-307-02** **FA2-308-03**	**FA2-202-01** **See Table 9A-3**	**FA2-304-01**

Fire Barrier Description:
The floor and walls of this zone are of reinforced concrete or other materials which provide at least 3-hour fire resistive capability. The ceiling (floor of I&C room) is substantial metal or floor panel which is not fire rated. All penetrations into the zone from outside the area are protected for 3-hour.

Potential Combustibles	
Item	Heat Release (Btu)
Cable	**2.8E+08**
Sheet	**7.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Statio**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+05**
Maximum Anticipated Combustible Loading:	**3.7E+05**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 141 of 277)

Fire Zone: **FA2-307-01**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.41**

Area Designation: **B-Class 1E I&C Room**

Zone Designation: **B-Class 1E I&C Room**

Associated Safety Division(s): **B**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02	**FA2-203-01**	**FA2-401-01**
FA2-303-01	**FA2-304-01**	**FA2-402-01**
FA2-304-01	**FA2-307-02**	
FA2-304-02	**FA2-308-02**	**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**9.9E+06**
Instruments	**1.8E+05**
High Voltage Cables	**4.0E+06**
Low Voltage Cables	**3.0E+06**
Control Cables	**5.3E+06**
Instrumentation Cables	**4.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.6E+04**
Maximum Anticipated Combustible Loading:	**4.3E+04**

Floor Area (ft^2)
750

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 142 of 277)

Fire Zone:	**FA2-307-02**
Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.41**
Area Designation:	**B-Class 1E I&C Room**
Zone Designation:	**B-Class 1E I&C Room Raised Floor**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02 **FA2-303-01** **FA2-304-02** **FA2-308-03**	**FA2-201-01** **FA2-202-01**	**FA2-307-01**

Fire Barrier Description:
The floor and walls of this zone are of reinforced concrete or other materials which provide at least 3-hour fire resistive capability. The ceiling (floor of I&C room) is substantial metal or floor panel which is not fire rated. All penetrations into the zone from outside the area are protected for 3-hour.

Potential Combustibles	
Item	Heat Release (Btu)
Cable	**2.8E+08**
Sheet	**7.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.7E+05**
Maximum Anticipated Combustible Loading:	**4.4E+05**

Floor Area (ft^2)
750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 143 of 277)

Fire Zone:	**FA2-308-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.42**
Area Designation:	**Main Control Room**
Zone Designation:	**Main Control Room**
Associated Safety Division(s)	**A, B, C, D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02	**FA2-308-03**	**FA2-312-01**
FA2-308-02		**FA2-406-01**
FA2-309-01	**See Table 9A-3**	**FA2-413-01**
FA2-312-01		

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Console and Panels, etc	**1.6E+07**
Instruments	**2.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**There is no backup detection system**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**7.7E+03**
Maximum Anticipated Combustible Loading:	**9.3E+03**

Floor Area (ft^2)
2,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**The fire in this zone has the potential to damage the safe-shutdown functions of 4 safety trains.** **In this fire, Remote Shutdown Console will be available.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 144 of 277)

Fire Zone: **FA2-308-02**

Building:	**Reactor**
Floor(s):	**2F,2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.42**

Area Designation:	**Main Control Room**
Zone Designation:	**Staff Room**
Associated Safety Division(s)	**A, B, C, D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 2001, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02	**FA2-308-03**	**FA2-307-01**
FA2-304-01		**FA2-405-01**
FA2-307-01	**See Table 9A-3**	**FA2-412-01**
FA2-308-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**2.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic Smoke Detection	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Automatic low pressure water mist suppression system	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.1E+02**
Maximum Anticipated Combustible Loading:	**1.7E+02**

Floor Area (ft^2)
2,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire by either personnel or by the water mist system will serve to minimize damage from a fire and the affect on plant operations.	**The fire in this zone has the potential to damage the safe-shutdown functions of 4 safety trains.** **In this fire, Remote Shutdown Console will be available.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 145 of 277)

Fire Zone: **FA2-308-03**

Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.42**

Area Designation: **Main Control Room**

Zone Designation: **Main Control Room Raised Floor**

Associated Safety Division(s) **A, B, C, D**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 15, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02	**FA2-204-01**	**FA2-308-01**
FA2-206-02	**FA2-201-01**	**FA2-308-02**
FA2-304-02	**FA2-203-01**	
FA2-307-02	**See Table 9A-3**	

Fire Barrier Description: **The floor and walls of this zone are of reinforced concrete or other materials which provide at least 3-hour fire resistive capability. The ceiling (floor of MCR) is substantial metal or floor panel which is not fire rated. All penetrations into the zone are protected for 3-hour.**

Potential Combustibles

Item	Heat Release (Btu)
Cable	**2.8E+08**
Sheet	**7.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**5.9E+04**
Maximum Anticipated Combustible Loading:	**7.0E+04**

Floor Area (ft^2): **4,700**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**The fire in this zone has the potential to damage the safe-shutdown functions of 4 safety trains. In this fire, Remote Shutdown Console will be available.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 146 of 277)

Fire Zone:	**FA2-309-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.43**
Area Designation:	**D-Class 1E I&C Room**
Zone Designation:	**D-Class 1E I&C Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 14, 72 804 and 2001**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-308-01 **FA2-312-01** **FA2-313-01** **FA6-101-15**	**FA2-309-02**	**FA2-312-01** **FA2-404-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**3.5E+05**
Panels	**1.1E+07**
High Voltage Cables	**4.8E+06**
Low Voltage Cables	**3.6E+06**
Control Cables	**6.3E+06**
Instrumentation Cables	**5.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.5E+04**
Maximum Anticipated Combustible Loading:	**4.2E+04**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 147 of 277)

Fire Zone: **FA2-309-02**

Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.43**

Area Designation: **D-Class 1E I&C Room**

Zone Designation: **D-Class 1E I&C Room Raised Floor**

Associated Safety Division(s): **D**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 14, 72, 804 and 2001**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-308-03	**FA2-205-01**	**FA2-309-01**
FA2-312-02		
FA2-313-01	**See Table 9A-3**	
FA6-101-15		

Fire Barrier Description:
The floor and walls of this zone are of reinforced concrete or other materials which provide at least 3-hour fire resistive capability. The ceiling (floor of I&C room) is substantial metal or floor panel which is not fire rated. All penetrations into the zone from outside the area are protected for 3-hour.

Potential Combustibles	
Item	Heat Release (Btu)
Cable	**2.8E+08**
Sheet	**7.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+05**
Maximum Anticipated Combustible Loading:	**3.7E+05**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 148 of 277)

Fire Zone: **FA2-312-01**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.44**

Area Designation: **C-Class 1E I&C Room**

Zone Designation: **C-Class 1E I&C Room**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02	**FA2-204-01**	**FA2-403-01**
FA2-308-01	**FA2-308-01**	**FA2-404-01**
FA2-309-01	**FA2-309-01**	
FA2-314-01	**FA2-312-02**	**See Table 9A-3**

Fire Barrier Description: **Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.**

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**3.5E+05**
Panels	**9.9E+06**
High Voltage Cables	**4.0E+06**
Low Voltage Cables	**3.0E+06**
Control Cables	**5.3E+06**
Instrumentation Cables	**4.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.6E+04**
Maximum Anticipated Combustible Loading:	**4.3E+04**

Floor Area (ft^2)
750

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 149 of 277)

Fire Zone:	**FA2-312-02**
Building:	**Reactor**
Floor(s):	**2F**
Fig:	**9A-5**
Sect:	**3.44**
Area Designation:	**C-Class 1E I&C Room**
Zone Designation:	**C-Class 1E I&C Room Raised Floor**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 2001, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02 **FA2-308-03** **FA2-309-02** **FA2-314-01**	**FA2-205-01** **FA2-206-01**	**FA2-312-01**

Fire Barrier Description:

The floor and walls of this zone are of reinforced concrete or other materials which provide at least 3-hour fire resistive capability. The ceiling (floor of I&C room) is substantial metal or floor panel which is not fire rated. All penetrations into the zone from outside the area are protected for 3-hour.

Potential Combustibles	
Item	Heat Release (Btu)
Cable	**2.8E+08**
Sheet	**7.6E+05**

Fire Detection - Primary	Fire Detection - Backup
Air Aspirating Very Early Smoke Detection Alarm	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Clean Gaseous Agent	**Fire Hose Station**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**3.7E+05**
Maximum Anticipated Combustible Loading:	**4.4E+05**

Floor Area (ft^2)
750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this space which is possible due to the early smoke detection system which discharges the gaseous agent will prevent damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 150 of 277)

Fire Zone:	**FA2-313-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.45**
Area Designation:	**D-Class 1E UPS Room**
Zone Designation:	**D-Class 1E UPS Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02 **FA2-309-01** **FA2-309-02** **FA2-314-01**	**FA2-205-01** **See Table 9A-3**	**FA2-404-01**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**3.8E+06**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.2E+04**
Maximum Anticipated Combustible Loading:	**3.9E+04**

Floor Area (ft^2)
400

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 151 of 277)

Fire Zone: **FA2-314-01**

Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.46**

Area Designation:	**C-Class 1E UPS Room**
Zone Designation:	**C-Class 1E UPS Room**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02	**FA2-205-01**	**FA2-403-01**
FA2-312-01	**FA2-206-01**	
FA2-312-02		
FA2-313-01		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**3.8E+06**
High Voltage Cables	**1.9E+06**
Low Voltage Cables	**1.4E+06**
Control Cables	**2.5E+06**
Instrumentation Cables	**2.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.3E+04**
Maximum Anticipated Combustible Loading:	**4.0E+04**

Floor Area (ft^2)
350

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 152 of 277)

Fire Zone:	**FA2-315-01**
Building:	**Reactor**
Floor(s):	**2F, 2MF**
Fig:	**9A-5, 9A-6**
Sect:	**3.47**
Area Designation:	**FA2-315 Area**
Zone Designation:	**FA2-315-01 Zone**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-206-02 FA2-313-01 FA6-101-15	**FA2-205-01**	**FA2-407-01**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**2.3E+03**

Floor Area (ft^2)
40

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 153 of 277)

Fire Zone:	**FA2-401-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.48**
Area Designation:	**B-Class 1E Electrical Room & MCR HVAC Equipment Room**
Zone Designation:	**B-Class 1E Electrical Room & MCR HVAC Equipment Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-402-01	**FA2-303-01**	**FA2-501-01**
FA2-407-04	**FA2-307-01**	**FA2-501-03**
FA2-412-01		**FA2-504-01**
FA2-414-01		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**5.8E+06**
Grease	**1.7E+06**
Instruments	**3.5E+06**
Panels	**1.2E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+04**
Maximum Anticipated Combustible Loading:	**3.7E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 154 of 277)

Fire Zone:	**FA2-402-01**				
Building:	**Reactor**	Area Designation:	**A-Class 1E Electrical Room & MCR HVAC Equipment Room**	Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**
Floor(s):	**3F**	Zone Designation:	**A-Class 1E Electrical Room & MCR HVAC Equipment Room**		
Fig:	**9A-7**				
Sect:	**3.49**	Associated Safety Division(s)	**A**		

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-401-01	**FA2-302-01**	**FA2-501-02**
	FA2-407-04	**FA2-304-01**	
	FA2-412-01	**FA2-307-01**	
	FA2-414-01		**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	**Heat Release (Btu)**
Filters	**5.8E+06**
Grease	**1.7E+06**
Instruments	**2.9E+06**
Panels	**1.2E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+04**
Maximum Anticipated Combustible Loading:	**3.7E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 155 of 277)

Fire Zone: **FA2-403-01**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.50**

Area Designation: **C-Class 1E Electrical Room & MCR HVAC Equipment Room**

Zone Designation: **C-Class 1E Electrical Room & MCR HVAC Equipment Room**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-404-01	**FA2-312-01**	**FA2-501-06**
FA2-407-01	**FA2-314-01**	**FA2-501-07**
FA2-413-01		**FA2-502-01**
FA2-415-01		**FA2-503-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Filters	**6.8E+06**
Grease	**9.8E+05**
Instruments	**3.0E+06**
Panels	**1.2E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+04**
Maximum Anticipated Combustible Loading:	**3.7E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train** **Three trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 156 of 277)

Fire Zone:	**FA2-404-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.51**
Area Designation:	**D-Class 1E Electrical Room & MCR HVAC Equipment Room**
Zone Designation:	**D-Class 1E Electrical Room & MCR HVAC Equipment Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-403-01	**FA2-309-01**	**FA2-501-08**
FA2-407-01	**FA2-312-01**	
FA2-413-01	**FA2-313-01**	
FA2-415-01		**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**6.8E+06**
Grease	**1.7E+06**
Instruments	**2.7E+06**
Panels	**1.2E+05**
High Voltage Cables	**6.9E+06**
Low Voltage Cables	**5.2E+06**
Control Cables	**9.2E+06**
Instrumentation Cables	**8.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**3.1E+04**
Maximum Anticipated Combustible Loading:	**3.7E+04**

Floor Area (ft^2)
1,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 157 of 277)

Fire Zone: **FA2-405-01**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.52**

Area Designation:	**A-MCR Emergency Filtration Unit & Fan Room**
Zone Designation:	**A-MCR Emergency Filtration Unit & Fan Room**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 15, 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-406-01 **FA2-412-01** **FA6-101-15**	**FA2-308-02**	**FA2-414-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Charcoal Filter	**6.6E+06**
Instruments	**1.5E+06**
Particle Filters	**2.7E+05**
High Voltage Cables	**3.4E+06**
Low Voltage Cables	**2.6E+06**
Control Cables	**4.6E+06**
Instrumentation Cables	**4.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke/heat	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Water spray, and Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.5E+04**
Maximum Anticipated Combustible Loading:	**4.3E+04**

Floor Area (ft^2)
650

Table 9A-2 Fire Hazard Analysis Summary (Sheet 158 of 277)

Fire Zone:	**FA2-406-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.53**
Area Designation:	**B-MCR Emergency Filtration Unit & Fan Room**
Zone Designation:	**B-MCR Emergency Filtration Unit & Fan Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 15, 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-405-01 **FA2-413-01** **FA6-101-15**	**FA2-308-01**	**FA2-415-01**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Charcoal Filter	**6.6E+06**
Instruments	**1.5E+06**
Particle Filters	**2.7E+05**
High Voltage Cables	**3.4E+06**
Low Voltage Cables	**2.6E+06**
Control Cables	**4.6E+06**
Instrumentation Cables	**4.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke/heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Water spray, and Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.5E+04**
Maximum Anticipated Combustible Loading:	**4.3E+04**

Floor Area (ft^2)
650

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 159 of 277)

Fire Zone: **FA2-407-01**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.54**

Area Designation:	**FA2-407 Area**
Zone Designation:	**FA2-407-01 3F Non-Radioactive Area Westside Corridor**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-16	**FA2-152-06**	**FA2-415-01**
FA2-110-01	**FA2-206-02**	**FA2-501-05**
FA2-117-43	**FA2-315-01**	**FA2-501-11**
FA2-403-01	**See Table 9A-3**	**FA2-505-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**3.5E+05**
Panels	**5.3E+04**
High Voltage Cables	**1.1E+07**
Low Voltage Cables	**8.1E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.3E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
2,050

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 2 safe-shutdown trains. Two trains remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 160 of 277)

Fire Zone:	**FA2-407-02**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.54**
Area Designation:	**FA2-407 Area**
Zone Designation:	**MCR Monitor Room (FA2-407-02)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-117-31 **FA2-407-04** **FA2-409-01**	**FA2-117-22**	**FA2-501-10**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.0E+03**
Maximum Anticipated Combustible Loading:	**5.1E+03**

Floor Area (ft^2)
300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 161 of 277)

Fire Zone:	**FA2-407-03**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.54**
Area Designation:	**FA2-407 Area**
Zone Designation:	**MCR Monitor Room (FA2-407-03)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-43 **FA2-407-01** **FA2-410-01**	**FA2-117-18**	**FA2-501-05**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**4.0E+03**
Maximum Anticipated Combustible Loading:	**5.1E+03**

Floor Area (ft^2)
300

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not any safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 162 of 277)

Fire Zone: **FA2-407-04**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.54**

Area Designation: **FA2-407 Area**

Zone Designation: **FA2-407-04 3F Non-Radioactive Area Eastside Corridor**

Associated Safety Division(s): **A**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-15	**FA2-151-06**	**FA2-414-01**
FA2-101-01	**FA2-201-02**	**FA2-501-01**
FA2-117-31	**FA2-301-01**	
FA2-401-01	**See Table 9A-3**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**3.5E+05**
Panels	**5.3E+04**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.7E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 163 of 277)

Fire Zone:	**FA2-408-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.55**
Area Designation:	**R/B-3F A-Electrical Penetration Area**
Zone Designation:	**R/B-3F A-Electrical Penetration Area**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-17	**FA2-120-07**	**FA2-117-27**
FA1-101-18	**FA2-153-05**	**FA2-117-35**
FA2-117-28	**FA2-117-27**	
FA2-117-31	**See Table 9A-3**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**6.2E+05**
High Voltage Cables	**4.8E+06**
Low Voltage Cables	**3.6E+06**
Control Cables	**6.3E+06**
Instrumentation Cables	**5.6E+06**
Panels	**2.5E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 164 of 277)

Fire Zone:	**FA2-409-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.56**
Area Designation:	**R/B-3F B-Electrical Penetration Area**
Zone Designation:	**R/B-3F B-Electrical Penetration Area**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-15	**FA2-151-05**	**FA2-117-34**
FA2-117-31	**FA2-151-06**	
FA2-207-01		
FA2-407-02	**See Table 9A-3**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**6.2E+05**
High Voltage Cables	**7.1E+06**
Low Voltage Cables	**5.4E+06**
Control Cables	**9.5E+06**
Instrumentation Cables	**8.3E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 165 of 277)

Fire Zone: **FA2-410-01**

Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.57**

Area Designation:	**R/B-3F C-Electrical Penetration Area**
Zone Designation:	**R/B-3F C-Electrical Penetration Area**
Associated Safety Division(s)	**C**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-16	**FA2-152-05**	**FA2-117-41**
FA2-117-43	**FA2-152-06**	**FA2-501-05**
FA2-208-01		**FA2-501-04**
FA2-407-01	**See Table 9A-3**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	**Heat Release (Btu)**
Instruments	**6.2E+05**
High Voltage Cables	**7.4E+06**
Low Voltage Cables	**5.6E+06**
Control Cables	**9.9E+06**
Instrumentation Cables	**8.6E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 166 of 277)

Fire Zone:	**FA2-411-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.58**
Area Designation:	**R/B-3F D-Electrical Penetration Area**
Zone Designation:	**R/B-3F D-Electrical Penetration Area**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-17	**FA2-153-05**	**FA2-117-27**
FA2-117-28	**FA2-117-24**	**FA2-117-36**
FA2-117-29		**FA2-117-37**
FA2-117-43	**See Table 9A-3**	**FA2-117-40**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**6.2E+05**
High Voltage Cables	**8.5E+06**
Low Voltage Cables	**6.3E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**

Table 9A-2 Fire Hazard Analysis Summary(Sheet 167 of 277)

Fire Zone:	**FA2-412-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.59**
Area Designation:	**FA2-412 Duct Space Area**
Zone Designation:	**FA2-412-01 Duct Space Zone**
Associated Safety Division(s)	**A,B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-401-01 **FA2-402-01** **FA2-405-01** **FA2-407-04**	**FA2-308-02** **See Table 9A-3**	**FA2-414-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**4.0E+05**
Instruments	**2.1E+06**
High Voltage Cables	**7.7E+06**
Low Voltage Cables	**5.8E+06**
Control Cables	**1.0E+07**
Instrumentation Cables	**8.9E+06**
Panels	**2.5E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train.** **1 train remain free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 168 of 277)

Fire Zone:	**FA2-413-01**
Building:	**Reactor**
Floor(s):	**3F**
Fig:	**9A-7**
Sect:	**3.60**
Area Designation:	**FA2-413 Duct Space Area**
Zone Designation:	**FA2-413-01 Duct Space Zone**
Associated Safety Division(s)	**C, D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-403-01 **FA2-404-01** **FA2-407-01** **FA2-406-01**	**FA2-308-01** **See Table 9A-3**	**FA2-415-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	**Heat Release (Btu)**
Grease	**4.0E+05**
Instruments	**2.1E+06**
High Voltage Cables	**7.7E+06**
Low Voltage Cables	**5.8E+06**
Control Cables	**1.0E+07**
Instrumentation Cables	**8.9E+06**
Panels	**2.5E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
1,450

