FINAL SAFETY ANALYSIS REPORT

CHAPTER 9

AUXILIARY SYSTEMS

9.0 AUXILIARY SYSTEMS

This chapter of the U.S. EPR Final Safety Analysis Report (FSAR) is incorporated by reference with supplements and departures as identified in the following sections.

9.1 FUEL STORAGE AND HANDLING

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

9.1.1 Criticality Safety of New and Spent Fuel Storage and Handling

No departures or supplements.

9.1.2 New and Spent Fuel Storage

No departures or supplements.

9.1.3 Spent Fuel Pool Cooling and Purification System

No departures or supplements.

9.1.4 Fuel Handling System

The U.S. EPR FSAR included the following COL Item in Section 9.1.4:

> A COL applicant that references the U.S. EPR design certification will perform appropriate tests and analyses, which demonstrate that an identified NRC-approved cask can be safely connected to the spent fuel cask transfer facility (SFCTF), and the cask and its adapter meet the criteria specified in Table 9.1.4-1, prior to initial fuel loading into the reactor.

The COL Item is addressed with the following two-step approach:

> Before initial fuel loading into the reactor, the licensee shall perform an appropriate test and analysis that demonstrates that an identified NRC-approved cask can be safely connected to the SFCTF, and the cask and its adapter meet the criteria specified in U.S. EPR FSAR Table 9.1.4-1. Before initial fuel loading into the reactor, the licensee shall submit a report documenting the test and analysis required above and the results obtained, to the Director of the Office of New Reactors or the Director's designee.
>
> The licensee shall not use the SFCTF for initial cask loading operations until the licensee performs the tests identified below, verifies that the results of the tests fall within the acceptance criteria and submits a report to the Director of the Office of New Reactors or the Director's designee.
>
> The tests are:
>
> - Verify the penetration leak tightness with loading pit filled with water.
> - Verify the cask loading sequence and the sequential interlocking with the actual cask and a dummy assembly under water.

9.1.5 Overhead Heavy Load Handling System

No departures or supplements.

9.1.5.1 Design Basis

No departures or supplements.

9.1.5.2 System Description

9.1.5.2.1 General Description

No departures or supplements.

9.1.5.2.2 Reactor Building Polar Crane

No departures or supplements.

9.1.5.2.3 Fuel Building Auxiliary Crane

No departures or supplements.

9.1.5.2.4 Other Overhead Load Handling Systems

No departures or supplements.

9.1.5.2.5 System Operation

The U. S. EPR FSAR includes the following COL Item in Section 9.1.5.2.5:

> A COL applicant that references the U.S. EPR design certification will provide site-specific information on the heavy load handling program, including a commitment to procedures for heavy load lifts in the vicinity of irradiated fuel or safe shutdown equipment, and crane operator training and qualification.

This COL Item is addressed as follows:

Procedures

Administrative procedures to control heavy loads shall be developed prior to fuel load to allow sufficient time for plant staff familiarization, to allow NRC staff adequate time to review the procedures, and to develop operator licensing examinations. Heavy loads handling procedures address the following:

- ♦ Identification of any heavy loads and heavy load handling equipment outside the scope of loads described in the U.S. EPR FSAR and the associated heavy load attributes (load weight and typical load path).
- ♦ Equipment identification.
- ♦ Required equipment inspections and acceptance criteria prior to performing lift and movement operations.
- ♦ Approved safe load paths and exclusion areas.
- ♦ Safety precautions and limitations.
- ♦ Special tools, rigging hardware, and equipment required for the heavy load lift.

- Rigging arrangement for the load.
- Adequate job steps and proper sequence for handling the load.

Safe load paths are defined for movement of heavy loads to minimize the potential for a load drop on irradiated fuel in the reactor vessel or spent fuel pool or on safe shutdown equipment. Paths are defined in procedures and equipment layout drawings. Safe load path procedures address the following general requirements.

- When heavy loads must be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will limit the height of the load and the time the load is carried.
- When heavy loads could be carried (i.e., no physical means to prevent) but are not required to be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will define an area over which loads shall not be carried so that if the load is dropped, it will not result in damage to spent fuel or operable safe shutdown equipment or compromise reactor vessel integrity.
- Where intervening structures are shown to provide protection, no load travel path is required.
- Defined safe load paths will follow, to the extent practical, structural floor members.
- When heavy loads movement is restricted by design or operational limitation, no safe load path is required.
- Supervision is present during heavy load lifts to enforce procedural requirements.