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 1 safe-shutdown train.** **1 train remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 169 of 277)

Fire Zone:	**FA2-414-01**
Building:	**Reactor**
Floor(s):	**3F to Roof**
Fig:	**9A-7 to 9A-10**
Sect:	**3.61**
Area Designation:	**FA2-414 MSFW Piping Room**
Zone Designation:	**FA2-414-01 MSFW Piping Room**
Associated Safety Division(s)	**A, B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-15	**FA2-405-01**	**FA2-501-01**
FA1-101-23	**FA2-407-04**	**Roof**
FA1-101-24	**FA2-412-01**	
FA2-401-01	**See Table 9A-3**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**6.4E+05**
Grease	**6.0E+06**
Hydrualic fluid	**2.0E+05**
Instruments	**5.9E+06**
High Voltage Cables	**1.5E+07**
Low Voltage Cables	**1.1E+07**
Control Cables	**1.9E+07**
Instrumentation Cables	**1.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
2,750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 2 safe-shutdown trains. Two trains remain free from fire damage.** **Either control circuits of Main Steam Power Relief valve or Main Steam Power Relief Isolation valve will be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 170 of 277)

Fire Zone:	**FA2-415-01**
Building:	**Reactor**
Floor(s):	**3F to Roof**
Fig:	**9A-7 to 9A-10**
Sect:	**3.62**
Area Designation:	**FA2-415 MSFW Piping Room**
Zone Designation:	**FA2-415-01 MSFW Piping Room**
Associated Safety Division(s)	**C, D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-16	**FA2-413-01**	**FA2-501-11**
FA1-101-24	**FA2-501-11**	**Roof**
FA2-403-01		
FA2-404-01	**See Table 9A-3**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Filters	**6.4E+05**
Grease	**2.9E+06**
Hydrualic fluid	**2.9E+05**
Instruments	**6.1E+06**
High Voltage Cables	**1.5E+07**
Low Voltage Cables	**1.1E+07**
Control Cables	**1.9E+07**
Instrumentation Cables	**1.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
2,750

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the few functions of 2 safe-shutdown trains. Two trains remain free from fire damage. Either control circuits of Main Steam Power Operated Relief valve or Main Steam Power Operated Relief Isolation valves will be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 171 of 277)

Fire Zone:	**FA2-501-01**
Building:	**Reactor**
Floor(s):	**4F, Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**FA2-501-01 Non－Radioactive Zone Eastside Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-23	**FA2-401-01**	**FA2-414-01**
FA1-101-24	**FA2-414-01**	**FA2-501-09**
FA2-101-01	**FA2-407-04**	**FA2-601-01**
FA2-117-34	**See Table 9A-3**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-02, 03, 10) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.0E+06**
High Voltage Cables	**1.3E+07**
Low Voltage Cables	**9.5E+06**
Control Cables	**1.7E+07**
Instrumentation Cables	**1.5E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
2,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the cables for Reactor Trip Breaker-1 and 2, but train C and D is not affected by this fire. Either of train A or train D cable of Main Steam Isolation Valve 515A and 515B will be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 172 of 277)

Fire Zone: **FA2-501-02**

Building:	**Reactor**
Floor(s):	**4F, Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.63**

Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**A-Emergency Feedwater Pit**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: For Complete Listing) Listed See Table 9A-3 (Primary Inter face

Wall	Floor	Ceiling
FA2-414-01 **FA2-501-01** **FA2-501-03** **FA2-601-01**	**FA2-402-01**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-01, 03, 10) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**7.2E+01**

Floor Area (ft^2)
1,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 173 of 277)

Fire Zone: **FA2-501-03**

Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**

Area Designation: **Emergency Feedwater Pit, MG Set Room Area**

Zone Designation: **SGBD Water Radiation Monitor Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: For Complete Listing) Listed See Table 9A-3 (Primary Inter face

Wall	Floor	Ceiling
FA2-414-01	**FA2-401-01**	**FA2-414-01**
FA2-501-01		**FA2-501-09**
FA2-501-02		**FA2-601-01**
FA2-504-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-01, 02, 10) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+07**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.3E+04**
Maximum Anticipated Combustible Loading:	**5.1E+04**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 174 of 277)

Fire Zone:	**FA2-501-04**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**LRT Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: For Complete Listing) Listed See Table 9A-3 (Primary Inter face

Wall	Floor	Ceiling
FA1-101-24 **FA2-117-41** **FA2-501-11** **FA2-501-05**	**FA2-410-01**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-05, 06, 07, 08, 11) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**2.4E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**6.7E+02**
Maximum Anticipated Combustible Loading:	**1.1E+03**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 175 of 277)

Fire Zone: **FA2-501-05**

Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**

Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**CRDM Cabinet Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: For Complete Listing) Listed See Table 9A-3 (Primary Inter face

Wall	Floor	Ceiling
FA2-117-41	**FA2-117-43**	**Roof**
FA2-117-44	**FA2-407-01**	
FA2-501-04	**FA2-407-03**	
FA2-501-11	**FA2-410-01**	**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-04, 06, 07, 08, 11) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lighting Transformer	**6.6E+05**
Panels	**4.7E+06**
High Voltage Cables	**5.3E+06**
Low Voltage Cables	**4.0E+06**
Control Cables	**7.1E+06**
Instrumentation Cables	**6.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.8E+04**
Maximum Anticipated Combustible Loading:	**3.4E+04**

Floor Area (ft^2)
1,000

Table 9A-2 Fire Hazard Analysis Summary (Sheet 176 of 277)

Fire Zone:	**FA2-501-06**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**MG Set Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-415-01	**FA2-403-01**	**Roof**
	FA2-501-07		
	FA2-501-08		
	FA2-501-11	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-04, 05, 07, 08, 11) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**2.0E+06**
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 177 of 277)

Fire Zone:	**FA2-501-07**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**MG Set Control Panel Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-501-06 FA2-501-08 FA2-501-11 FA2-502-01	**FA2-403-01 See Table 9A-3**	**FA2-602-01 Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-04, 05, 06, 08, 11) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**7.9E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.0E+03**
Maximum Anticipated Combustible Loading:	**5.2E+03**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 178 of 277)

Fire Zone:	**FA2-501-08**
Building:	**Reactor**
Floor(s):	**4F, Roof**
Fig:	**9A-8, 9A-9**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**B-Emergency Feedwater Pit**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-415-01 **FA2-501-06** **FA2-501-07** **FA2-501-11**	**FA2-404-01** **See Table 9A-3**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-04, 05, 06, 07, 11) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no Safe-shutdown Circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**7.2E+01**

Floor Area (ft^2)
1,300

Table 9A-2 Fire Hazard Analysis Summary (Sheet 179 of 277)

Fire Zone:	**FA2-501-09**
Building:	**Reactor**
Floor(s):	**Roof**
Fig:	**9A-9**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**C/V Purge Air Handling Unit Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-23	**FA2-117-34**	**Roof**
FA2-101-01	**FA2-117-35**	
FA2-414-01	**FA2-501-01**	**See Table 9A-3**
FA2-501-01	**FA2-501-03**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**2.7E+06**
Instruments	**5.6E+06**
Panels	**8.3E+04**
High Voltage Cables	**1.5E+07**
Low Voltage Cables	**1.1E+07**
Control Cables	**1.9E+07**
Instrumentation Cables	**1.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
2,750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is not Safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 180 of 277)

Fire Zone: **FA2-501-10**

Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**

Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**FA2-501-10 Zone**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-34 **FA2-117-35** **FA2-501-01**	**FA2-407-02**	**FA2-501-09**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-01, 02, 03) in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**3.7E+02**

Floor Area (ft^2)
250

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 181 of 277)

Fire Zone:	**FA2-501-11**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.63**
Area Designation:	**Emergency Feedwater Pit, MG Set Room Area**
Zone Designation:	**FA2-501-11 Non－Radioactive Zone Westside Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA1-101-24	**FA2-407-01**	**FA2-415-01**
FA2-110-01	**FA2-415-01**	**FA2-505-01**
FA2-415-01		**FA2-602-01**
FA2-501-01	**See Table 9A-3**	**Roof**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones (FA2-501-04, 05, 06, 07, 08) in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.1E+06**
High Voltage Cables	**9.8E+06**
Low Voltage Cables	**7.3E+06**
Control Cables	**1.3E+07**
Instrumentation Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
1,850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this zone has the potential to damage the few functions of safe-shutdown trains. Function of other safety trains or alternative safety functions remain free from fire damage. Either Train A or D cable of Main Steam Isolation valve will be unaffected by providing with appropriate fire barriers.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 182 of 277)

Fire Zone:	**FA2-502-01**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.64**
Area Designation:	**Reactor Trip Breaker Cabinet-1 Room**
Zone Designation:	**Reactor Trip Breaker Cabinet-1 Room**
Associated Safety Division(s)	**A,B,C,D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-501-06 **FA2-501-07** **FA2-501-11** **FA2-503-01**	**FA2-403-01**	**Roof**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**7.3E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.9E+03**
Maximum Anticipated Combustible Loading:	**6.5E+03**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage 4 trains circuits for RTB-1, but Circuits for RTB-2 remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 183 of 277)

Fire Zone:	**FA2-503-01**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.65**
Area Designation:	**Reactor Trip Breaker Cabinet-2 Room**
Zone Designation:	**Reactor Trip Breaker Cabinet-2 Room**
Associated Safety Division(s)	**A,B,C,D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-501-07 **FA2-501-11** **FA2-502-01**	**FA2-403-01**	**FA2-602-01** **Roof**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**7.3E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**4.9E+03**
Maximum Anticipated Combustible Loading:	**6.5E+03**

Floor Area (ft^2)
150

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage 4 trains circuits for RTB-2, but Circuits for RTB-1 remains free from fire damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 184 of 277)

Fire Zone:	**FA2-504-01**
Building:	**Reactor**
Floor(s):	**4F**
Fig:	**9A-8**
Sect:	**3.66**
Area Designation:	**Remote Shutdown Console Room**
Zone Designation:	**Remote Shutdown Console Room**
Associated Safety Division(s)	**A, B, C, D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-414-01 **FA2-501-01** **FA2-501-03**	**FA2-401-01**	**FA2-414-01** **FA2-501-09** **FA2-601-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**5.3E+05**
Panels	**1.8E+06**
High Voltage Cables	**1.1E+06**
Low Voltage Cables	**7.9E+05**
Control Cables	**1.4E+06**
Instrumentation Cables	**1.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.4E+04**
Maximum Anticipated Combustible Loading:	**4.2E+04**

Floor Area (ft^2)
200

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this zone to be damaged . Every plant operation is controlled from Main Control Board.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 185 of 277)

Fire Zone:	**FA2-505-01**
Building:	**Reactor**
Floor(s):	**4F to Roof**
Fig:	**9A-8 to 9A-10**
Sect:	**3.67**
Area Designation:	**FA2-505 Stairwell**
Zone Designation:	**FA2-505-01 Stairwell**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-110-01 **FA2-501-11** **FA2-602-01** **FA2-602-02**	**FA2-407-01** **FA2-501-11**	**Roof**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**There is no backup suppression system.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using manual hose streams before damage	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 186 of 277)

Fire Zone:	**FA2-601-01**
Building:	**Reactor**
Floor(s):	**Roof**
Fig:	**9A-9**
Sect:	**3.68**
Area Designation:	**A-CCW Surge Tank Room**
Zone Designation:	**A-CCW Surge Tank Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-501-09	**FA2-501-01**	**Roof**
FA2-414-01	**FA2-501-03**	
FA2-501-02	**FA2-504-01**	

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**8.8E+05**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
550

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 187 of 277)

Fire Zone:	**FA2-602-01**
Building:	**Reactor**
Floor(s):	**Roof**
Fig:	**9A-9**
Sect:	**3.69**

Area Designation:	**B-CCW Surge Tank Room**
Zone Designation:	**B-CCW Surge Tank Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-110-01	**FA2-501-07**	**FA2-602-02**
FA2-505-01	**FA2-501-11**	
FA2-501-08	**FA2-503-01**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Instruments	**7.9E+05**
High Voltage Cables	**2.4E+06**
Low Voltage Cables	**1.8E+06**
Control Cables	**3.2E+06**
Instrumentation Cables	**2.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
450

Table 9A-2 Fire Hazard Analysis Summary (Sheet 188 of 277)

Fire Zone: **FA2-602-02**

Building:	**Reactor**
Floor(s):	**Roof**
Fig:	**9A-10**
Sect:	**3.69**

Area Designation: **B-CCW Surge Tank Room**

Zone Designation: **FA2-602-02 Zone**

Associated Safety Division(s) **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-110-01 **FA2-505-01**	**FA2-602-01**	**Roof**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Instruments	**6.2E+05**
High Voltage Cables	**2.6E+06**
Low Voltage Cables	**2.0E+06**
Control Cables	**3.5E+06**
Instrumentation Cables	**3.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 189 of 277)

Fire Zone:	**FA3-101-01**
Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.70**
Area Designation:	**A-Essential Chiller Unit & Pump Room**
Zone Designation:	**A-Essential Chiller Unit & Pump Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-101-01	**FA3-104-03**	**FA3-103-03**
FA2-102-01	**FA3-106-01**	**FA3-104-04**
FA2-111-01	**FA7-101-01**	
FA3-102-01		

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.4E+06**
Lube Oil	**2.0E+06**
Panels	**5.6E+05**
High Voltage Cables	**6.3E+06**
Low Voltage Cables	**4.8E+06**
Control Cables	**8.5E+06**
Instrumentation Cables	**7.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,200

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone has the potential to cause functional damage of safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 190 of 277)

Fire Zone: **FA3-102-01**

Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.71**

Area Designation:	**B-Essential Chiller Unit & Pump Room**
Zone Designation:	**B-Essential Chiller Unit & Pump Room**
Associated Safety Division(s)	**B**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA3-101-01	**FA3-106-01**	**FA3-103-03**
FA3-103-01	**FA7-102-01**	**FA3-104-03**
FA3-104-01		**FA3-104-04**
FA3-104-03		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.4E+06**
Lube Oil	**2.0E+06**
Panels	**5.6E+05**
High Voltage Cables	**6.3E+06**
Low Voltage Cables	**4.8E+06**
Control Cables	**8.5E+06**
Instrumentation Cables	**7.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone has the potential to cause functional damage of safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage to achieve safe-shutdown.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 191 of 277)

Fire Zone:	**FA3-103-01**
Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.72**
Area Designation:	**B-Class 1E GTG Room**
Zone Designation:	**B-GTG Auxiliary Component Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-102-01	**FA3-104-01**	**FA3-103-02**
FA3-103-02		**FA3-104-04**
FA3-104-03	**See Table 9A-3**	**FA3-119-01**
FA3-104-01		**FA3-103-03**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Lube Oil	**4.0E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**5.7E+02**
Maximum Anticipated Combustible Loading:	**8.1E+02**

Floor Area (ft^2)
700

Table 9A-2 Fire Hazard Analysis Summary (Sheet 192 of 277)

Fire Zone:	**FA3-103-02**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.72**
Area Designation:	**B-Class 1E GTG Room**
Zone Designation:	**FA2-103-02 Zone**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-01	**FA3-103-01**	**FA3-103-03**
FA3-105-01	**FA3-106-01**	**FA3-105-02**
FA3-106-01		
FA3-117-01	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+02**

Floor Area (ft^2)
500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 193 of 277)

Fire Zone:	**FA3-103-03**
Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.72**
Area Designation:	**B-Class 1E GTG Room**
Zone Designation:	**B-Class 1E GTG Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-101-01	**FA3-101-01**	**Roof**
FA2-201-01	**FA3-102-01**	
FA3-104-04	**FA3-103-01**	
FA3-105-02	**FA3-103-02**	**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.2E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.3E+07**
Low Voltage Cables	**9.5E+06**
Control Cables	**1.7E+07**
Instrumentation Cables	**1.5E+07**
Fuel Oil	**1.2E+08**
Fuel Oil(light Oil)	**2.1E+07**
Instruments	**8.8E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.1E+05**
Maximum Anticipated Combustible Loading:	**2.5E+05**

Floor Area (ft^2)
2,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire has the potential to cause functional damage of safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage to achieve safe-shutdown.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 194 of 277)

Fire Zone: **FA3-104-01**

Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.73**

Area Designation:	**A-Class 1E GTG Room**
Zone Designation:	**A-GTG Auxiliary Component Room**
Associated Safety Division(s)	**A**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA3-102-01	**FA3-106-01**	**FA3-103-01**
FA3-103-01	**FA3-119-01**	**FA3-104-04**
FA3-104-02		**FA3-119-01**
FA3-105-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**4.0E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**6.6E+02**
Maximum Anticipated Combustible Loading:	**9.5E+02**

Floor Area (ft^2)
600

Table 9A-2 Fire Hazard Analysis Summary (Sheet 195 of 277)

Fire Zone:	**FA3-104-02**
Building:	**Power Source**
Floor(s):	**B1F**
Fig:	**9A-11**
Sect:	**3.73**
Area Designation:	**A-Class 1E GTG Room**
Zone Designation:	**FA3-104-02 Zone**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-104-01 **FA3-106-01** **FA3-115-01**		**FA3-105-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 196 of 277)

Fire Zone: **FA3-104-03**

Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.73**
Area Designation:	**A-Class 1E GTG Room**
Zone Designation:	**FA3-104-03 Zone**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-101-01 **FA3-102-01** **FA3-103-01**	**FA3-102-01**	**FA3-104-04**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+4**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**4.7E+02**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 197 of 277)

Fire Zone:	**FA3-104-04**
Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.73**
Area Designation:	**A-Class 1E GTG Room**
Zone Designation:	**A-Class 1E GTG Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-102-01	**FA3-101-01**	**Roof**
FA2-201-01	**FA3-102-01**	
FA2-202-01	**FA3-103-01**	
FA3-103-03	**FA3-104-01**	**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.3E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.1E+06**
Low Voltage Cables	**7.9E+05**
Control Cables	**1.4E+06**
Instrumentation Cables	**1.5E+07**
Fuel Oil	**1.2E+08**
Fuel Oil (Light Oil)	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.1E+05**
Maximum Anticipated Combustible Loading:	**2.5E+05**

Floor Area (ft^2)
2,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire in this fire zone has the potential to damage the safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage to achieve safe-shutdown.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 198 of 277)

Fire Zone:	**FA3-105-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.74**
Area Designation:	**A-AAC GTG Room**
Zone Designation:	**A-AAC Power Source Starter Battery Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-02 **FA3-104-01** **FA3-117-01** **FA3-119-01**	**FA3-104-02** **FA3-115-01**	**FA3-105-02**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**3.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**8.5E+03**
Maximum Anticipated Combustible Loading:	**1.1E+04**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 199 of 277)

Fire Zone:	**FA3-105-02**
Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.74**
Area Designation:	**A-AAC GTG Room**
Zone Designation:	**A-AAC GTG Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-03 **FA3-104-04** **FA3-106-01**	**FA3-103-02** **FA3-105-01** **FA3-106-01** **FA3-117-01**	**Roof** **See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Battery	**3.4E+07**
Instruments	**1.3E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.7E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.2E+07**
Fuel Oil	**1.2E+08**
Fuel Oil(light Oil)	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+05**
Maximum Anticipated Combustible Loading:	**3.2E+05**

Floor Area (ft^2)
1,950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly identified and extinguished fire in this room would minimize the damage to room and undesirable impact on plant operation.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 200 of 277)

Fire Zone: **FA3-106-01**

Building:	**Power Source**
Floor(s):	**B1F to 1F**
Fig:	**9A-11, 9A-12**
Sect:	**3.75**

Area Designation:	**FA3-106 Area**
Zone Designation:	**FA3-106-01 Corridor**
Associated Safety Division(s)	**B**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-111-01	**FA3-116-01**	**FA3-103-02**
FA3-101-01	**FA3-118-01**	**FA3-103-03**
FA3-102-01		**FA3-105-02**
FA3-103-01	**See Table 9A-3**	

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**8.5E+01**

Floor Area (ft^2)
1,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to cause functional damage of safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 201 of 277)

Fire Zone:	**FA3-107-01**
Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.76**
Area Designation:	**FA3-107 Hatch Area**
Zone Designation:	**FA3-107-01 Hatch Zone**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA3-106-01	**-**	**-**

Fire Barrier Description:
The borders of this fire area are constructed using reinforced concrete and other material which results in fire resistance that provides at least 3-hour resistance. Openings and penetrations into this fire area are protected with fire protection features provide at least 3-hours fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**3.7E+02**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**A fire has the potential to cause functional damage of safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 202 of 277)

Fire Zone: **FA3-108-01**

Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.77**

Area Designation: **C-Essential Chiller Unit & Pump Room**

Zone Designation: **C-Essential Chiller Unit & Pump Room**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA3-109-01	**FA3-112-01**	**FA3-109-03**
FA3-110-01	**FA7-103-01**	**FA3-111-03**
FA3-111-01		**FA3-111-04**
FA3-111-03		

Fire Barrier Description: **Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

Potential Combustibles

Item	Heat Release (Btu)
Instruments	**1.4E+06**
Lube Oil	**2.0E+06**
Panels	**5.6E+05**
High Voltage Cables	**6.3E+06**
Low Voltage Cables	**4.8E+06**
Control Cables	**8.5E+06**
Instrumentation Cables	**7.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,200

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 203 of 277)

Fire Zone:	**FA3-109-01**
Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.78**
Area Designation:	**C-Class 1E GTG Room**
Zone Designation:	**C-GTG Auxiliary Component Room**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-108-01	**FA3-111-01**	**FA3-109-02**
FA3-109-02		**FA3-109-03**
FA3-111-01		**FA3-111-04**
FA3-112-01	**See Table 9A-3**	**FA3-124-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Lube Oil	**4.0E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**5.7E+02**
Maximum Anticipated Combustible Loading:	**8.1E+02**

Floor Area (ft^2)
700

Table 9A-2 Fire Hazard Analysis Summary (Sheet 204 of 277)

Fire Zone:	**FA3-109-02**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.78**
Area Designation:	**C-Class 1E GTG Room**
Zone Designation:	**FA3-109-02 Zone**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-01	**FA3-109-01**	**FA3-109-03**
FA3-112-01	**FA3-112-01**	**FA3-113-02**
FA3-113-01		
FA3-122-01	**See Table 9A-3**	

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+4**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**1.9E+02**

Floor Area (ft^2)
500

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 205 of 277)

Fire Zone:	**FA3-109-03**
Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.78**
Area Designation:	**C-Class 1E GTG Room**
Zone Designation:	**C-Class 1E GTG Room**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-110-01	**FA3-108-01**	**FA3-114-01**
FA2-206-01	**FA3-109-01**	**Roof**
FA3-111-04	**FA3-109-02**	
FA3-113-02	**FA3-110-01**	**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.3E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.3E+07**
Low Voltage Cables	**9.5E+06**
Control Cables	**1.7E+07**
Instrumentation Cables	**1.5E+07**
Fuel Oil	**1.2E+08**
Fuel Oil (Light Oil)	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.1E+05**
Maximum Anticipated Combustible Loading:	**2.5E+05**

Floor Area (ft^2)
2,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 206 of 277)

Fire Zone: **FA3-110-01**

Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.79**

Area Designation:	**D-Essential Chiller Unit & Pump Room**
Zone Designation:	**D-Essential Chiller Unit & Pump Room**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-108-01	**FA3-111-03**	**FA3-109-03**
FA2-110-01	**FA3-112-01**	**FA3-111-04**
FA2-112-01	**FA7-104-01**	
FA3-108-01		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.4E+06**
Lube Oil	**2.0E+06**
Panels	**5.6E+05**
High Voltage Cables	**6.3E+06**
Low Voltage Cables	**4.8E+06**
Control Cables	**8.5E+06**
Instrumentation Cables	**7.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
1,200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**. A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 207 of 277)

Fire Zone: **FA3-111-01**

Building:	**Power Source**
Floor(s):	**B1F, B1MF**
Fig:	**9A-11**
Sect:	**3.80**

Area Designation:	**D-Class 1E GTG Room**
Zone Designation:	**D-GTG Auxiliary Component Room**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA3-108-01	**FA3-113-01**	**FA3-109-01**
FA3-109-01	**FA3-124-01**	**FA3-111-04**
FA3-111-02		**FA3-124-01**
FA3-112-01		

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**4.0E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**6.6E+02**
Maximum Anticipated Combustible Loading:	**9.5E+02**

Floor Area (ft^2)
600

Table 9A-2 Fire Hazard Analysis Summary (Sheet 208 of 277)

Fire Zone: **FA3-111-02**

Building:	**Power Source**
Floor(s):	**B1F**
Fig:	**9A-11**
Sect:	**3.80**

Area Designation:	**D-Class 1E GTG Room**
Zone Designation:	**FA3-111-02 Zone**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-111-01 **FA3-112-01** **FA3-121-01**		**FA3-113-01**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 209 of 277)

Fire Zone:	**FA3-111-03**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.80**
Area Designation:	**D-Class 1E GTG Room**
Zone Designation:	**FA3-111-03 Zone**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA3-108-01 **FA3-109-01** **FA3-110-01**	**FA3-108-01**	**FA3-111-04**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**4.7E+02**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 210 of 277)

Fire Zone:	**FA3-111-04**
Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.80**
Area Designation:	**D-Class 1E GTG Room**
Zone Designation:	**D-Class 1E GTG Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-108-01	**FA3-108-01**	**FA3-114-01**
FA2-206-01	**FA3-109-01**	**Roof**
FA3-109-03	**FA3-110-01**	
FA3-113-02	**FA3-111-01**	**See Table 9A-3**

Fire Barrier Description:

Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.3E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.1E+06**
Low Voltage Cables	**7.9E+05**
Control Cables	**1.4E+06**
Instrumentation Cables	**1.5E+07**
Fuel Oil	**1.2E+08**
Fuel Oil (Light Oil)	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.1E+05**
Maximum Anticipated Combustible Loading:	**2.5E+05**

Floor Area (ft^2)
2,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly suppressed fire in this area would minimize damage to safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 211 of 277)

Fire Zone: **FA3-112-01**

Building:	**Power Source**
Floor(s):	**B1F to 1F**
Fig:	**9A-11, 9A-12**
Sect:	**3.81**

Area Designation: **FA3-112 Area**

Zone Designation: **FA3-112-01 Corridor**

Associated Safety Division(s): **C**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-112-01	**FA3-120-01**	**FA3-109-02**
FA3-108-01	**FA3-122-01**	**FA3-109-03**
FA3-109-01		**FA3-113-02**
FA3-109-02	**See Table 9A-3**	**Roof**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**8.5E+01**

Floor Area (ft^2)
1,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 212 of 277)

Fire Zone: **FA3-113-01**

Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.82**

Area Designation:	**B-AAC GTG Room**
Zone Designation:	**B-AAC Power Source Starter Battery Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-02 **FA3-111-01** **FA3-123-01** **FA3-124-01**	**FA3-111-02** **FA3-121-01**	**FA3-113-02**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**3.0E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**8.5E+03**
Maximum Anticipated Combustible Loading:	**1.1E+04**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 213 of 277)

Fire Zone: **FA3-113-02**

Building:	**Power Source**
Floor(s):	**1F, Roof**
Fig:	**9A-12**
Sect:	**3.82**

Area Designation:	**B-AAC GTG Room**
Zone Designation:	**B-AAC GTG Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-03	**FA3-109-02**	**Roof**
FA3-111-04	**FA3-112-01**	
FA3-112-01	**FA3-113-01**	
FA4-101-04	**FA3-122-01**	**See Table 9A-3**

Fire Barrier Description:
Reinforced concrete walls providing in excess of 3-hour fire resistive capability. Three hour fire rated door to area and all openings and penetrations to fire area are protected to 3-hour fire resistance. This zone has unprotected openings with spatial separation to mitigate fire spread with adjacent zones in this fire area.

Potential Combustibles	
Item	Heat Release (Btu)
Battery	**3.4E+07**
Instruments	**1.3E+06**
Lube Oil	**3.1E+08**
Panels	**3.2E+06**
Rubber	**1.9E+05**
High Voltage Cables	**1.0E+07**
Low Voltage Cables	**7.7E+06**
Control Cables	**1.4E+07**
Instrumentation Cables	**1.2E+07**
Fuel Oil	**1.2E+08**
Fuel Oil (Light Oil)	**2.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+05**
Maximum Anticipated Combustible Loading:	**3.2E+05**

Floor Area (ft^2): **1,950**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly identified and extinguished fire in this room would minimize the damage to room and undesirable impact on plant operation.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 214 of 277)

Fire Zone:	**FA3-114-01**
Building:	**Power Source**
Floor(s):	**1MF**
Fig:	**9A-12**
Sect:	**3.83**
Area Designation:	**Cable Tray Space**
Zone Designation:	**Cable Tray Space**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-110-01	**FA3-109-03**	**Roof**
FA2-206-02	**FA3-111-04**	
FA3-109-03		
FA3-111-04		**See Table 9A-3**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**7.1E+06**
Low Voltage Cables	**3.4E+07**
Control Cables	**7.6E+07**
Instrumentation Cables	**1.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**8.6E+04**
Maximum Anticipated Combustible Loading:	**1.0E+05**

Floor Area (ft^2)
1,550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not any safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 215 of 277)

Fire Zone:	**FA3-115-01**
Building:	**Power Source**
Floor(s):	**B1F**
Fig:	**9A-11**
Sect:	**3.84**
Area Designation:	**A-Class 1E Battery Room**
Zone Designation:	**A-Class 1E Battery Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-104-02 **FA3-106-01** **FA3-116-01**	**-**	**FA3-105-01** **FA3-117-01**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**
Battery	**5.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.2E+05**
Maximum Anticipated Combustible Loading:	**1.4E+05**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 216 of 277)

Fire Zone:	FA3-116-01
Building:	Power Source
Floor(s):	B1F
Fig:	9A-11
Sect:	3.85
Area Designation:	B-Class 1E Battery Room
Zone Designation:	B-Class 1E Battery Room
Associated Safety Division(s)	B
Applicable Regulatory and Code Ref(s):	IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-106-01 FA3-115-01	-	FA3-106-01 FA3-118-01

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	3.2E+06
Low Voltage Cables	2.4E+06
Control Cables	4.2E+06
Instrumentation Cables	3.7E+06
Battery	5.7E+07

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	Manual Fire Alarm Pull Station

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	Portable Fire Extinguisher

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	1.2E+05
Maximum Anticipated Combustible Loading:	1.4E+05

Floor Area (ft^2)
600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	A fire has the potential to damage safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage.

Table 9A-2 Fire Hazard Analysis Summary (Sheet 217 of 277)

Fire Zone:	**FA3-117-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.86**
Area Designation:	**A-Class 1E Battery Charger Room**
Zone Designation:	**A-Class 1E Battery Charger Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-02 **FA3-105-01** **FA3-118-01**	**FA3-115-01**	**FA3-105-02**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Control Center and Inverter	**4.3E+06**
Instruments	**2.6E+05**
Panels	**3.9E+05**
Transformer	**2.5E+06**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**4.1E+04**
Maximum Anticipated Combustible Loading:	**5.0E+04**

Floor Area (ft^2)
400

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 218 of 277)

Fire Zone:	**FA3-118-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.87**
Area Designation:	**B-Class 1E Battery Charger Room**
Zone Designation:	**B-Class 1E Battery Charger Room**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-02 **FA3-106-01** **FA3-117-01**	**FA3-116-01**	**FA3-105-02** **FA3-106-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Control Center and Inverter	**3.9E+06**
Instruments	**2.6E+05**
Panels	**3.9E+05**
Transformer	**2.5E+06**
High Voltage Cables	**1.9E+06**
Low Voltage Cables	**1.4E+06**
Control Cables	**2.5E+06**
Instrumentation Cables	**2.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.3E+04**
Maximum Anticipated Combustible Loading:	**5.1E+04**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 219 of 277)

Fire Zone:	**FA3-119-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.88**
Area Designation:	**Spare Battery Charger-1 Room**
Zone Designation:	**Spare Battery Charger-1 Room**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-103-01	**FA3-103-01**	**FA3-104-04**
FA3-103-02	**FA3-104-01**	
FA3-104-01		
FA3-105-01		

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**1.0E+05**
Transformer	**2.5E+06**
Inverter	**2.7E+06**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.4E+04**
Maximum Anticipated Combustible Loading:	**5.3E+04**

Floor Area (ft^2)
250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 220 of 277)

Fire Zone:	**FA3-120-01**
Building:	**Power Source**
Floor(s):	**B1F**
Fig:	**9A-11**
Sect:	**3.89**
Area Designation:	**C-Class 1E Battery Room**
Zone Designation:	**C-Class 1E Battery Room**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-112-01		**FA3-112-01**
FA3-121-01		**FA3-122-01**
FA4-101-01		
FA4-101-22		

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**
Battery	**5.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**1.2E+05**
Maximum Anticipated Combustible Loading:	**1.4E+05**

Floor Area (ft^2)
600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 221 of 277)

Fire Zone: **FA3-121-01**

Building:	**Power Source**
Floor(s):	**B1F**
Fig:	**9A-11**
Sect:	**3.90**

Area Designation:	**D-Class 1E Battery Room**
Zone Designation:	**D-Class 1E Battery Room**
Associated Safety Division(s)	**D**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-111-02 **FA3-112-01** **FA3-120-01**	**-**	**FA3-113-01** **FA3-123-01**

Fire Barrier Description:
Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**3.2E+06**
Low Voltage Cables	**2.4E+06**
Control Cables	**4.2E+06**
Instrumentation Cables	**3.7E+06**
Battery	**5.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**1.2E+05**
Maximum Anticipated Combustible Loading:	**1.4E+05**

Floor Area (ft^2)
600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 222 of 277)

Fire Zone:	**FA3-122-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.91**
Area Designation:	**C-Class 1E Battery Charger Room**
Zone Designation:	**C-Class 1E Battery Charger Room**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-02 **FA3-112-01** **FA3-123-01**	**FA3-120-01**	**FA3-113-02** **FA3-112-01**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Control Center and Inverter	**3.9E+06**
Instruments	**2.6E+05**
Panels	**3.9E+05**
Transformer	**2.5E+06**
High Voltage Cables	**1.9E+06**
Low Voltage Cables	**1.4E+06**
Control Cables	**2.5E+06**
Instrumentation Cables	**2.2E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.3E+04**
Maximum Anticipated Combustible Loading:	**5.1E+04**

Floor Area (ft^2)
350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire in this fire zone has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 223 of 277)

Fire Zone:	**FA3-123-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.92**
Area Designation:	**D-Class 1E Battery Charger Room**
Zone Designation:	**D-Class 1E Battery Charger Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA3-109-02 **FA3-113-01** **FA3-122-01**	**FA3-121-01**	**FA3-113-02**

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Control Center and Inverter	**4.3E+06**
Instruments	**2.6E+05**
Panels	**3.9E+05**
Transformer	**2.5E+06**
High Voltage Cables	**2.1E+06**
Low Voltage Cables	**1.6E+06**
Control Cables	**2.8E+06**
Instrumentation Cables	**2.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.1E+04**
Maximum Anticipated Combustible Loading:	**5.0E+04**

Floor Area (ft^2)
400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**A fire has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 224 of 277)

Fire Zone:	**FA3-124-01**
Building:	**Power Source**
Floor(s):	**B1MF**
Fig:	**9A-11**
Sect:	**3.93**
Area Designation:	**Spare Battery Charger-2 Room**
Zone Designation:	**Spare Battery Charger-2 Room**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-01	**FA3-109-01**	**FA3-111-04**
FA3-109-02	**FA3-111-01**	
FA3-111-01		
FA3-113-01		

Fire Barrier Description:

Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**1.0E+05**
Transformer	**2.5E+06**
Inverter	**2.7E+06**
High Voltage Cables	**1.3E+06**
Low Voltage Cables	**9.9E+05**
Control Cables	**1.8E+06**
Instrumentation Cables	**1.5E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.	**There are safe-shutdown circuit in this zone to be damaged**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**4.4E+04**
Maximum Anticipated Combustible Loading:	**5.3E+04**

Floor Area (ft^2)
250

Table 9A-2 Fire Hazard Analysis Summary (Sheet 225 of 277)

Fire Zone:	**FA4-101-01**
Building:	**Auxiliary**
Floor(s):	**B1F to 2F**
Fig:	**9A-13 to 9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Auxiliary Building B1F Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-115-03	**FA3-112-01**	**FA4-101-04**
FA2-116-03	**FA3-120-01**	**FA4-101-21**
FA2-124-01	**FA4-101-02**	
FA2-153-02	**FA4-101-03**	**See Table 9A-3**

Fire Barrier Description:

The A/B is walls are built using construction that provides at least 3-hour fire resistance for exterior walls. Penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**8.9E+06**
Gasket	**4.7E+05**
Hydrogen gas	**3.9E+06**
Instruments	**2.2E+07**
Lube Oil	**7.7E+05**
Panels	**8.4E+06**
Rubber	**2.3E+07**
Transformer	**1.6E+06**
Washing Drainage Strainer and Transport Container	**1.2E+05**
High Voltage Cables	**1.0E+08**
Low Voltage Cables	**7.8E+07**
Control Cables	**1.4E+08**
Instrumentation Cables	**1.2E+08**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.6E+04**
Maximum Anticipated Combustible Loading:	**3.1E+04**

Floor Area (ft^2)
19,700

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is not any mitigation or safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 226 of 277)

Fire Zone: **FA4-101-02**

Building:	**Auxiliary**
Floor(s):	**B1F to Roof**
Fig:	**9A-13 to 9A-17**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**FA4-101-02 Stairwell (B1F~3F)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA2-116-03	**FA2-117-43**	**Roof**
FA2-117-07	**FA2-117-44**	
FA2-117-17	**FA2-153-02**	
FA2-117-42	**FA4-101-01**	**See Table 9A-3**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Table 9A-2 Fire Hazard Analysis Summary (Sheet 227 of 277)

Fire Zone:	**FA4-101-03**
Building:	**Auxiliary**
Floor(s):	**B1F, 1F**
Fig:	**9A-13, 9A-14**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Boric Acid Tank Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-01 **FA2-117-05** **FA2-117-07** **FA2-118-01**	**FA2-119-01** **FA4-101-01** **FA4-101-04**	**FA4-101-17**

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**7.9E+04**
Instruments	**7.0E+05**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**5.8E+02**
Maximum Anticipated Combustible Loading:	**7.7E+02**

Floor Area (ft^2)
1,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A fire in this area credibly involves small amount of materials which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 228 of 277)

Fire Zone:	**FA4-101-04**
Building:	**Auxiliary**
Floor(s):	**1F, 2F**
Fig:	**9A-14, 9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Auxiliary Building 1F Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-07	**FA4-101-01**	**FA4-101-05**
FA2-117-17		**FA4-101-06**
FA2-152-03		**FA4-101-07**
FA2-152-04	**See Table 9A-3**	**FA4-101-08**

Fire Barrier Description:

The A/B walls are built using construction that provides at least 3-hour fire resistance for exterior walls. Penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**6.3E+07**
Instruments	**8.6E+06**
Panels	**1.6E+07**
Rubber	**7.6E+05**
High Voltage Cables	**1.0E+08**
Low Voltage Cables	**7.7E+07**
Control Cables	**1.4E+08**
Instrumentation Cables	**1.2E+08**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Statio**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+04**
Maximum Anticipated Combustible Loading:	**3.2E+04**

Floor Area (ft^2)
19,400

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 229 of 277)

Fire Zone:	**FA4-101-05**
Building:	**Auxiliary**
Floor(s):	**9A-2F to Roof**
Fig:	**9A-15 to 9A-17**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**FA4-101-05 Stairwell (2F~Roof)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-109-03 **FA4-101-10** **FA4-101-18** **FA4-101-23**	**FA4-101-04**	**Roof**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There are no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 230 of 277)

Fire Zone:	**FA4-101-06**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E Electrical Room (FA4-101-06)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-07 **FA4-101-08** **FA4-101-10** **FA4-101-13**	**FA4-101-04**	**FA4-101-18**

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Control Center	**1.4E+07**
Low Voltage Cables	**4.2E+08**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.7E+05**
Maximum Anticipated Combustible Loading:	**3.3E+05**