Inspection and Testing

Cranes addressed in U.S. EPR FSAR Section 9.1.5 are inspected, tested, and maintained in accordance with ASME B30.2 (ASME, 2005). Prior to making a heavy load lift, an inspection of the crane is made in accordance with the above applicable standards.

Training and Qualification

Training and qualification of operators of cranes addressed in U.S. EPR FSAR Section 9.1.5 meet the requirements of ASME B30.2 (ASME, 2005), and include the following:

- Knowledge testing of the crane to be operated in accordance with the applicable ANSI crane standard.
- Practical testing for the type of crane to be operated.
- Supervisor signatory authority on the practical operating examination.
- Applicable physical requirements for crane operators as defined in the applicable crane standard.

Quality Assurance

Procedures for control of heavy loads are developed in accordance with Section 13.5. In accordance with Section 17.5, other specific quality program controls are applied to the heavy loads handling program, targeted at those characteristics or critical attributes that render the equipment a significant contributor to plant safety.

9.1.5.3 Safety Evaluation

No departures or supplements.

9.1.5.4 Inspection and Testing Requirements

No departures or supplements.

9.1.5.5 Instrumentation Requirements

No departures or supplements.

9.1.5.6 References

{**ASME, 2005.** Overhead and Gantry Cranes – Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist, ASME B30.2, American Society of Mechanical Engineers, 2005.}

9.2 WATER SYSTEMS

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

9.2.1 Essential Service Water System

No departures or supplements.

9.2.1.1 Design Bases

The ESW System is designed to permit periodic inspection of components necessary to maintain the integrity and capability of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 45.

{The ESW basin external access piping allows water to be drawn from the basin with a portable pump. The ESW basin external access piping is shown schematically in Figure 9.2-10 and Figure 9.2-11 provides a plan and section view of the ESW basin external access piping and valves.}

9.2.1.2 System Description

{This section of the U.S. EPR is incorporated by reference with the following supplements. The ESWS interfaces the UHS Makeup Water System through the Post-DBA UHS Makeup Keep-Fill Line. The Post-DBA UHS Makeup Water Keep-Fill line provides makeup water to the UHS Makeup Water System through a safety-related manual isolation valve, safety-related check valve, and a safety-related flow restriction orifice.}

9.2.1.3 Component Description

9.2.1.3.1 Safety-Related Essential Service Water Pumps

No departures or supplements.

9.2.1.3.2 Dedicated Essential Service Water Pumps

No departures or supplements.

9.2.1.3.3 Debris Filters - Safety Divisions

No departures or supplements.

9.2.1.3.4 Debris Filter - Dedicated Division

No departures or supplements.

9.2.1.3.5 Piping, Valves, and Fittings

The U.S. EPR includes the following COL item in Section 9.2.1.3.5:

> A COL applicant that references the U.S. EPR design certification will provide a description of materials that will be used for the essential service water system (ESWS) at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.

This COL item is addressed as follows:

{The ESWS piping, valves and fittings are made of carbon steel. This is compatible with the water chemistry in the UHS tower basin. Buried piping is coated and wrapped and provided with appropriate cathodic protection. The Cathodic Protection (CP) system for underground pipe is described in Section 8.3.1.1.15. The UHS cooling towers are constructed of reinforced concrete, tower fill is constructed of ceramic tile, spray piping and nozzles are fabricated of corrosion resistant materials (e.g., stainless steel, bronze), and the cooling tower basin is made of concrete. Appropriate chemical treatment as described in Section 9.2.5.2.4, is used to maintain the quality of water in the basin at an acceptable level to reduce corrosion, scaling etc, of ESWS components during normal operation.

Under normal operation, the ESWS is exposed to desalinated water treated with corrosion inhibitors. During post DBA scenario, the ESWS may be exposed to brackish water if the nonsafety-related source of desalinated water is unavailable from 72 hours to 30 days after the DBA.

Above ground ESWS piping, valves and fittings are made of bare carbon steel (internally) having 0.250 inches corrosion allowance.