Floor Area (ft^2)
1,600

Table 9A-2 Fire Hazard Analysis Summary (Sheet 231 of 277)

Fire Zone:	**FA4-101-07**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Computer Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face
Listed See Table 9A-3
For Complete Listing)

Wall	Floor	Ceiling
FA4-101-06 **FA4-101-08** **FA4-101-10**	**FA4-101-04**	**FA4-101-18**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**7.8E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**6.8E+03**
Maximum Anticipated Combustible Loading:	**8.2E+03**

Floor Area (ft^2)
1,150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. IF suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 232 of 277)

Fire Zone:	**FA4-101-08**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E I&C Room (FA4-101-08)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-06 **FA4-101-07** **FA4-101-10**	**FA4-101-04**	**FA4-101-18**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**1.8E+07**
High Voltage Cables	**1.4E+07**
Low Voltage Cables	**1.1E+07**
Control Cables	**1.9E+07**
Instrumentation Cables	**1.7E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading	**3.5E+04**

Floor Area (ft^2)
2,700

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. IF suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 233 of 277)

Fire Zone:	**FA4-101-09**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Radwaste Control Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA3-113-02 **FA4-101-10** **FA5-101-01**	**FA4-101-22**	**FA4-101-18** **FA4-101-19**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Lighting Transformer	**6.6E+05**
Panels	**1.3E+07**
High Voltage Cables	**2.9E+06**
Low Voltage Cables	**2.2E+06**
Control Cables	**3.9E+06**
Instrumentation Cables	**3.4E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.7E+04**
Maximum Anticipated Combustible Loading	**5.7E+04**

Floor Area (ft^2)
550

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 234 of 277)

Fire Zone:	**FA4-101-10**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**FA4-101-10 Corridor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-42	**FA4-101-04**	**FA4-101-18**
FA2-153-05	**FA4-101-22**	**FA4-101-19**
FA2-206-02		
FA3-109-03	**See Table 9A-3**	

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**2.1E+07**
Low Voltage Cables	**1.6E+07**
Control Cables	**2.8E+07**
Instrumentation Cables	**2.5E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading	**2.7E+04**

Floor Area (ft^2)
4,000

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 235 of 277)

Fire Zone:	**FA4-101-11**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E I&C Room (FA4-101-11)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-10 **FA4-101-12** **FA5-101-01** **FA5-101-02**	**FA4-101-04** **FA4-101-22**	**FA4-101-18**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**8.7E+06**
High Voltage Cables	**8.7E+06**
Low Voltage Cables	**6.5E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.8E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
1,650

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. IF suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 236 of 277)

Fire Zone:	**FA4-101-12**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E I&C Room (FA4-101-12)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA4-101-10	**FA4-101-04**	**FA4-101-18**
	FA4-101-11	**FA4-101-22**	
	FA4-101-14		
	FA5-101-01	**See Table 9A-3**	

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**2.4E+07**
High Voltage Cables	**1.4E+07**
Low Voltage Cables	**1.0E+07**
Control Cables	**1.8E+07**
Instrumentation Cables	**1.6E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**3.2E+04**
Maximum Anticipated Combustible Loading:	**3.8E+04**

Floor Area (ft^2)
2,600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. If suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 237 of 277)

Fire Zone:	**FA4-101-13**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E Electrical Room (FA4-101-13)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-117-42 **FA2-153-05** **FA4-101-02** **FA4-101-06**	**FA4-101-04** **See Table 9A-3**	**FA4-101-18**

Fire Barrier Description:
The walls of the A/B fire area are built using construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Panels	**2.8E+07**
Low Voltage Cables	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.1E+04**
Maximum Anticipated Combustible Loading:	**2.6E+04**

Floor Area (ft^2)
1,850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 238 of 277)

Fire Zone:	**FA4-101-14**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Communication System Equipment Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-01 **FA4-101-10** **FA4-101-12** **FA4-101-16**	**FA4-101-04** **See Table 9A-3**	**FA4-101-18**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**1.1E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**8.1E+03**
Maximum Anticipated Combustible Loading:	**9.8E+03**

Floor Area (ft^2)
1,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 239 of 277)

Fire Zone: **FA4-101-15**

Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Resin Fill Tank Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-42 **FA4-101-02** **FA4-101-04** **FA4-101-13**	**FA4-101-04** **See Table 9A-3**	**FA4-101-20**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Panels	**2.6E+05**
High Voltage Cables	**8.5E+06**
Low Voltage Cables	**6.3E+06**
Control Cables	**1.1E+07**
Instrumentation Cables	**9.9E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
1,600

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 240 of 277)

Fire Zone:	**FA4-101-16**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Non-Class 1E Battery Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-01 **FA4-101-04** **FA4-101-10** **FA4-101-14**	**FA4-101-04** **See Table 9A-3**	**FA4-101-21**

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Instruments	**3.5E+05**
Battery Panel	**6.6E+07**
High Voltage Cables	**6.6E+06**
Low Voltage Cables	**5.0E+06**
Control Cables	**8.8E+06**
Instrumentation Cables	**7.7E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**7.5E+04**
Maximum Anticipated Combustible Loading:	**9.0E+04**

Floor Area (ft^2)
1,250

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 241 of 277)

Fire Zone:	**FA4-101-17**
Building:	**Auxiliary**
Floor(s):	**2F**
Fig:	**9A-15**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Boric Acid Batching Tank Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-42 **FA2-118-01** **FA2-119-01** **FA4-101-04**	**FA4-101-03** **See Table 9A-3**	**FA4-101-20**

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.1E+04**
Instruments	**5.3E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**4.2E+02**
Maximum Anticipated Combustible Loading:	**5.8E+02**

Floor Area (ft^2)
1,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 242 of 277)

Fire Zone: **FA4-101-18**

Building:	**Auxiliary**
Floor(s):	**3F**
Fig:	**9A-16**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**HVAC Equipment Room (FA4-101-18)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-43	**FA4-101-06**	**FA4-101-23**
FA2-407-01	**FA4-101-07**	**FA4-101-24**
FA4-101-02	**FA4-101-08**	**Roof**
FA4-101-05	**FA4-101-09**	**See Table 9A-3**

Fire Barrier Description:

The A/B is constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance for exterior walls. Penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**1.1E+07**
Grease	**2.5E+05**
Instruments	**7.4E+06**
Lube Oil	**8.0E+06**
Panels	**1.0E+06**
High Voltage Cables	**9.2E+07**
Low Voltage Cables	**6.9E+07**
Control Cables	**1.2E+08**
Instrumentation Cables	**1.1E+08**
Rubber	**1.1E+06**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
17,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 243 of 277)

Fire Zone:	**FA4-101-19**
Building:	**Auxiliary**
Floor(s):	**3F**
Fig:	**9A-16**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**TSC Emergency Filter Unit & Fan Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-18	**FA4-101-09** **FA4-101-10**	**Roof**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Charcoal Filter	**6.6E+06**
Instruments	**7.9E+05**
Particle Filters	**2.7E+05**
High Voltage Cables	**4.2E+06**
Low Voltage Cables	**3.2E+06**
Control Cables	**5.6E+06**
Instrumentation Cables	**4.9E+06**

Fire Detection - Primary	Fire Detection – Backup
Automatic smoke/heat	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression – Backup
Water spray, and Fire Hose Station	**Portable Fire Extinguisher**

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**3.2E+04**
Maximum Anticipated Combustible Loading:	**3.9E+04**

Floor Area (ft^2)
800

Table 9A-2 Fire Hazard Analysis Summary (Sheet 244 of 277)

Fire Zone:	**FA4-101-20**
Building:	**Auxiliary**
Floor(s):	**3F**
Fig:	**9A-16**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**HVAC Equipment Room (FA4-101-20)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-43	**FA4-101-04**	**FA4-101-24**
FA2-118-01	**FA4-101-15**	**Roof**
FA2-119-01	**FA4-101-17**	
FA4-101-02	**See Table 9A-3**	

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Filters	**1.1E+06**
Grease	**1.1E+06**
Instruments	**1.2E+06**
Panels	**1.1E+05**
Particle Filters	**1.4E+06**
High Voltage Cables	**4.4E+07**
Low Voltage Cables	**3.3E+07**
Control Cables	**5.9E+07**
Instrumentation Cables	**5.2E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
8,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 245 of 277)

Fire Zone:	**FA4-101-21**
Building:	**Auxiliary**
Floor(s):	**3F**
Fig:	**9A-16**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**C/V Low Volume Purge Exhaust Filtration Unit Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA4-101-20 **FA4-101-18**	**FA4-101-01** **FA4-101-16**	**Roof**

Fire Barrier Description:
The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles Item	Heat Release (Btu)
Charcoal Filter	**1.6E+07**
Filters	**5.5E+05**
Grease	**8.8E+04**
Instruments	**1.2E+06**
Particle Filters	**3.6E+05**
High Voltage Cables	**9.0E+06**
Low Voltage Cables	**6.7E+06**
Control Cables	**1.2E+07**
Instrumentation Cables	**1.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke/heat	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	**Fire Suppression - Backup**
Water spray, and Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**3.3E+04**
Maximum Anticipated Combustible Loading:	**4.0E+04**

Floor Area (ft^2)
1,700

Fire Impact to Zone: Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 246 of 277)

Fire Zone: **FA4-101-22**

Building:	**Auxiliary**
Floor(s):	**B1F,1F**
Fig:	**9A-13, 9A-14**
Sect:	**3.94**

Area Designation: **Auxiliary Building**

Zone Designation: **Hold Up Tank Room**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA3-112-01	**FA4-101-04**	**FA4-101-09**
FA3-113-02	**FA5-101-01**	**FA4-101-10**
FA3-120-01		**FA4-101-11**
FA4-101-01		**FA4-101-12**

Fire Barrier Description:

The walls of the A/B fire area are constructed using reinforced concrete and other material which results in construction that provides at least 3-hour fire resistance. Openings and penetrations into the auxiliary building are protected with fire protection features providing at least 3-hours fire resistance. Internal zone boundaries are structural without assigned fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Gasket	**1.2E+05**
Instruments	**5.3E+05**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+02**
Maximum Anticipated Combustible Loading:	**2.9E+02**

Floor Area (ft^2)
2,950

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves small amount of materials which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 247 of 277)

Fire Zone:	**FA4-101-23**
Building:	**Auxiliary**
Floor(s):	**Roof**
Fig:	**9A-17**
Sect:	**3.94**
Area Designation:	**Auxiliary Building**
Zone Designation:	**Instrument Maintenance Shop (Cold)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-44 **FA2-501-05** **FA2-501-11** **FA4-101-05**	**FA4-101-18**	**Roof**

Fire Barrier Description:

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**5.0E+01**

Floor Area (ft^2)
1,850

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 248 of 277)

Fire Zone: **FA4-101-24**

Building:	**Auxiliary**
Floor(s):	**Roof**
Fig:	**9A-17**
Sect:	**3.94**

Area Designation:	**Auxiliary Building**
Zone Designation:	**Auxiliary Building Roof**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-117-44 **FA2-118-01** **FA2-119-01** **FA4-101-02**	**FA4-101-18** **FA4-101-20**	**Roof**

Fire Barrier Description:

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+4**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**2.4E+01**

Floor Area (ft^2)
3,950

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and suppressed fire in this room will minimize fire damage to the elevator.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 249 of 277)

Fire Zone:	**FA5-101-01**
Building:	**Access Control**
Floor(s):	**B1F to 2F**
Fig:	**9A-18, 9A-19**
Sect:	**3.95**
Area Designation:	**Access Control Building Area**
Zone Designation:	**Access Control Building**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA4-101-01	**FA4-101-11**	**FA5-101-02**
FA4-101-04	**FA4-101-12**	**Roof**
FA4-101-09	**FA4-101-14**	
FA4-101-10	**See Table 9A-3**	

Fire Barrier Description:
A 3 hour rated fire wall exists between this building and the adjacent auxiliary building. All opening in this wall are protected to 3-hour fire rating. Other exterior walls are not assigned a fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Filters	**5.5E+05**
Instruments	**6.2E+06**
Lube Oil	**8.1E+06**
Panels	**3.0E+06**
High Voltage Cables	**4.7E+07**
Low Voltage Cables	**3.5E+07**
Control Cables	**6.2E+07**
Instrumentation Cables	**5.4E+07**
Filters	**4.1E+05**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.5E+04**
Maximum Anticipated Combustible Loading:	**2.9E+04**

Floor Area (ft^2)
8,800

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. If suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 250 of 277)

Fire Zone:	**FA5-101-02**
Building:	**Access Control**
Floor(s):	**2F**
Fig:	**9A-19**
Sect:	**3.95**
Area Designation:	**Access Control Building Area**
Zone Designation:	**Technical Support Center**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA4-101-10 **FA4-101-11** **FA5-101-01**	**FA5-101-01**	**Roof**

Fire Barrier Description:

The walls of this zone are constructed using reinforced concrete and other material zone boundaries are structural without assigned fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**1.6E+07**
Low Voltage Cables	**1.2E+07**
Control Cables	**2.1E+07**
Instrumentation Cables	**1.9E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
3,000

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly detected and extinguished fire minimizes the potential damage to plant equipment and the potential for adverse consequences. If suppressed quickly no adverse impact is expected.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 251 of 277)

Fire Zone:	**FA6-101-01**
Building:	**Turbine**
Floor(s):	**B1F**
Fig:	**9A-20**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Building B1F Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	-	**-**	**FA6-101-02** **FA6-101-07** **FA6-101-08** **FA6-101-12**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**3.8E+06**
High Voltage Cables	**2.4E+08**
Low Voltage Cables	**1.8E+08**
Control Cables	**3.1E+08**
Instrumentation Cables	**2.7E+08**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
44,500

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 252 of 277)

Fire Zone:	**FA6-101-02**
Building:	**Turbine**
Floor(s):	**1F**
Fig:	**9A-21**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Building 1F Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-03	**FA6-101-01**	**FA6-101-13**
FA6-101-04		**FA6-101-16**
FA6-101-05		
FA6-101-06	**See Table 9A-3**	

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
crane	**4.2E+04**
Instruments	**2.1E+06**
Lube Oil	**5.6E+07**
Panel	**1.6E+06**
Lube oil	**3.3E+04**
High Voltage Cables	**3.1E+08**
Low Voltage Cables	**2.4E+08**
Control Cables	**4.2E+08**
Instrumentation Cables	**3.7E+08**

Fire Detection - Primary	Fire Detection – Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression – Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
59,300

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 253 of 277)

Fire Zone:	**FA6-101-03**
Building:	**Turbine**
Floor(s):	**1F**
Fig:	**9A-21**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Electrical Room (1F)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA6-101-02 **FA6-101-04** **FA6-101-07** **FA6-101-09**	**FA6-101-10** **FA6-101-15**	**FA6-101-14**

Fire Barrier Description:
This Electric Room is separated from the adjacent turbine building fire zones and fire areas with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Battery	**1.4E+07**
Charger	**5.2E+06**
Switchgear and Control Centers	**4.4E+07**
High Voltage Cables	**5.2E+07**
Low Voltage Cables	**3.9E+07**
Control Cables	**6.9E+07**
Instrumentation Cables	**6.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Preaction Sprinkler	**There is no backup suppression system.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.9E+04**
Maximum Anticipated Combustible Loading:	**3.5E+04**

Floor Area (ft^2)
9,800

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 254 of 277)

Fire Zone: **FA6-101-04**

Building:	**Turbine**
Floor(s):	**1F**
Fig:	**9A-21**
Sect:	**3.96**

Area Designation: **Turbine Building**

Zone Designation: **FA6-101-04 Zone**

Associated Safety Division(s): **N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-102-01	**FA7-101-01**	**FA6-101-15**
FA2-108-01	**FA7-102-01**	
FA2-201-01	**FA7-103-01**	
FA2-202-01	**FA7-104-01**	**See Table 9A-3**

Fire Barrier Description: **The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance.**

Potential Combustibles	
Item	Heat Release (Btu)
High Voltage Cables	**4.5E+07**
Low Voltage Cables	**3.4E+07**
Control Cables	**6.1E+07**
Instrumentation Cables	**5.3E+07**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.2E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
8,600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a sever fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 255 of 277)

Fire Zone:	**FA6-101-05**
Building:	**Turbine**
Floor(s):	**1F to Roof**
Fig:	**9A-21 to 9A-26**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-05 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA6-101-02 **FA6-101-13** **FA6-101-17** **FA6-101-19**	**FA6-101-22**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the stairwell are rated to 1 ½ hours fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection – Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression – Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 256 of 277)

Fire Zone:	**FA6-101-06**
Building:	**Turbine**
Floor(s):	**1F to Roof**
Fig:	**9A-21 to 9A-26**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-06 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Wall	Ceiling
FA6-101-02 **FA6-101-13** **FA6-101-17** **FA6-101-19**	**FA6-101-23**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the stairwell are rated to 1 ½ hours fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 257 of 277)

Fire Zone: **FA6-101-07**

Building:	**Turbine**
Floor(s):	**1F to Roof**
Fig:	**9A-21 to 9A-26**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-07 E.V Shaft**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-02 **FA6-101-03** **FA6-101-04** **FA6-101-08**	**FA6-101-01** **See Table 9A-3**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the elevator shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the elevator are rated to 1 ½ hours fire resistance. The elevator shaft designed to meet IBC and ASME 17 requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**4.7E+02**

Floor Area (ft^2)
200

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 258 of 277)

Fire Zone:	**FA6-101-08**
Building:	**Turbine**
Floor(s):	**1F to Roof**
Fig:	**9A-21 to 9A-26**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-08 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA6-101-02 **FA6-101-07** **FA6-101-13** **FA6-101-17**	**FA6-101-01** **See Table 9A-3**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the stairwell are rated to 1 ½ hours fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 259 of 277)

Fire Zone:	**FA6-101-09**
Building:	**Turbine**
Floor(s):	**1F to 3F**
Fig:	**9A-21 to 9A-23**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-09 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-03 **FA6-101-14** **FA6-101-18**	**-**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the stairwell are rated to 1 ½ hours fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles

Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 260 of 277)

Fire Zone:	**FA6-101-10**
Building:	**Turbine**
Floor(s):	**1F, 2F**
Fig:	**9A-21, 9A-22**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-10 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-03 **FA6-101-14**	**-**	**Roof**

Fire Barrier Description:

A one hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 1-hours fire resistance. Doors to the stairwell are rated to ¾ hour fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 261 of 277)

Fire Zone:	**FA6-101-11**
Building:	**Turbine**
Floor(s):	**1F to Roof**
Fig:	**9A-21 to 9A-26**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-11 Stairwell**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-02 **FA6-101-13** **FA6-101-17** **FA6-101-19**	**-**	**Roof**

Fire Barrier Description:
A two hour fire barrier surrounds the stairwell shaft. All penetrations into or from the shaft are protected for 2-hours fire resistance. Doors to the stairwell are rated to 1 ½ hours fire resistance. The stair well is designed to meet IBC requirements.

Potential Combustibles	
Item	Heat Release (Btu)
Transients Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+02**

Floor Area (ft^2)
100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 262 of 277)

Fire Zone:	**FA6-101-12**
Building:	**Turbine**
Floor(s):	**1F**
Fig:	**9A-21**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Sampling Room**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA6-101-02	**FA6-101-01**	**FA6-101-13**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**4.0E+01**

Floor Area (ft^2)
2,350

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 263 of 277)

Fire Zone: **FA6-101-13**

Building:	**Turbine**
Floor(s):	**2F**
Fig:	**9A-22**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Building 2F Floor**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 13, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-05	**FA6-101-02**	**FA6-101-17**
FA6-101-06	**FA6-101-12**	
FA6-101-07		
FA6-101-08	**See Table 9A-3**	

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
crane	**4.2E+04**
Gen Load Breaker and Station	**1.1E+05**
Grease	**2.9E+06**
Lube Oil	**9.4E+04**
Instruments	**2.6E+06**
Panel	**3.9E+05**
High Voltage Cables	**3.1E+07**
Low Voltage Cables	**2.4E+07**
Control Cables	**4.2E+07**
Instrumentation Cables	**3.7E+07**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
5,950

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 264 of 277)

Fire Zone:	**FA6-101-14**
Building:	**Turbine**
Floor(s):	**2F**
Fig:	**9A-22**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Electrical Room (2F)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-07 **FA6-101-09** **FA6-101-10** **FA6-101-13**	**FA6-101-03** **See Table 9A-3**	**FA6-101-18** **Roof**

Fire Barrier Description:
This Electric Room is separated from the adjacent turbine building fire zones and fire areas with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Battery	**1.4E+07**
Charger	**5.2E+06**
Switchgear and Control Centers	**3.2E+07**
High Voltage Cables	**5.2E+07**
Low Voltage Cables	**3.9E+07**
Control Cables	**6.9E+07**
Instrumentation Cables	**6.0E+07**

Fire Detection - Primary	Fire Detection - Backup
Automatic smoke	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Preaction Sprinkler	**There is no backup suppression system.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.8E+04**
Maximum Anticipated Combustible Loading:	**3.3E+04**

Floor Area (ft^2)
9,800

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
An quickly identified and suppressed fire will serve to minimize adverse impact and recovery cost after a fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 265 of 277)

Fire Zone:	**FA6-101-15**
Building:	**Turbine**
Floor(s):	**2F**
Fig:	**9A-22**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**FA6-101-15 Zone**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-201-02	**FA6-101-04**	**Roof**
FA2-206-02		
FA2-301-01		
FA2-302-01	**See Table 9A-3**	

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Gasket	**4.0E+04**
Grease	**1.8E+05**
Instruments	**1.6E+06**
High Voltage Cables	**4.5E+07**
Low Voltage Cables	**3.4E+07**
Control Cables	**6.1E+07**
Instrumentation Cables	**5.3E+07**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.7E+04**

Floor Area (ft^2)
8,600

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 266 of 277)

Fire Zone: **FA6-101-16**

Building:	**Turbine**
Floor(s):	**2F**
Fig:	**9A-22**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Lube Oil Tank Room**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 13, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-15 **FA6-101-13**	**FA6-101-02**	**FA6-101-17**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. The turbine oil tank room protected with 3-hour fire walls.

Potential Combustibles	
Item	Heat Release (Btu)
Lube Oil	**4.6E+09**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.4E+06**
Maximum Anticipated Combustible Loading:	**2.9E+06**

Floor Area (ft^2)
1,900

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 267 of 277)

Fire Zone:	**FA6-101-17**
Building:	**Turbine**
Floor(s):	**3F**
Fig:	**9A-23**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Building 3F Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 13, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-05	**FA6-101-13**	**FA6-101-19**
FA6-101-06	**FA6-101-16**	**FA6-101-20**
FA6-101-07		**FA6-101-21**
FA6-101-08	**See Table 9A-3**	**Roof**

Fire Barrier Description:

The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Grease	**7.2E+06**
Instruments	**3.5E+05**
Panel	**4.1E+07**
rubber	**1.1E+05**
High Voltage Cables	**3.3E+08**
Low Voltage Cables	**2.5E+08**
Control Cables	**4.4E+08**
Instrumentation Cables	**3.8E+08**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Wet Pipe Sprinkler	**Fire Hose Station**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
62,150

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
The wet-pipe extinguishing system provides protection to prevent a severe fire in this area. This will minimize damage from a severe fire.	**There is no safe-shutdown circuit in this fire zone to be damaged mitigation functions.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 268 of 277)

Fire Zone: **FA6-101-18**

Building:	**Turbine**
Floor(s):	**3F**
Fig:	**9A-23**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**Security Room (FA6-101-18)**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s): **IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-09	**FA6-101-14**	**Roof**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles

Item	Heat Release (Btu)
Transients Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 269 of 277)

Fire Zone:	**FA6-101-19**
Building:	**Turbine**
Floor(s):	**4F+**
Fig:	**9A-24, 9A-25**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Turbine Building Operation Floor**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones:
(Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-05	**FA6-101-17**	**FA6-101-22**
FA6-101-06	**FA6-101-20**	**FA6-101-23**
FA6-101-07	**FA6-101-21**	
FA6-101-08	**See Table 9A-3**	

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Grease	**3.4E+06**
Instruments	**1.9E+06**
Oil	**1.5E+07**
Generator	**1.3E+07**
High Voltage Cables	**2.7E+08**
Low Voltage Cables	**2.1E+08**
Control Cables	**3.7E+08**
Instrumentation Cables	**3.2E+08**

Fire Detection - Primary	Fire Detection - Backup
UV/IR flame detection	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station **Wet Pipe Sprinklers on Bearings**	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**2.3E+04**
Maximum Anticipated Combustible Loading:	**2.8E+04**

Floor Area (ft^2)
51,750

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves small amount of materials which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 270 of 277)

Fire Zone: **FA6-101-20**

Building:	**Turbine**
Floor(s):	**4F**
Fig:	**9A-24**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**Tool Room (FA6-101-20)**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-19	**FA6-101-17**	**FA6-101-19**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**9.3E+01**

Floor Area (ft^2)
1,000

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged..**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 271 of 277)

Fire Zone:	**FA6-101-21**
Building:	**Turbine**
Floor(s):	**4F**
Fig:	**9A-24**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Tool Room (FA6-101-21)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA6-101-19	**FA6-101-17**	**FA6-101-19**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Transient Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**4.4E+01**

Floor Area (ft^2)
2,100

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 272 of 277)

Fire Zone:	**FA6-101-22**
Building:	**Turbine**
Floor(s):	**Roof**
Fig:	**9A-26**
Sect:	**3.96**
Area Designation:	**Turbine Building**
Zone Designation:	**Security Room (FA6-101-22)**
Associated Safety Division(s)	**N**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA6-101-05	**FA6-101-19**	**Roof**

Fire Barrier Description:

The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Transients Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 273 of 277)

Fire Zone:	**FA6-101-23**
Building:	**Turbine**
Floor(s):	**Roof**
Fig:	**9A-26**
Sect:	**3.96**

Area Designation:	**Turbine Building**
Zone Designation:	**Security Room (FA6-101-23)**
Associated Safety Division(s)	**N**

Applicable Regulatory and Code Ref(s):
IBC, RG 1.189; NFPA 10, 14, 72 and 804

	Wall	Floor	Ceiling
Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	**FA6-101-06**	**FA6-101-19**	**Roof**

Fire Barrier Description:
The turbine building is separated from the adjacent R/B and power source building with a 3-hour fire rated wall with all penetrations and openings protected to 3-hour fire resistance. Other walls are not assigned a fire rating.

Potential Combustibles	
Item	Heat Release (Btu)
Transients Only	**9.3E+04**

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**
Fire Suppression - Primary	Fire Suppression - Backup
Fire Hose Station	**Portable Fire Extinguisher**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**6.2E+02**

Floor Area (ft^2)
150

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A fire in this area credibly involves transient material which personnel would notice a fire involving and initiate fire suppression using portable extinguishers or manual hose streams before damage.	**There is no safe-shutdown circuit in this zone to be damaged.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 274 of 277)

Fire Zone:	**FA7-101-01**
Building:	**ESW Pipe Tunnel**
Floor(s):	**B1F**
Fig:	**9A-27**
Sect:	**3.97**
Area Designation:	**ESW Piping Tunnel**
Zone Designation:	**ESW Piping Tunnel A**
Associated Safety Division(s)	**A**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)	Wall	Floor	Ceiling
	FA2-104-01 FA3-101-01 FA7-102-01	**-**	**FA6-101-04**

Fire Barrier Description:
The ESW piping tunnels are constructed with reinforced concrete walls, floor and ceiling which provide in excess of 3-hour fire resistance capability as defined in ASTM E-119. All openings and penetrations are protected for 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transients Only	

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Portable Fire Extinguisher	**There is no backup suppression system.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**nil**

Floor Area (ft^2)
-

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly identified and suppressed fire will minimize damage and after event cleanup.	**A fire has the potential to damage safe-shutdown functions associated with safety train A. Train B, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 275 of 277)

Fire Zone:	**FA7-102-01**
Building:	**ESW Pipe Tunnel**
Floor(s):	**B1F**
Fig:	**9A-27**
Sect:	**3.98**
Area Designation:	**ESW Piping Tunnel**
Zone Designation:	**ESW Piping Tunnel B**
Associated Safety Division(s)	**B**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-105-01 **FA3-102-01** **FA7-101-01** **FA7-103-01**	**-**	**FA6-101-04**

Fire Barrier Description:

The ESW piping tunnels are constructed with reinforced concrete walls, floor and ceiling which provide in excess of 3-hour fire resistance capability as defined in ASTM E-119. All openings and penetrations are protected for 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Transients Only	

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Portable Fire Extinguisher	**There is no backup suppression system.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**nil**

Floor Area (ft^2)
-

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly identified and suppressed fire will minimize damage and after event cleanup.	**A fire in this fire zone has the potential to damage safe-shutdown functions associated with safety train B. Train A, C and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 276 of 277)

Fire Zone:	**FA7-103-01**
Building:	**ESW Pipe Tunnel**
Floor(s):	**B1F**
Fig:	**9A-27**
Sect:	**3.99**
Area Designation:	**ESW Piping Tunnel**
Zone Designation:	**ESW Piping Tunnel C**
Associated Safety Division(s)	**C**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-106-01 **FA3-108-01** **FA7-102-01** **FA7-104-01**	**-**	**FA6-101-04**

Fire Barrier Description:

The ESW piping tunnels are constructed with reinforced concrete walls, floor and ceiling which provide in excess of 3-hour fire resistance capability as defined in ASTM E-119. All openings and penetrations are protected for 3-hour fire resistance.

Potential Combustibles	
Item	Heat Release (Btu)
Transients Only	

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Portable Fire Extinguisher	**There is no backup suppression system.**

Fire Zone Combustible Summary	
	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**nil**

Floor Area (ft^2)
-

Fire Impact to Zone	
Suppression System Operates	Suppression System Fails to Op.
A quickly identified and suppressed fire will minimize damage and after event cleanup.	**A fire in this fire zone has the potential to damage safe-shutdown functions associated with safety train C. Train A, B and D remain free from the damage.**

Table 9A-2 Fire Hazard Analysis Summary (Sheet 277 of 277)

Fire Zone:	**FA7-104-01**
Building:	**ESW Pipe Tunnel**
Floor(s):	**B1F**
Fig:	**9A-26**
Sect:	**3.100**
Area Designation:	**ESW Piping Tunnel**
Zone Designation:	**ESW Piping Tunnel D**
Associated Safety Division(s)	**D**
Applicable Regulatory and Code Ref(s):	**IBC, RG 1.189; NFPA 10, 72 and 804**

Adjacent Fire Zones: (Primary Inter face Listed See Table 9A-3 For Complete Listing)

Wall	Floor	Ceiling
FA2-107-01 **FA3-110-01** **FA7-103-01**		**FA6-101-04**

Fire Barrier Description:
The ESW piping tunnels are constructed with reinforced concrete walls, floor and ceiling which provide in excess of 3-hour fire resistance capability as defined in ASTM E-119. All openings and penetrations are protected for 3-hour fire resistance.

Potential Combustibles

Item	Heat Release (Btu)
Transients Only	

Fire Detection - Primary	Fire Detection - Backup
There is no automatic detection.	**Manual Fire Alarm Pull Station**

Fire Suppression - Primary	Fire Suppression - Backup
Portable Fire Extinguisher	**There is no backup suppression system.**

Fire Zone Combustible Summary

	Btu/ft^2
Anticipated Combustible Loading:	**nil**
Maximum Anticipated Combustible Loading:	**nil**

Floor Area (ft^2)
-

Fire Impact to Zone

Suppression System Operates	Suppression System Fails to Op.
A quickly identified and suppressed fire will minimize damage and after event cleanup.	**A fire in this fire zone has the potential to damage safe-shutdown functions associated with safety train D. Train A, B and C remain free from the damage.**

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 1 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA1-101-01	Ceiling	FA1-101-06, FA1-101-07, FA1-101-12, FA1-101-02
	Wall	FA1-101-02, FA1-101-03, FA2-117-09, FA2-117-10 FA2-117-16
FA1-101-02	Ceiling	FA1-101-08, FA1-101-12, FA1-101-11, FA1-101-09 FA1-101-13, FA1-101-10
	Floor	FA1-101-01
	Wall	FA1-101-03, FA1-101-01
FA1-101-03	Ceiling	FA1-101-26, FA1-101-25, FA1-101-24, ,FA1-101-23 FA1-101-13
	Wall	FA1-101-13, FA1-101-26, FA1-101-25, FA1-101-12 FA1-101-11, FA1-101-10, FA1-101-09, FA1-101-08 FA1-101-05, FA1-101-04, FA1-101-01, FA1-101-02
FA1-101-04	Ceiling	FA1-101-18, FA1-101-15
	Wall	FA2-151-06, FA1-101-07, FA2-201-02, FA2-151-05 FA1-101-05, FA1-101-03, FA1-101-14, FA1-101-13 FA1-101-11, FA1-101-08, FA2-207-01
FA1-101-05	Ceiling	FA1-101-16, FA1-101-17
	Wall	FA1-101-09, FA2-208-01, FA2-206-02, FA2-152-06 FA2-152-05, FA1-101-10, FA1-101-06, FA1-101-04 FA1-101-03, FA1-101-13
FA1-101-06	Ceiling	FA1-101-20, FA1-101-17, FA1-101-19
	Floor	FA1-101-01
	Wall	FA1-101-05, FA2-153-05, FA2-208-01, FA1-101-07 FA1-101-10, FA1-101-25
FA1-101-07	Ceiling	FA1-101-22, FA1-101-18
	Floor	FA1-101-01
	Wall	FA2-207-01, FA2-153-05, FA2-120-07, FA1-101-26 FA1-101-14, FA1-101-11, FA1-101-06, FA1-101-04 FA2-120-06
FA1-101-08	Ceiling	FA1-101-23
	Floor	FA1-101-02
	Wall	FA1-101-15, FA1-101-13, FA1-101-23, FA1-101-03 FA1-101-11, FA1-101-04, FA1-101-21

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 2 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA1-101-09	Ceiling	FA1-101-24
	Floor	FA1-101-02
	Wall	FA1-101-24, FA1-101-21, FA1-101-16, FA1-101-13 FA1-101-10, FA1-101-05, FA1-101-03
FA1-101-10	Ceiling	FA1-101-25
	Floor	FA1-101-02
	Wall	FA1-101-03, FA1-101-05, FA1-101-06, FA1-101-09 FA1-101-12, FA1-101-17, FA1-101-19, FA1-101-25
FA1-101-11	Ceiling	FA1-101-26
	Floor	FA1-101-02
	Wall	FA1-101-04, FA1-101-07, FA1-101-08, FA1-101-12 FA1-101-18, FA1-101-22, FA1-101-26, FA1-101-03
FA1-101-12	Ceiling	FA1-101-26, FA1-101-25
	Floor	FA1-101-02, FA1-101-01
	Wall	FA1-101-11, FA1-101-03, FA1-101-10
FA1-101-13	Ceiling	FA1-101-24, FA1-101-23, FA1-101-21
	Floor	FA1-101-02, FA1-101-03
	Wall	FA1-101-09, FA1-101-04, FA1-101-05, FA1-101-03 FA1-101-08
FA1-101-14	Ceiling	FA1-101-26
	Wall	FA1-101-23, FA1-101-18, FA1-101-07, FA1-101-04 FA1-101-26
FA1-101-15	Ceiling	FA1-101-24, FA1-101-23
	Floor	FA1-101-04
	Wall	FA2-409-01, FA2-414-01, FA2-407-04, FA2-207-01 FA1-101-18, FA1-101-16, FA1-101-08, FA1-101-21
FA1-101-16	Ceiling	FA1-101-24
	Floor	FA1-101-05
	Wall	FA2-407-01, FA2-410-01, FA2-208-01, FA1-101-21 FA1-101-17, FA1-101-15, FA1-101-09, FA2-415-01
FA1-101-17	Ceiling	FA1-101-24, FA1-101-25
	Floor	FA1-101-06, FA1-101-05, FA1-101-19, FA1-101-20
	Wall	FA2-411-01, FA2-408-01, FA2-208-01, FA1-101-25 FA1-101-19, FA1-101-18, FA1-101-16, FA1-101-10 FA1-101-20

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 3 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA1-101-18	Ceiling	FA1-101-26, FA1-101-23
	Floor	FA1-101-04, FA1-101-07
	Wall	FA1-101-15, FA2-207-01, FA2-117-33, FA2-117-32 FA1-101-26, FA1-101-17, FA2-408-01, FA1-101-14 FA1-101-11, FA1-101-22
FA1-101-19	Ceiling	FA1-101-17
	Floor	FA1-101-06
	Wall	FA1-101-17, FA1-101-20, FA1-101-10
FA1-101-20	Ceiling	FA1-101-17
	Floor	FA1-101-06
	Wall	FA1-101-17, FA1-101-19
FA1-101-21	Ceiling	FA1-101-24, FA1-101-23
	Floor	FA1-101-13
	Wall	FA1-101-24, FA1-101-23, FA1-101-16, FA1-101-15 FA1-101-08, FA1-101-09
FA1-101-22	Ceiling	FA1-101-26
	Floor	FA1-101-07
	Wall	FA1-101-18,FA1-101-11
FA1-101-23	Floor	FA1-101-21, FA1-101-03, FA1-101-08, FA1-101-13 FA1-101-15, FA1-101-18
	Wall	FA2-501-09, FA2-501-01, FA2-414-01, FA2-207-01 FA2-117-34, FA1-101-24, FA1-101-21, FA1-101-14 FA1-101-08, FA1-101-26
FA1-101-24	Floor	FA1-101-16, FA1-101-03, FA1-101-17, FA1-101-21 FA1-101-13, FA1-101-09, FA1-101-15
	Wall	FA2-117-41, FA2-501-11, FA2-501-04, FA2-501-01 FA2-415-01,FA1-101-09, FA2-208-01, FA1-101-25 FA1-101-23, FA1-101-21, FA2-414-01
FA1-101-25	Floor	FA1-101-10, FA1-101-17, FA1-101-12, FA1-101-03
	Wall	FA2-117-35, FA1-101-06, FA2-208-01, FA2-117-44 FA2-117-40, FA2-117-37, FA1-101-26, FA1-101-24 FA1-101-10, FA1-101-17, FA1-101-03, FA2-117-39
FA1-101-26	Floor	FA1-101-18, FA1-101-12, FA1-101-22, FA1-101-14 FA1-101-11, FA1-101-03
	Wall	FA1-101-23, FA1-101-18, FA2-207-01, FA2-117-39 FA1-101-25, FA1-101-03, FA1-101-07, FA1-101-14 FA1-101-11, FA2-117-35

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 4 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-101-01	Wall	FA2-111-01, FA3-103-03, FA2-501-09, FA3-101-01 FA2-501-01, FA2-407-04, FA2-201-01, FA2-201-02
FA2-102-01	Ceiling	FA2-202-01, FA2-201-01, FA2-201-02
	Wall	FA3-104-04, FA3-101-01, FA2-202-01, FA6-101-04 FA2-104-01, FA2-103-01, FA2-201-01, FA2-111-01
FA2-103-01	Ceiling	FA2-202-01
	Wall	FA2-102-01, FA2-104-01, FA2-111-01
FA2-104-01	Ceiling	FA2-202-01
	Wall	FA7-101-01, FA2-111-01, FA2-105-01, FA2-102-01 FA2-103-01
FA2-105-01	Ceiling	FA2-203-01
	Wall	FA7-102-01, FA2-106-01, FA2-104-01, FA2-111-01
FA2-106-01	Ceiling	FA2-204-01
	Wall	FA2-107-01, FA2-112-01, FA7-103-01, FA2-105-01
FA2-107-01	Ceiling	FA2-205-01
	Wall	FA2-108-01, FA7-104-01, FA2-109-01, FA2-106-01 FA2-112-01
FA2-108-01	Ceiling	FA2-206-01, FA2-205-01, FA2-206-02
	Wall	FA2-107-01, FA6-101-04, FA3-111-04, FA3-110-01 FA2-205-01, FA2-112-01, FA2-109-01, FA2-206-01
FA2-109-01	Ceiling	FA2-205-01
	Wall	FA2-107-01, FA2-108-01, FA2-112-01
FA2-110-01	Wall	FA2-501-11, FA3-110-01, FA3-109-03, FA2-602-02 FA2-505-01, FA3-114-01, FA2-407-01, FA2-206-02 FA2-206-01, FA2-112-01, FA2-602-01
FA2-111-01	Ceiling	FA2-201-01
	Wall	FA2-114-03, FA3-106-01, FA3-101-01, FA2-151-01 FA2-123-01, FA2-120-03, FA2-114-02, FA2-112-01 FA2-105-01, FA2-104-01,FA2-103-01, FA2-101-01 FA2-102-01
FA2-112-01	Ceiling	FA2-206-01
	Wall	FA2-123-01, FA2-115-03, FA3-112-01, FA3-110-01 FA2-153-02, FA2-106-01, FA2-111-01, FA2-152-01 FA2-110-01, FA2-109-01, FA2-108-01, FA2-107-01 FA2-115-02
FA2-113-01	Ceiling	FA2-120-02
	Wall	FA2-113-03, FA2-113-02, FA2-123-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 5 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-113-02	Ceiling	FA2-120-02
	Wall	FA2-113-01, FA2-113-03, FA2-120-01, FA2-121-01
FA2-113-03	Ceiling	FA2-120-03, FA2-120-02
	Wall	FA2-121-01, FA2-113-01, FA2-113-02
FA2-114-01	Ceiling	FA2-151-01
	Wall	FA2-114-03, FA2-123-01, FA2-114-02
FA2-114-02	Ceiling	FA2-151-01
	Wall	FA2-111-01, FA2-114-01, FA2-114-03, FA2-123-01
FA2-114-03	Ceiling	FA2-151-01, FA2-120-03
	Wall	FA2-121-01, FA2-114-02, FA2-111-01, FA2-114-01
FA2-115-01	Ceiling	FA2-152-01
	Wall	FA2-115-02, FA2-115-03, FA2-123-01
FA2-115-02	Ceiling	FA2-152-01
	Wall	FA2-115-03, FA2-115-01, FA2-112-01, FA2-123-01
FA2-115-03	Ceiling	FA2-152-01, FA2-153-02
	Wall	FA2-112-01, FA2-115-01, FA2-115-02, FA2-124-01 FA4-101-01
FA2-116-01	Ceiling	FA2-153-01
	Wall	FA2-116-03, FA2-116-02, FA2-123-01
FA2-116-02	Ceiling	FA2-153-01
	Wall	FA2-116-01, FA2-116-03, FA2-117-01, FA2-117-02 FA2-123-01
FA2-116-03	Ceiling	FA2-153-01, FA2-153-02
	Wall	FA4-101-02, FA4-101-01, FA2-117-01, FA2-116-02 FA2-116-01, FA2-124-01
FA2-117-01	Ceiling	FA2-117-04, FA2-117-05
	Wall	FA2-117-02, FA2-116-03, FA2-116-02, FA2-118-01 FA2-119-01, FA4-101-03, FA2-117-03
FA2-117-02	Ceiling	FA2-117-04, FA2-117-07, FA2-117-13, FA2-117-14
	Wall	FA2-117-01, FA2-116-02, FA2-123-01, FA2-117-03
FA2-117-03	Ceiling	FA2-117-04
	Wall	FA2-117-01, FA2-117-02
FA2-117-04	Ceiling	FA2-117-42, FA2-117-21, FA2-117-20, FA2-117-07 FA2-117-06
	Floor	FA2-117-01, FA2-117-07, FA2-117-06, FA2-117-02 FA2-117-03
	Wall	FA2-153-01, FA2-117-07, FA2-117-06, FA2-117-05 FA2-117-17

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 6 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-117-05	Ceiling	FA2-117-07
	Floor	FA2-117-01
	Wall	FA2-117-04, FA2-118-01, FA2-119-01, FA2-153-01 FA2-153-02, FA4-101-03
FA2-117-06	Ceiling	FA2-117-04, FA2-117-21, FA2-117-20
	Floor	FA2-117-04
	Wall	FA2-117-07, FA2-117-04
FA2-117-07	Ceiling	FA2-117-04, FA2-152-03, FA2-117-17, FA2-117-42 FA2-117-27, FA2-117-19
	Floor	FA2-123-01,FA2-153-02, FA2-117-05, FA2-117-02 FA2-117-04
	Wall	FA2-153-01, FA2-117-12, FA4-101-04, FA4-101-03 FA4-101-02, FA2-208-01, FA2-153-04, FA2-117-04 FA2-152-04, FA2-117-16, FA2-117-13, FA2-153-03 FA2-117-14, FA2-152-03, FA2-117-10, FA2-117-17 FA2-117-08, FA2-117-06, FA2-118-01, FA2-119-01
FA2-117-08	Ceiling	FA2-151-03, FA2-117-19
	Floor	FA2-120-03, FA2-121-02, FA2-120-01
	Wall	FA2-122-01, FA2-120-05, FA2-120-04, FA2-207-01 FA2-117-16, FA2-117-15, FA2-117-12, FA2-151-04 FA2-117-11, FA2-117-09, FA2-117-07, FA2-120-02
FA2-117-09	Ceiling	FA2-153-05, FA2-120-07, FA2-117-16
	Wall	FA1-101-01, FA2-120-05, FA2-117-16, FA2-117-08 FA2-117-10
FA2-117-10	Ceiling	FA2-117-16
	Floor	FA2-123-01
	Wall	FA2-153-04, FA2-117-07, FA1-101-01, FA2-117-09
FA2-117-11	Ceiling	FA2-117-27
	Wall	FA2-117-12, FA2-117-08
FA2-117-12	Ceiling	FA2-117-27
	Wall	FA2-117-07, FA2-117-08, FA2-117-11, FA2-117-13
FA2-117-13	Ceiling	FA2-117-27
	Floor	FA2-117-02, FA2-123-01
	Wall	FA2-117-14, FA2-117-07, FA2-117-12
FA2-117-14	Ceiling	FA2-117-27
	Floor	FA2-117-02, FA2-123-01
	Wall	FA2-117-07, FA2-117-13

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 7 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-117-15	Ceiling	FA2-117-27
	Wall	FA2-117-31, FA2-117-19, FA2-117-08, FA2-122-01 FA2-117-27
FA2-117-16	Ceiling	FA2-120-07, FA2-117-24, FA2-117-25, FA2-153-05 FA2-120-06
	Floor	FA2-120-05, FA2-153-04, FA2-117-09, FA2-117-10
	Wall	FA2-153-04, FA2-153-01, FA2-120-02, FA2-117-17 FA2-117-09, FA2-117-08, FA2-117-07, FA1-101-01 FA2-120-05
FA2-117-17	Ceiling	FA2-117-42, FA2-117-23, FA2-117-24
	Floor	FA2-117-07, FA2-153-01
	Wall	FA4-101-04, FA4-101-02, FA2-117-16, FA2-117-07 FA2-117-04, FA2-153-01
FA2-117-18	Ceiling	FA2-407-03
	Floor	FA2-152-01
	Wall	FA2-152-06, FA2-152-05, FA2-117-42, FA2-206-02
FA2-117-19	Ceiling	FA2-117-27, FA2-120-06, FA2-117-31
	Floor	FA2-117-07, FA2-151-03, FA2-151-04, FA2-117-08
	Wall	FA2-117-27, FA2-207-01, FA2-201-02, FA2-153-05 FA2-117-15, FA2-151-05, FA2-122-01, FA2-120-07 FA2-117-22, FA2-120-06, FA2-117-42, FA2-117-25 FA2-117-26,
FA2-117-20	Ceiling	FA2-117-30
	Floor	FA2-117-04, FA2-117-06
	Wall	FA2-117-42, FA2-117-27, FA2-117-21
FA2-117-21	Ceiling	FA2-117-43, FA2-117-30
	Floor	FA2-117-04, FA2-117-06
	Wall	FA2-117-42, FA2-117-27, FA2-117-20
FA2-117-22	Ceiling	FA2-407-02
	Floor	FA2-151-01
	Wall	FA2-151-05, FA2-151-06, FA2-201-02, FA2-117-19
FA2-117-23	Ceiling	FA2-117-24
	Floor	FA2-153-01, FA2-117-17
	Wall	FA2-117-42, FA2-153-05, FA2-117-24
FA2-117-24	Ceiling	FA2-117-28, FA2-411-01,FA2-117-29
	Floor	FA2-153-01, FA2-153-04, FA2-117-17, FA2-117-16 FA2-117-23
	Wall	FA2-117-23, FA2-117-42, FA2-153-05

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 8 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-117-25	Ceiling	FA2-117-33
	Floor	FA2-120-02, FA2-117-16
	Wall	FA2-117-19, FA2-120-06 FA2-120-07, FA2-117-26
FA2-117-26	Ceiling	FA2-117-32
	Floor	FA2-120-02
	Wall	FA2-117-19, FA2-117-25, FA2-120-06
FA2-117-27	Ceiling	FA2-117-43, FA2-408-01
	Floor	FA2-117-30, FA2-408-01, FA2-153-05, FA2-122-01 FA2-117-31, FA2-117-43, FA2-117-42, FA2-117-33 FA2-117-32, FA2-411-01, FA2-117-12, FA2-117-07 FA2-117-11, FA2-117-13, FA2-117-14, FA2-117-15 FA2-117-19, FA2-117-28
	Wall	FA2-120-07, FA2-117-31, FA2-117-30, FA2-117-21 FA2-153-05, FA2-117-38, FA2-122-01, FA2-117-44 FA2-117-20, FA2-117-19, FA2-117-43, FA2-117-35 FA2-117-42, FA2-117-39, FA2-117-15
FA2-117-28	Ceiling	FA2-117-35, FA2-117-44, FA2-117-37, FA2-117-27
	Floor	FA2-117-24
	Wall	FA2-117-43, FA2-408-01, FA2-411-01
FA2-117-29	Ceiling	FA2-117-44, FA2-117-36
	Floor	FA2-117-24
	Wall	FA2-411-01, FA2-117-43
FA2-117-30	Ceiling	FA2-117-27, FA2-117-38
	Floor	FA2-117-21, FA2-117-20
	Wall	FA2-117-43, FA2-117-27
FA2-117-31	Ceiling	FA2-117-27, FA2-117-35
	Floor	FA2-120-06, FA2-117-19
	Wall	FA2-117-32, FA2-117-33, FA2-117-15, FA2-117-43 FA2-122-01, FA2-207-01, FA2-407-02, FA2-407-04 FA2-408-01, FA2-409-01, FA2-117-27
FA2-117-32	Ceiling	FA2-117-27, FA2-117-35
	Floor	FA2-120-06, FA2-117-26
	Wall	FA2-117-31, FA2-117-33, FA2-207-01, FA1-101-18
FA2-117-33	Ceiling	FA2-117-35, FA2-117-27
	Floor	FA2-120-06, FA2-117-25, FA2-120-07
	Wall	FA2-408-01, FA1-101-18, FA2-117-31, FA2-117-32

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 9 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-117-34	Ceiling	Roof, FA2-501-09
	Floor	FA2-409-01
	Wall	FA2-501-01, FA2-117-35, FA2-501-10, FA1-101-23 FA2-207-01
FA2-117-35	Ceiling	FA2-501-09
		FA2-117-39
		Roof
	Floor	FA2-117-28, FA2-117-32, FA2-117-33, FA2-411-01 FA2-408-01, FA2-117-31
	Wall	FA2-501-10, FA2-501-01, FA2-207-01, FA2-117-39 FA2-117-37, FA2-117-34, FA1-101-26, FA1-101-25 FA2-117-27, FA2-117-44
FA2-117-36	Ceiling	FA2-117-44
	Floor	FA2-117-29, FA2-411-01
	Wall	FA2-117-37, FA2-117-40 FA2-117-44
FA2-117-37	Ceiling	FA2-117-44
	Floor	FA2-117-28, FA2-411-01
	Wall	FA2-117-40, FA2-117-44, FA2-117-39, FA2-117-35 FA1-101-25, FA2-117-36
FA2-117-38	Ceiling	Roof
	Floor	FA2-117-30, FA2-117-43
	Wall	FA2-117-27, FA2-117-44
FA2-117-39	Ceiling	Roof
	Floor	FA2-117-35
	Wall	FA2-117-37, FA1-101-25, FA2-117-27, FA2-117-35 FA1-101-26, FA2-117-44
FA2-117-40	Ceiling	Roof
	Floor	FA2-411-01
	Wall	FA1-101-25, FA2-117-36, FA2-117-37, FA2-117-44 FA2-208-01
FA2-117-41	Ceiling	Roof
	Floor	FA2-410-01
	Wall	FA2-501-04, FA2-117-44, FA1-101-24, FA2-208-01 FA2-501-05
FA2-117-42	Ceiling	FA2-117-43, FA2-153-05, FA2-117-27
	Floor	FA2-152-03, FA2-152-04, FA2-117-04, FA2-117-07 FA2-117-17

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 10 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-117-42	Wall	FA4-101-15, FA2-152-05, FA2-153-05, FA2-206-02 FA4-101-10, FA4-101-17, FA4-101-02, FA2-208-01 FA2-118-01, FA2-117-27, FA2-117-24, FA2-117-23, FA2-117-18, FA2-117-21, FA2-119-01, FA2-117-20, FA2-117-19, FA4-101-13
FA2-117-43	Ceiling	FA2-117-27, FA2-117-44, FA2-117-38, FA2-501-05
	Floor	FA2-117-42, FA2-117-27, FA2-153-05, FA2-117-21
	Wall	FA4-101-02, FA2-411-01, FA2-410-01, FA2-408-01 FA4-101-20, FA2-407-03, FA4-101-18, FA2-119-01 FA2-118-01, FA2-117-31, FA2-117-30, FA2-117-29 FA2-117-28, FA2-117-27, FA2-407-01, FA2-208-01
FA2-117-44	Ceiling	Roof
	Floor	FA2-117-28, FA2-411-01, FA2-117-37, FA2-117-36 FA2-117-29, FA2-117-43
	Wall	FA4-101-02, FA2-501-05, FA4-101-24, FA2-118-01 FA2-119-01, FA4-101-23, FA2-117-27, FA2-117-41 FA1-101-25, FA2-117-35, FA2-117-36, FA2-117-37 FA2-117-38, FA2-117-39, FA2-117-40, FA2-208-01
FA2-118-01	Ceiling	Roof
	Wall	FA2-117-42, FA4-101-03, FA4-101-24, FA4-101-20 FA4-101-17, FA2-119-01, FA2-117-43, FA2-117-07 FA2-117-05, FA2-117-01, FA2-117-44
FA2-119-01	Ceiling	Roof
	Wall	FA4-101-03, FA2-117-05, FA4-101-24, FA4-101-20 FA4-101-17, FA2-117-44, FA2-117-43, FA2-117-01 FA2-117-07, FA2-117-42, FA2-118-01
FA2-120-01	Ceiling	FA2-117-08
	Wall	FA2-121-01, FA2-121-02, FA2-120-02, FA2-113-02
FA2-120-02	Ceiling	FA2-117-25, FA2-120-04, FA2-120-06, FA2-117-26 FA2-120-05
	Floor	FA2-113-02, FA2-113-03, FA2-113-01
	Wall	FA2-121-02, FA2-120-05, FA2-120-03, FA2-120-01 FA2-117-08, FA2-117-16, FA2-120-04
FA2-120-03	Ceiling	FA2-117-08, FA2-151-04
	Floor	FA2-121-01, FA2-114-03, FA2-113-03
	Wall	FA2-121-02, FA2-151-01, FA2-111-01, FA2-120-02
FA2-120-04	Ceiling	FA2-120-06
	Floor	FA2-120-02

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 11 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-120-04	Wall	FA2-207-01, FA2-120-05, FA2-117-08, FA2-151-03 FA2-120-02
FA2-120-05	Ceiling	FA2-120-06, FA2-120-07, FA2-117-16
	Floor	FA2-120-02
	Wall	FA2-120-02, FA2-117-16, FA2-117-09, FA2-117-08 FA2-120-04
FA2-120-06	Ceiling	FA2-117-31, FA2-117-33 FA2-117-32
	Floor	FA2-120-05, FA2-120-04, FA2-120-02, FA2-117-16 FA2-117-19
	Wall	FA2-117-25, FA2-117-19, FA1-101-07, FA2-120-07 FA2-151-05, FA2-207-01, FA2-117-26
FA2-120-07	Ceiling	FA2-408-01, FA2-117-33
	Floor	FA2-117-09, FA2-117-16, FA2-120-05
	Wall	FA2-153-05, FA2-120-06, FA2-117-25, FA1-101-07 FA2-117-19, FA2-117-27
FA2-121-01	Ceiling	FA2-121-02, FA2-120-03
	Wall	FA2-113-02, FA2-122-01, FA2-120-01, FA2-114-03 FA2-113-03, FA2-123-01
FA2-121-02	Ceiling	FA2-117-08
	Floor	FA2-121-01
	Wall	FA2-120-01, FA2-120-02, FA2-120-03, FA2-122-01
FA2-122-01	Ceiling	FA2-117-27
	Wall	FA2-117-31, FA2-121-02, FA2-117-08, FA2-117-19 FA2-121-01, FA2-117-15, FA2-117-27
FA2-123-01	Ceiling	FA2-117-14, FA2-117-13, FA2-117-10, FA2-117-07
	Wall	FA2-121-01, FA2-124-01, FA2-117-02, FA2-116-02 FA2-115-02, FA2-115-01, FA2-114-02, FA2-114-01 FA2-113-01, FA2-112-01, FA2-111-01, FA2-116-01
FA2-124-01	Ceiling	FA2-153-02
	Wall	FA2-116-03, FA2-115-03, FA4-101-01, FA2-123-01
FA2-151-01	Ceiling	FA2-117-22, FA2-151-03, FA2-151-02, FA2-151-06
	Floor	FA2-114-01, FA2-114-03, FA2-114-02
	Wall	FA2-120-03, FA2-151-02, FA2-151-03, FA2-151-04 FA2-111-01
FA2-151-02	Ceiling	FA2-151-06
	Floor	FA2-151-01
	Wall	FA2-151-04, FA2-151-03, FA2-151-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 12 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-151-03	Ceiling	FA2-151-05, FA2-117-19
	Floor	FA2-117-08, FA2-151-01, FA2-151-04
	Wall	FA2-151-04, FA2-151-02, FA2-151-01, FA2-120-04 FA2-207-01
FA2-151-04	Ceiling	FA2-151-03, FA2-151-06, FA2-117-19, FA2-201-02
	Floor	FA2-120-03
	Wall	FA2-207-01, FA2-201-01, FA2-152-04, FA2-151-02 FA2-151-01, FA2-117-08, FA2-151-03
FA2-151-05	Ceiling	FA2-409-01
	Floor	FA2-151-03
	Wall	FA1-101-04, FA2-117-19, FA2-117-22, FA2-120-06 FA2-151-06, FA2-207-01
FA2-151-06	Ceiling	FA2-409-01, FA2-407-04
	Floor	FA2-151-02, FA2-151-04, FA2-151-01
	Wall	FA2-151-05, FA2-152-06, FA2-117-22, FA1-101-04 FA2-201-02
FA2-152-01	Ceiling	FA2-117-18, FA2-152-06, FA2-152-04, FA2-152-03 FA2-152-02
	Floor	FA2-115-03, FA2-115-02, FA2-115-01
	Wall	FA2-152-03, FA2-152-04, FA2-112-01, FA2-153-02 FA2-152-02
FA2-152-02	Ceiling	FA2-152-04
		FA2-152-06
	Floor	FA2-152-01
	Wall	FA2-152-03, FA2-152-01
FA2-152-03	Ceiling	FA2-152-05, FA2-117-42
	Floor	FA2-117-07, FA2-152-01, FA2-152-04
	Wall	FA4-101-04, FA2-153-03, FA2-152-04, FA2-152-02 FA2-152-01, FA2-117-07, FA2-208-01
FA2-152-04	Ceiling	FA2-206-02, FA2-117-42, FA2-152-03, FA2-152-06
	Floor	FA2-152-01, FA2-153-02
	Wall	FA2-208-01, FA2-206-01, FA2-152-02, FA2-152-01 FA2-151-04, FA2-117-07, FA2-152-03, FA4-101-04
FA2-152-05	Ceiling	FA2-410-01
	Floor	FA2-152-03
	Wall	FA2-208-01, FA2-153-05, FA2-117-42, FA2-117-18 FA1-101-05, FA2-152-06

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 13 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-152-06	Ceiling	FA2-410-01, FA2-407-01
	Floor	FA2-152-04, FA2-152-01, FA2-152-02
	Wall	FA1-101-05, FA2-152-05, FA2-206-02, FA2-117-18 FA2-151-06
FA2-153-01	Ceiling	FA2-153-03, FA2-117-17, FA2-117-23, FA2-117-24 FA2-153-04
	Floor	FA2-116-02, FA2-116-01, FA2-116-03
	Wall	FA2-153-03, FA2-153-02, FA2-117-16, FA2-117-04 FA2-117-07, FA2-153-04, FA2-117-05, FA2-117-17
FA2-153-02	Ceiling	FA2-117-07, FA2-152-04
	Floor	FA2-124-01, FA2-116-03, FA2-115-03
	Wall	FA2-152-01, FA2-112-01, FA2-153-01, FA4-101-01 FA4-101-02, FA2-117-05
FA2-153-03	Ceiling	FA2-153-05
	Floor	FA2-153-01
	Wall	FA2-208-01, FA2-152-03, FA2-117-07, FA2-153-04 FA2-153-01
FA2-153-04	Ceiling	FA2-153-05, FA2-117-16, FA2-117-24
	Floor	FA2-153-01
	Wall	FA2-153-01, FA2-117-16, FA2-117-10, FA2-117-07 FA2-153-03
FA2-153-05	Ceiling	FA2-117-27, FA2-408-01, FA2-411-01, FA2-117-43
	Floor	FA2-153-03, FA2-153-04, FA2-117-42, FA2-117-09 FA2-117-16
	Wall	FA2-117-27, FA2-208-01, FA4-101-10, FA1-101-06 FA1-101-07, FA2-117-24, FA2-120-07, FA2-117-19 FA2-117-42, FA2-117-23, FA2-152-05, FA4-101-13
FA2-201-01	Ceiling	FA2-202-01, FA2-303-01, FA2-307-02, FA2-308-03 FA2-201-02
	Floor	FA2-111-01, FA2-102-01
	Wall	FA3-104-04, FA3-103-03, FA6-101-04, FA2-101-01 FA2-203-01, FA2-202-01, FA2-151-04, FA2-102-01 FA2-206-01
FA2-201-02	Ceiling	FA2-407-04
	Floor	FA2-151-04, FA2-201-01, FA2-202-01, FA2-102-01
	Wall	FA3-103-03, FA3-104-04, FA2-307-02, FA2-303-01 FA2-308-02, FA6-101-15, FA2-307-01, FA2-308-03 FA2-301-01, FA2-206-02, FA2-151-06, FA2-117-22 FA2-117-19, FA2-101-01, FA1-101-04, FA2-302-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 14 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-202-01	Ceiling	FA2-307-02, FA2-201-02, FA2-301-01, FA2-304-02 FA2-302-01, FA2-203-01, FA2-303-01, FA2-308-03
	Floor	FA2-103-01, FA2-201-01, FA2-104-01, FA2-102-01
	Wall	FA3-104-04, FA2-201-01, FA2-102-01, FA6-101-04 FA2-203-01
FA2-203-01	Ceiling	FA2-307-01, FA2-308-03
	Floor	FA2-202-01, FA2-105-01
	Wall	FA2-202-01, FA2-201-01, FA6-101-04, FA2-204-01
FA2-204-01	Ceiling	FA2-308-03, FA2-312-01
	Floor	FA2-106-01, FA2-205-01
	Wall	FA6-101-04, FA2-206-01, FA2-203-01, FA2-205-01
FA2-205-01	Ceiling	FA2-315-01, FA2-204-01, FA2-206-02, FA2-312-02 FA2-309-02, FA2-313-01, FA2-314-01, FA2-308-03
	Floor	FA2-107-01, FA2-206-01, FA2-108-01, FA2-109-01
	Wall	FA6-101-04, FA2-206-01, FA2-204-01, FA2-108-01
FA2-206-01	Ceiling	FA2-205-01, FA2-314-01, FA2-312-02, FA2-206-02 FA2-308-03
	Floor	FA2-112-01 ,FA2-108-01
	Wall	FA6-101-04, FA2-108-01, FA2-201-01, FA3-111-04 FA3-109-03, FA2-205-01, FA2-204-01, FA2-152-04 FA2-110-01
FA2-206-02	Ceiling	FA2-407-01
	Floor	FA2-152-04, FA2-206-01, FA2-205-01, FA2-108-01
	Wall	FA2-314-01, FA2-315-01, FA4-101-10, FA6-101-15 FA2-308-03, FA2-313-01, FA3-114-01, FA2-110-01 FA1-101-05, FA2-308-01, FA2-201-02, FA2-152-06 FA2-117-42, FA2-117-18, FA2-312-02, FA2-312-01
FA2-207-01	Ceiling	Roof
	Wall	FA2-117-35, FA2-120-04, FA2-120-06, FA2-151-03 FA2-151-04, FA2-409-01, FA2-117-31, FA2-151-05 FA1-101-04, FA2-117-19, FA2-117-08, FA1-101-26 FA1-101-23, FA1-101-18, FA1-101-15, FA1-101-07 FA2-117-32, FA2-117-34
FA2-208-01	Ceiling	Roof
	Wall	FA2-117-44, FA2-152-03, FA2-152-04, FA2-153-03 FA2-410-01, FA2-411-01, FA2-152-05, FA2-117-43 FA1-101-16, FA2-117-42, FA1-101-06, FA1-101-17 FA2-153-05, FA1-101-24, FA1-101-05, FA1-101-25 FA2-117-07, FA2-117-40, FA2-117-41

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 15 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-301-01	Ceiling	FA2-407-04
	Floor	FA2-202-01
	Wall	FA2-302-01, FA6-101-15, FA2-201-02
FA2-302-01	Ceiling	FA2-402-01
	Floor	FA2-202-01
	Wall	FA2-304-01, FA6-101-15, FA2-303-01, FA2-301-01 FA2-201-02, FA2-304-02
FA2-303-01	Ceiling	FA2-401-01
	Floor	FA2-201-01, FA2-202-01
	Wall	FA2-201-02, FA2-302-01, FA2-307-01, FA2-307-02
FA2-304-01	Ceiling	FA2-402-01, FA2-307-01
	Floor	FA2-304-02
	Wall	FA2-307-01, FA2-308-02, FA6-101-15, FA2-302-01
FA2-304-02	Ceiling	FA2-304-01
	Floor	FA2-202-01
	Wall	FA2-307-02, FA2-308-03, FA2-302-01, FA6-101-15 FA2-307-01
FA2-307-01	Ceiling	FA2-402-01, FA2-401-01
	Floor	FA2-307-02, FA2-308-02, FA2-304-01, FA2-203-01
	Wall	FA2-304-02, FA2-304-01, FA2-303-01, FA2-308-03 FA2-201-02, FA6-101-15, FA2-308-02
FA2-307-02	Ceiling	FA2-307-01
	Floor	FA2-201-01, FA2-202-01
	Wall	FA2-308-03, FA2-303-01, FA2-201-02, FA2-304-02
FA2-308-01	Ceiling	FA2-312-01, FA2-413-01, FA2-406-01
	Floor	FA2-308-03
	Wall	FA2-309-01, FA6-101-15, FA2-308-02, FA2-206-02 FA2-312-01
FA2-308-02	Ceiling	FA2-412-01, FA2-405-01, FA2-307-01
	Floor	FA2-308-03
	Wall	FA6-101-15, FA2-308-01, FA2-307-01, FA2-201-02 FA2-304-01
FA2-308-03	Ceiling	FA2-308-02, FA2-308-01
	Floor	FA2-205-01, FA2-202-01, FA2-201-01, FA2-203-01 FA2-204-01, FA2-206-01
	Wall	FA2-309-02, FA6-101-15, FA2-312-01, FA2-201-02 FA2-307-02, FA2-307-01, FA2-304-02, FA2-206-02 FA2-312-02

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 16 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-309-01	Ceiling	FA2-312-01, FA2-404-01
	Floor	FA2-309-02
	Wall	FA2-308-01, FA2-312-01, FA2-313-01, FA6-101-15
FA2-309-02	Ceiling	FA2-309-01
	Floor	FA2-205-01
	Wall	FA2-312-01, FA2-312-02, FA2-313-01, FA6-101-15 FA2-308-03
FA2-312-01	Ceiling	FA2-404-01, FA2-403-01
	Floor	FA2-308-01, FA2-204-01, FA2-309-01, FA2-312-02
	Wall	FA6-101-15, FA2-314-01, FA2-309-02, FA2-308-03 FA2-308-01, FA2-206-02, FA2-309-01
FA2-312-02	Ceiling	FA2-312-01
	Floor	FA2-205-01, FA2-206-01
	Wall	FA2-308-03, FA2-309-02, FA2-314-01, FA2-206-02
FA2-313-01	Ceiling	FA2-404-01
	Floor	FA2-205-01
	Wall	FA6-101-15, FA2-314-01, FA2-309-02, FA2-309-01 FA2-206-02, FA2-315-01
FA2-314-01	Ceiling	FA2-403-01
	Floor	FA2-205-01, FA2-206-01
	Wall	FA2-206-02, FA2-312-01, FA2-312-02, FA2-313-01
FA2-315-01	Ceiling	FA2-407-01
	Floor	FA2-205-01
	Wall	FA2-313-01, FA6-101-15, FA2-206-02
FA2-401-01	Ceiling	FA2-501-01, FA2-504-01, FA2-501-03
	Floor	FA2-303-01, FA2-307-01
	Wall	FA2-412-01, FA2-407-04, FA2-402-01, FA2-414-01
FA2-402-01	Ceiling	FA2-501-02
	Floor	FA2-302-01, FA2-304-01, FA2-307-01
	Wall	FA2-401-01, FA6-101-15, FA2-407-04, FA2-412-01 FA2-414-01
FA2-403-01	Ceiling	FA2-501-06, FA2-503-01, FA2-502-01, FA2-501-07
	Floor	FA2-314-01, FA2-312-01
	Wall	FA2-413-01, FA2-407-01, FA2-404-01, FA2-415-01
FA2-404-01	Ceiling	FA2-501-08
	Floor	FA2-309-01, FA2-312-01, FA2-313-01
	Wall	FA2-415-01, FA6-101-15, FA2-403-01, FA2-407-01 FA2-413-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 17 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-405-01	Ceiling	FA2-414-01
	Floor	FA2-308-02
	Wall	FA2-406-01, FA2-412-01, FA6-101-15
FA2-406-01	Ceiling	FA2-415-01
	Floor	FA2-308-01
	Wall	FA6-101-15, FA2-413-01, FA2-405-01
FA2-407-01	Ceiling	FA2-505-01, FA2-501-11, FA2-501-05,FA2-415-01
	Floor	FA2-152-06, FA2-206-02, FA2-315-01
	Wall	FA2-413-01, FA2-403-01, FA6-101-15, FA4-101-18 FA2-407-04, FA2-404-01, FA2-117-43, FA2-110-01 FA1-101-16, FA2-407-03, FA2-410-01
FA2-407-02	Ceiling	FA2-501-10
	Floor	FA2-117-22
	Wall	FA2-117-31, FA2-407-04, FA2-409-01
FA2-407-03	Ceiling	FA2-501-05
	Floor	FA2-117-18
	Wall	FA2-410-01, FA2-117-43, FA2-407-01
FA2-407-04	Ceiling	FA2-501-01, FA2-414-01
	Floor	FA2-151-06, FA2-201-02, FA2-301-01
	Wall	FA2-409-01, FA1-101-15, FA6-101-15, FA2-412-01
FA2-407-04	Wall	FA2-407-02, FA2-407-01, FA2-402-01, FA2-401-01 FA2-101-01, FA2-117-31
FA2-408-01	Ceiling	FA2-117-27, FA2-117-35
	Floor	FA2-120-07, FA2-153-05, FA2-117-27
	Wall	FA2-117-31, FA2-117-33, FA2-117-43, FA2-411-01 FA1-101-18, FA1-101-17, FA2-117-28
FA2-409-01	Ceiling	FA2-117-34
	Floor	FA2-151-05, FA2-151-06
	Wall	FA2-117-31, FA2-207-01, FA2-407-02, FA2-407-04 FA1-101-15
FA2-410-01	Ceiling	FA2-501-04, FA2-117-41, FA2-501-05
	Floor	FA2-152-05, FA2-152-06
	Wall	FA2-208-01, FA1-101-16, FA2-117-43, FA2-407-03 FA2-407-01
FA2-411-01	Ceiling	FA2-117-36, FA2-117-44, FA2-117-37, FA2-117-35 FA2-117-27, FA2-117-40
	Floor	FA2-117-24, FA2-153-05

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 18 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-411-01	Wall	FA2-117-29, FA2-117-28, FA1-101-17, FA2-117-43 FA2-208-01, FA2-408-01
FA2-412-01	Ceiling	FA2-414-01
	Floor	FA2-308-02
	Wall	FA2-401-01, FA6-101-15, FA2-413-01, FA2-402-01 FA2-405-01, FA2-407-04
FA2-413-01	Ceiling	FA2-415-01
	Floor	FA2-308-01
	Wall	FA6-101-15, FA2-407-01, FA2-406-01, FA2-404-01 FA2-403-01, FA2-412-01
FA2-414-01	Ceiling	FA2-501-01Roof
	Floor	FA2-412-01, FA2-504-01, FA2-501-03, FA2-501-01 FA2-405-01, FA2-407-04
	Wall	FA2-504-01, FA2-415-01, FA1-101-15, FA2-501-09 FA1-101-23, FA2-501-03, FA2-501-02, FA1-101-24 FA2-501-01, FA2-401-01, FA2-402-01, FA2-601-01
FA2-415-01	Ceiling	RoofFA2-501-11
	Floor	FA2-413-01, FA2-501-11, FA2-406-01, FA2-407-01
	Wall	FA2-501-11, FA2-501-08, FA2-501-06, FA2-414-01 FA2-404-01, FA2-403-01, FA1-101-24, FA1-101-16
FA2-501-01	Ceiling	FA2-414-01, FA2-501-09, FA2-601-01Roof
	Floor	FA2-401-01, FA2-407-04, FA2-414-01
	Wall	FA2-501-03, FA2-501-10, FA2-501-09, FA2-501-11 FA2-414-01, FA2-117-35, FA2-504-01, FA2-117-34 FA2-101-01, FA1-101-24, FA1-101-23, FA2-501-02
FA2-501-02	Ceiling	Roof
	Floor	FA2-402-01
	Wall	FA2-501-03, FA2-501-01, FA2-414-01, FA2-601-01
FA2-501-03	Ceiling	FA2-414-01, FA2-501-09, FA2-601-01
	Floor	FA2-401-01
	Wall	FA2-414-01, FA2-501-01, FA2-501-02, FA2-504-01
FA2-501-04	Ceiling	Roof
	Floor	FA2-410-01
	Wall	FA2-501-11, FA1-101-24, FA2-117-41, FA2-501-05
FA2-501-05	Ceiling	Roof
	Floor	FA2-117-43, FA2-407-01, FA2-407-03, FA2-410-01
	Wall	FA2-501-11, FA2-501-04, FA2-117-44, FA2-117-41 FA4-101-23

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 19 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-501-06	Ceiling	Roof
	Floor	FA2-403-01
	Wall	FA2-415-01, FA2-501-07, FA2-501-08, FA2-501-11 FA2-502-01
FA2-501-07	Ceiling	Roof,FA2-602-01
	Floor	FA2-403-01
	Wall	FA2-501-11, FA2-502-01, FA2-503-01, FA2-501-08 FA2-501-06
FA2-501-08	Ceiling	Roof
	Floor	FA2-404-01
	Wall	FA2-501-06, FA2-602-01, FA2-501-07, FA2-415-01 FA2-501-11
FA2-501-09	Ceiling	Roof
	Floor	FA2-501-01, FA2-504-01, FA2-501-10, FA2-501-03 FA2-117-35, FA2-117-34
	Wall	FA2-414-01, FA2-101-01, FA1-101-23, FA2-601-01 FA2-501-01
FA2-501-10	Ceiling	FA2-501-09
	Floor	FA2-407-02
	Wall	FA2-117-35, FA2-117-34, FA2-501-01
FA2-501-11	Ceiling	Roof,FA2-415-01, FA2-602-01, FA2-505-01
	Floor	FA2-407-01, FA2-415-01
	Wall	FA2-501-07, FA2-501-08, FA4-101-23, FA2-505-01 FA2-503-01, FA1-101-24, FA2-501-06, FA2-501-05 FA2-501-04, FA2-501-01, FA2-415-01, FA2-110-01 FA2-502-01
FA2-502-01	Ceiling	Roof
	Floor	FA2-403-01
	Wall	FA2-501-07, FA2-501-11, FA2-501-06, FA2-503-01
FA2-503-01	Ceiling	FA2-602-01, Roof
	Floor	FA2-403-01
	Wall	FA2-501-07, FA2-501-11, FA2-502-01
FA2-504-01	Ceiling	FA2-414-01, FA2-501-09, FA2-601-01
	Floor	FA2-401-01
	Wall	FA2-501-03, FA2-414-01, FA2-501-01
FA2-505-01	Ceiling	Roof
	Floor	FA2-407-01, FA2-501-11
	Wall	FA2-602-02, FA2-602-01, FA2-501-11, FA2-110-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 20 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA2-601-01	Ceiling	Roof
	Floor	FA2-501-01, FA2-501-03, FA2-504-01
	Wall	FA2-501-02, FA2-501-09, FA2-414-01
FA2-602-01	Ceiling	FA2-602-02
	Floor	FA2-501-11, FA2-503-01, FA2-501-07
	Wall	FA2-110-01, FA2-505-01, FA2-501-08
FA2-602-02	Ceiling	Roof
	Floor	FA2-602-01
	Wall	FA2-110-01, FA2-505-01
FA3-101-01	Ceiling	FA3-103-03, FA3-104-04
	Wall	FA7-101-01, FA3-106-01, FA3-104-03, FA2-111-01 FA2-102-01, FA2-101-01, FA3-102-01
FA3-102-01	Ceiling	FA3-104-03, FA3-103-03, FA3-104-04
	Wall	FA3-106-01, FA7-102-01, FA3-104-01, FA3-101-01 FA3-104-03, FA3-103-01
FA3-103-01	Ceiling	FA3-103-02, FA3-119-01, FA3-103-03, FA3-104-04
	Floor	FA3-104-1
	Wall	FA3-119-01, FA3-106-01, FA3-104-01, FA3-103-02 FA3-102-01, FA3-104-03
FA3-103-02	Ceiling	FA3-103-03, FA3-105-02
	Floor	FA3-106-01, FA3-103-01
	Wall	FA3-103-01, FA3-117-01, FA3-118-01, FA3-119-01 FA3-106-01, FA3-105-01
FA3-103-03	Ceiling	Roof
	Floor	FA3-101-01, FA3-106-01, FA3-103-02, FA3-102-01 FA3-103-01
	Wall	FA2-201-02, FA2-201-01, FA3-104-04, FA3-105-02 FA2-101-01
FA3-104-01	Ceiling	FA3-104-04, FA3-103-01, FA3-119-01
	Wall	FA3-119-01, FA3-106-01, FA3-103-01, FA3-102-01 FA3-105-01, FA3-104-02
FA3-104-02	Ceiling	FA3-105-01
	Wall	FA3-104-01, FA3-106-01, FA3-115-01
FA3-104-03	Ceiling	FA3-104-04
	Floor	FA3-102-01
	Wall	FA3-103-01, FA3-101-01, FA3-102-01
FA3-104-04	Ceiling	Roof

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 21 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA3-104-04	Floor	FA3-102-01, FA3-119-01, FA3-104-03, FA3-104-01 FA3-103-01, FA3-101-01
	Wall	FA2-202-01, FA2-201-02, FA2-201-01, FA3-105-02 FA2-102-01, FA6-101-04, FA6-101-15, FA3-103-03
FA3-105-01	Ceiling	FA3-105-02
	Floor	FA3-104-02, FA3-115-01
	Wall	FA3-119-01, FA3-117-01, FA3-103-02, FA3-104-01
FA3-105-02	Ceiling	Roof
	Floor	FA3-106-01, FA3-118-01, FA3-117-01, FA3-103-02 FA3-105-01
	Wall	FA3-104-04, FA3-103-03, FA3-106-01
FA3-106-01	Ceiling	FA3-103-02, FA3-103-03, FA3-105-02
	Floor	FA3-116-01, FA3-118-01
	Wall	FA3-116-01, FA3-115-01, FA3-107-01, FA3-105-02 FA3-104-01
FA3-106-01	Wall	FA3-103-02, FA3-103-01, FA2-111-01, FA3-102-01 FA3-101-01, FA3-104-02, FA3-118-01
FA3-107-01		FA3-106-01
FA3-108-01	Ceiling	FA3-111-03, FA3-109-03, FA3-111-04
	Wall	FA7-103-01, FA3-112-01, FA3-111-03, FA3-110-01 FA3-109-01, FA3-111-01
FA3-109-01	Ceiling	FA3-124-01, FA3-109-02, FA3-109-03, FA3-111-04
	Floor	FA3-111-01
	Wall	FA3-112-01, FA3-111-01, FA3-108-01, FA3-109-02 FA3-124-01, FA3-111-03
FA3-109-02	Ceiling	FA3-113-02, FA3-109-03
	Floor	FA3-109-01, FA3-112-01
	Wall	FA3-124-01, FA3-122-01, FA3-113-01, FA3-112-01 FA3-109-01, FA3-123-01
FA3-109-03	Ceiling	FA3-114-01, Roof
	Floor	FA3-112-01, FA3-108-01, FA3-109-01, FA3-109-02 FA3-110-01
	Wall	FA4-101-10, FA4-101-05, FA4-101-04, FA3-111-04 FA2-206-01, FA2-110-01, FA3-113-02, FA3-114-01
FA3-110-01	Ceiling	FA3-109-03, FA3-111-04
	Wall	FA7-104-01, FA3-112-01, FA3-108-01, FA2-112-01 FA2-110-01, FA2-108-01, FA3-111-03

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 22 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA3-111-01	Ceiling	FA3-111-04, FA3-124-01, FA3-109-01
	Wall	FA3-112-01, FA3-113-01, FA3-111-02, FA3-109-01 FA3-108-01, FA3-124-01
FA3-111-02	Ceiling	FA3-113-01
	Wall	FA3-111-01, FA3-112-01, FA3-121-01
FA3-111-03	Ceiling	FA3-111-04
	Floor	FA3-108-01
	Wall	FA3-110-01, FA3-108-01, FA3-109-01
FA3-111-04	Ceiling	Roof, FA3-114-01
	Floor	FA3-111-01, FA3-110-01, FA3-124-01, FA3-109-01 FA3-108-01, FA3-111-03
	Wall	FA2-206-01, FA3-109-03, FA3-113-02, FA3-114-01 FA6-101-04, FA6-101-15, FA2-108-01
FA3-112-01	Ceiling	FA3-109-03, FA3-109-02, Roof, FA3-113-02
	Floor	FA3-122-01, FA3-120-01
	Wall	FA4-101-01, FA3-120-01, FA3-121-01, FA4-101-22 FA3-111-02, FA3-111-01, FA3-113-02, FA3-110-01 FA3-109-02, FA3-109-01, FA3-108-01, FA2-112-01 FA3-122-01
FA3-113-01	Ceiling	FA3-113-02
	Floor	FA3-111-02, FA3-121-01
	Wall	FA3-124-01, FA3-123-01, FA3-109-02, FA3-111-01
FA3-113-02	Ceiling	Roof
	Floor	FA3-113-01, FA3-122-01, FA3-123-01, FA3-112-01 FA3-109-02
	Wall	FA3-111-04, FA3-109-03, FA4-101-09, FA4-101-10 FA4-101-22, FA4-101-04, FA3-112-01
FA3-114-01	Ceiling	Roof
	Floor	FA3-109-03, FA3-111-04
	Wall	FA3-109-03, FA2-206-02, FA2-110-01, FA4-101-10 FA6-101-04, FA6-101-15, FA3-111-04
FA3-115-01	Ceiling	FA3-105-01, FA3-117-01
	Wall	FA3-104-02, FA3-106-01, FA3-116-01
FA3-116-01	Ceiling	FA3-106-01, FA3-118-01
	Wall	FA3-106-01, FA3-115-01
FA3-117-01	Ceiling	FA3-105-02
	Floor	FA3-115-01
	Wall	FA3-103-02, FA3-105-01, FA3-118-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 23 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA3-118-01	Ceiling	FA3-106-01, FA3-105-02
	Floor	FA3-116-01
	Wall	FA3-117-01, FA3-103-02, FA3-106-01
FA3-119-01	Ceiling	FA3-104-04
	Floor	FA3-103-01, FA3-104-01
	Wall	FA3-105-01, FA3-103-01, FA3-103-02, FA3-104-01
FA3-120-01	Ceiling	FA3-122-01, FA3-112-01
	Wall	FA3-121-01, FA4-101-01, FA4-101-22, FA3-112-01
FA3-121-01	Ceiling	FA3-123-01, FA3-113-01
	Wall	FA3-120-01, FA3-112-01, FA3-111-02
FA3-122-01	Ceiling	FA3-112-01, FA3-113-02
	Floor	FA3-120-01
	Wall	FA3-112-01, FA3-123-01, FA3-109-02
FA3-123-01	Ceiling	FA3-113-02
	Floor	FA3-121-01
	Wall	FA3-122-01, FA3-113-01, FA3-109-02
FA3-124-01	Ceiling	FA3-111-04
	Floor	FA3-109-01, FA3-111-01
	Wall	FA3-113-01, FA3-111-01, FA3-109-02, FA3-109-01
FA4-101-01	Ceiling	FA4-101-21, FA4-101-04
	Wall	FA4-101-03, FA4-101-16, FA4-101-14, FA4-101-04 FA5-101-01, FA2-115-03, FA3-120-01, FA3-112-01 FA2-153-02, FA2-124-01, FA2-116-03, FA4-101-22 FA4-101-02
FA4-101-02	Ceiling	Roof
	Wall	FA4-101-13, FA4-101-15, FA4-101-18, FA4-101-04 FA4-101-24, FA2-117-43, FA4-101-20, FA4-101-01 FA2-117-44, FA2-117-42, FA2-117-17, FA2-117-07 FA2-116-03, FA2-153-02
FA4-101-03	Ceiling	FA4-101-17
	Wall	FA2-117-07, FA4-101-04, FA4-101-01, FA2-117-05 FA2-117-01, FA2-119-01, FA2-118-01
FA4-101-04	Ceiling	FA4-101-11, FA4-101-20, FA4-101-16, FA4-101-15 FA4-101-14, FA4-101-12, FA4-101-10, FA4-101-08 FA4-101-07, FA4-101-06, FA4-101-13, FA4-101-05
	Floor	FA4-101-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 24 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA4-101-04	Wall	FA2-117-17, FA5-101-01, FA4-101-22, FA4-101-17 FA4-101-16, FA2-152-03, FA4-101-03, FA2-152-04 FA3-109-03, FA3-113-02, FA4-101-01, FA4-101-02 FA4-101-15, FA2-117-07
FA4-101-05	Ceiling	Roof
	Floor	FA4-101-04
	Wall	FA4-101-10, FA4-101-18, FA4-101-23
FA4-101-05	Wall	FA3-109-03
FA4-101-06	Ceiling	FA4-101-18
	Floor	FA4-101-04
	Wall	FA4-101-10, FA4-101-07, FA4-101-13, FA4-101-08
FA4-101-07	Ceiling	FA4-101-18
	Floor	FA4-101-04
	Wall	FA4-101-06, FA4-101-08, FA4-101-10
FA4-101-08	Ceiling	FA4-101-18
	Floor	FA4-101-04
	Wall	FA4-101-06, FA4-101-07, FA4-101-10
FA4-101-09	Ceiling	FA4-101-18, FA4-101-19
	Floor	FA4-101-22
	Wall	FA5-101-01, FA3-113-02, FA4-101-10
FA4-101-10	Ceiling	FA4-101-19, FA4-101-18
	Floor	FA4-101-22, FA4-101-04
	Wall	FA2-153-05, FA4-101-09, FA4-101-16, FA4-101-14 FA4-101-13, FA4-101-12, FA4-101-11 FA4-101-08 FA4-101-07, FA4-101-06, FA4-101-05, FA3-114-01 FA3-113-02, FA2-206-02, FA2-117-42, FA5-101-01 FA3-109-03
FA4-101-11	Ceiling	FA4-101-18
	Floor	FA4-101-22, FA4-101-04
	Wall	FA4-101-12, FA5-101-01, FA5-101-02, FA4-101-10
FA4-101-12	Ceiling	FA4-101-18
	Floor	FA4-101-04, FA4-101-22
	Wall	FA5-101-02, FA5-101-01, FA4-101-11, FA4-101-10 FA4-101-14
FA4-101-13	Ceiling	FA4-101-18
	Floor	FA4-101-04
	Wall	FA4-101-10, FA4-101-06, FA2-117-42, FA2-153-05 FA4-101-02, FA4-101-15

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 25 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA4-101-14	Ceiling	FA4-101-18
	Floor	FA4-101-04
	Wall	FA5-101-01, FA4-101-01, FA4-101-10, FA4-101-12 FA4-101-16
FA4-101-15	Ceiling	FA4-101-20
	Floor	FA4-101-04
	Wall	FA4-101-17, FA4-101-16, FA4-101-13, FA4-101-04 FA2-117-42, FA4-101-02
FA4-101-16	Ceiling	FA4-101-21
	Floor	FA4-101-04
	Wall	FA4-101-15, FA4-101-01, FA4-101-14, FA4-101-04 FA4-101-10
FA4-101-17	Ceiling	FA4-101-20
	Floor	FA4-101-03
	Wall	FA4-101-04, FA2-119-01, FA2-118-01, FA2-117-42 FA4-101-15
FA4-101-18	Ceiling	FA4-101-24, FA4-101-23, Roof
	Floor	FA4-101-10, FA4-101-14, FA4-101-13, FA4-101-11 FA4-101-08, FA4-101-07, FA4-101-06, FA4-101-09 FA4-101-12
	Wall	FA2-117-43, FA4-101-05, FA4-101-02, FA4-101-19 FA4-101-20, FA4-101-21, FA2-407-01
FA4-101-19	Ceiling	Roof
	Floor	FA4-101-10, FA4-101-09
	Wall	FA4-101-18
FA4-101-20	Ceiling	Roof, FA4-101-24
	Floor	FA4-101-15, FA4-101-04, FA4-101-17
	Wall	FA4-101-18, FA4-101-02, FA2-117-43, FA2-119-01 FA2-118-01, FA4-101-21
FA4-101-21	Ceiling	Roof
	Floor	FA4-101-01, FA4-101-16
	Wall	FA4-101-18, FA4-101-20
FA4-101-22	Ceiling	FA4-101-12, FA4-101-11, FA4-101-10, FA4-101-09
	Wall	FA5-101-01, FA4-101-01, FA3-120-01, FA3-112-01 FA3-113-02, FA4-101-04
FA4-101-23	Ceiling	Roof
	Floor	FA4-101-18
	Wall	FA2-501-05, FA2-501-11, FA4-101-05, FA2-117-44

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 26 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA4-101-24	Ceiling	Roof
	Floor	FA4-101-20, FA4-101-18
	Wall	FA4-101-02, FA2-119-01, FA2-117-44, FA2-118-01
FA5-101-01	Ceiling	Roof, FA5-101-02
	Wall	FA4-101-12, FA4-101-14, FA4-101-22, FA5-101-02 FA4-101-10, FA4-101-09, FA4-101-04, FA4-101-01 FA4-101-11
FA5-101-02	Ceiling	Roof
	Floor	FA5-101-01
	Wall	FA5-101-01, FA4-101-12, FA4-101-11
FA6-101-01	Ceiling	FA6-101-07, FA6-101-08, FA6-101-12, FA6-101-02
FA6-101-02		FA6-101-13, FA6-101-16
	Floor	FA6-101-01
	Wall	FA6-101-07, FA6-101-15, FA6-101-12, FA6-101-06 FA6-101-05, FA6-101-04, FA6-101-03, FA6-101-11 FA6-101-08
FA6-101-03	Ceiling	FA6-101-14
	Wall	FA6-101-10, FA6-101-09, FA6-101-07, FA6-101-04 FA6-101-02, FA6-101-15
FA6-101-04	Ceiling	FA6-101-15
	Floor	FA7-103-01, FA7-102-01, FA7-101-01, FA7-104-01
	Wall	FA3-111-04, FA6-101-03, FA6-101-02, FA3-114-01 FA2-206-01, FA2-205-01, FA2-204-01, FA2-203-01 FA2-202-01, FA2-201-01, FA2-108-01, FA2-102-01 FA6-101-07, FA3-104-04
FA6-101-05	Ceiling	Roof
	Wall	FA6-101-02, FA6-101-22, FA6-101-19, FA6-101-13 FA6-101-17
FA6-101-06	Ceiling	Roof
	Wall	FA6-101-02, FA6-101-13, FA6-101-17, FA6-101-19 FA6-101-23
FA6-101-07	Ceiling	Roof
	Floor	FA6-101-01
	Wall	FA6-101-03, FA6-101-04, FA6-101-08, FA6-101-13 FA6-101-14, FA6-101-15, FA6-101-17, FA6-101-19 FA6-101-02
FA6-101-08	Ceiling	Roof
	Floor	FA6-101-01

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 27 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA6-101-08	Wall	FA6-101-19, FA6-101-17, FA6-101-13, FA6-101-02 FA6-101-07
FA6-101-09	Ceiling	Roof
	Wall	FA6-101-03, FA6-101-14, FA6-101-18
FA6-101-10	Ceiling	Roof
	Wall	FA6-101-14, FA6-101-03
FA6-101-11	Ceiling	Roof
	Wall	FA6-101-02, FA6-101-13, FA6-101-17, FA6-101-19
FA6-101-12	Ceiling	FA6-101-13
	Floor	FA6-101-01
	Wall	FA6-101-02
FA6-101-13	Ceiling	FA6-101-17
	Floor	FA6-101-12, FA6-101-02
	Wall	FA6-101-06, FA6-101-16, FA6-101-15, FA6-101-14 FA6-101-11, FA6-101-07, FA6-101-05, FA6-101-08
FA6-101-14	Ceiling	FA6-101-18, Roof
	Floor	FA6-101-03
	Wall	FA6-101-15, FA6-101-07, FA6-101-09, FA6-101-13 FA6-101-10
FA6-101-15	Ceiling	Roof
	Floor	FA6-101-04
	Wall	FA6-101-02, FA2-407-01, FA2-407-04, FA2-412-01 FA2-413-01, FA3-104-04, FA2-308-03, FA3-114-01 FA6-101-03, FA6-101-07, FA6-101-13, FA6-101-14 FA6-101-16, FA2-406-01, FA3-111-04, FA2-302-01 FA2-405-01, FA2-309-02, FA2-201-02, FA2-301-01 FA2-304-01, FA2-304-02, FA2-307-01, FA2-402-01 FA2-308-02, FA2-309-01, FA2-312-01, FA2-313-01 FA2-404-01, FA2-315-01, FA2-308-01, FA2-206-02
FA6-101-16	Ceiling	FA6-101-17
	Floor	FA6-101-02
	Wall	FA6-101-15, FA6-101-13
FA6-101-17	Ceiling	Roof, FA6-101-21, FA6-101-20, FA6-101-19
	Floor	FA6-101-13, FA6-101-16
	Wall	FA6-101-11, FA6-101-08, FA6-101-07, FA6-101-05 FA6-101-06
FA6-101-18	Ceiling	Roof
	Floor	FA6-101-14

Table 9A-3 Fire Zone/Fire Area Interfaces (Sheet 28 of 28)

Fire Zone	Interface	Adjacent Fire Zones
FA6-101-18	Wall	FA6-101-09
FA6-101-19	Ceiling	FA6-101-22, FA6-101-23
	Floor	FA6-101-20, FA6-101-21, FA6-101-17
	Wall	FA6-101-21, FA6-101-07, FA6-101-08, FA6-101-06 FA6-101-05, FA6-101-20, FA6-101-11
FA6-101-20	Ceiling	FA6-101-19
	Floor	FA6-101-17
	Wall	FA6-101-19
FA6-101-21	Ceiling	FA6-101-19
	Floor	FA6-101-17
	Wall	FA6-101-19
FA6-101-22	Ceiling	Roof
	Floor	FA6-101-19
	Wall	FA6-101-05
FA6-101-23	Ceiling	Roof
	Floor	FA6-101-19
	Wall	FA6-101-06
FA7-101-01	Ceiling	FA6-101-04
	Wall	FA7-102-01, FA2-104-01, FA3-101-01
FA7-102-01	Ceiling	FA6-101-04
	Wall	FA2-105-01, FA3-102-01, FA7-101-01, FA7-103-01
FA7-103-01	Ceiling	FA6-101-04
	Wall	FA7-104-01, FA7-102-01, FA2-106-01, FA3-108-01
FA7-104-01	Ceiling	FA6-101-04
	Wall	FA7-103-01, FA2-107-01, FA3-110-01

Fire Zone/Fire Area Figures

Figures 9A-1 through 9A-27 follow and depict the fire zones and fire area boundaries for the basic US-APWR plant. The following legend applies for these figures.

LEGEND

FIRE AREA BOUNDARY
[3 HOUR FIRE BARRIER WITH 3 HOUR FIRE DOORS]
[Except Exterior Walls]

FIRE Zone

NUMBER (∗1)

FIRE AREA NUMBER

NUMBER (∗2)

FIRE Zone NUMBER

(∗1)
FIRE AREA NUMBER is shown as follows.

FA ○－■××
○ : **Building Number**
1 : C/V
2 : R/B
3 : PS/B
4 : A/B
5 : AC/B
6 : T/B
7 : O/B

(∗2)
FIRE Zone NUMBER is shown as follows.
FIRE AREA NUMBER－××

(SRI)

Figure 9A-1 Fire Zones and Fire Areas R/B (B1F)

(SRI)

Figure 9A-2 Fire Zones and Fire Areas R/B (B1MF)

Figure 9A-3 Fire Zones and Fire Areas R/B (1F)

(SRI)

(SRI)

Figure 9A-4 Fire Zones and Fire Areas R/B (1MF)

(SRI)

Figure 9A-5 Fire Zones and Fire Areas R/B (2F)

(SRI)

Figure 9A-6 Fire Zones and Fire Areas R/B (2MF)

(SRI)

Figure 9A-7 Fire Zones and Fire Areas R/B (3F)

(SRI)

Figure 9A-8 Fire Zones and Fire Areas R/B (4F)

Figure 9A-9 Fire Zones and Fire Areas R/B (Roof)

(SRI)

(SRI)

Figure 9A-10 Fire Zones and Fire Areas R/B (Roof)

(SRI)

Figure 9A-11 Fire Zones and Fire Areas PS/B (B1F, B1MF)

(SRI)

Figure 9A-12 Fire Zones and Fire Areas PS/B (1F, 1MF, Roof)

(SRI)

Figure 9A-13 Fire Zones and Fire Areas A/B (B1F)

Figure 9A-14 Fire Zones and Fire Areas A/B (1F)

(SRI)

(SRI)

Figure 9A-15 Fire Zones and Fire Areas A/B (2F)

(SRI)

Figure 9A-16 Fire Zones and Fire Areas A/B (3F)

(SRI)

Figure 9A-17 Fire Zones and Fire Areas A/B (Roof)

(SRI)

Figure 9A-18 Fire Zones and Fire Areas AC/B (B1F, B1MF, 1F)

Figure 9A-19 Fire Zones and Fire Areas AC/B (1MF, 2F, Roof)

(SRI)

(SRI)

Figure 9A-20 Fire Zones and Fire Areas T/B (B1F)

(SRI)

Figure 9A-21 Fire Zones and Fire Areas T/B (1F)

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Figure 9A-22 Fire Zones and Fire Areas T/B (2F)

(SRI)

(SRI)

Figure 9A-23 Fire Zones and Fire Areas T/B (3F)

(SRI)

Figure 9A-24 Fire Zones and Fire Areas T/B (4F)

(SRI)

Figure 9A-25 Fire Zones and Fire Areas T/B (5F)

Figure 9A-26 Fire Zones and Fire Areas T/B (Roof)

(SRI)

(SRI)

Figure 9A-27 Fire Zones and Fire Areas ESW Piping Tunnel