Plain carbon steel used for above ground piping (i.e., uncoated) exposed to the desalinated ESWS water quality with corrosion inhibitors, during normal operating conditions, is expected to have a uniform corrosion rate of approximately 0.004 inches/year or less. Over a period of 60 years this will result in a loss of approximately 0.24 inches of wall thickness or less. During the 30-day DBA scenario, assuming a maximum uniform corrosion rate of approximately 0.025 inches/year, the expected loss of wall thickness is approximately 0.002 inches. Therefore, the total loss of wall thickness due to internal corrosion of plain carbon steel is approximately 0.242 inches or less. The selection of carbon steel wall thickness includes additional allowance for corrosion.

The buried portion of 10" diameter ESW system piping and fittings is constructed of carbon steel with 2-layer fusion bonded epoxy internal lining, per the recommendation of ANSI/AWWA C213, and installed with a qualified installation program. The buried portion of 30" diameter ESW system piping and fittings is constructed of carbon steel internally lined with mortar using Type II cement per ASTM C 150, per the recommendation of ANSI/AWWA C205, and installed with a qualified installation program. For both 10" and 30" diameter ESW piping, appropriate external coating (e.g. epoxy) is also used to protect from external corrosion. Additionally, exterior surfaces of both 10" and 30" diameter buried piping exposed to soil shall be cathodically protected.

The buried piping with appropriate internal lining (e.g. 2-layer fusion-bonded epoxy, Type II cement) that is exposed to normal operating condition desalinated ESWS water quality, with corrosion inhibitors in the buried piping is not expected to have any detrimental corrosive effects on the ESWS over the 60 year design life. Appropriate internal lining (e.g. 2-layer fusion-bonded epoxy, Type II cement) exposed to the Chesapeake Bay water quality during the 30-day DBA scenario is not expected to have any detrimental effects, even without the chemical treatment.

The ESW basin external access piping isolation valve 30PEB15/25/35/45 AA001 is closed during normal operations. This valve is opened manually to allow water to be drawn from an ESW basin, not performing its safety related function. A normally open vent valve 30PEB15/25/35/45 AA501 is provided at the high point of the ESW basin external access piping to ensure that water cannot be inadvertently siphoned from the basin. This vent valve is closed prior to ESW basin external access piping use or for testing. A normally operated drain valve 30PEB15/25/35/45 AA401 is provided in the low point of the piping external to the basin, upstream of the ESW basin external access piping isolation valve, to drain the piping after use. The drain valve is closed prior to ESW basin external access piping use or for testing. The piping and valves associated with the ESW basin external access piping are constructed of stainless steel.}

9.2.1.4 Operation

No departures or supplements.

9.2.1.5 Safety Evaluation

No departures or supplements.

9.2.1.6 Inspection and Testing Requirements

{Inservice inspection of the ESW System including piping, valves, pumps and components is performed as identified in Section 6.6, in accordance with the requirements of ASME Section XI and ASME OM Code. The installation and design of the ESW System provides accessibility, as described in Section 6.6.2, for the performance of periodic inservice inspection. The frequency of inservice inspection, via flow or pressure tests, for buried piping segments is described in Section 6.6.4, to ensure system integrity beyond the ASME Section XI code requirement.

Periodic inspection requirements of interior lining of the buried 30" diameter and 10" diameter piping will be part of an appropriate plant inspection program.}

9.2.1.7 Instrumentation Requirements

No departures or supplements.

9.2.1.8 References

{NRC, 1976. Ultimate Heat Sink for Nuclear Power Plants (for Comment), Regulatory Guide 1.27, Revision 2, U. S. Nuclear Regulatory Commission, January 1976.}

9.2.2 Component Cooling Water System

No departures or supplements.

9.2.3 Demineralized Water Distribution System

No departures or supplements.

9.2.4 Potable and Sanitary Water Systems (PSWS)

{The U.S. EPR FSAR describes the Potable and Sanitary Water System as a single system. While the function will remain the same, CCNPP Unit 3 classifies the system as two systems: the Potable Water System; and the Sanitary Waste Water System.

The Potable Water System delivers drinking quality water to various points throughout the plant, to individual components and for use as process water in other systems. Potable water is used for human consumption, sanitation and cleaning, and other domestic and process purposes inside the Nuclear Island (NI) and the Conventional Island (CI).

The Sanitary Waste Water System collects water discharged from water closets, urinals, showers, sinks and other sources of sanitary water and, with the exception of that from sources within the radiologically controlled area (RCA), directs it via the domestic waste water collection system through the sewage treatment plant for processing. The sanitary water from sources within the RCA is directed to the Liquid Radwaste System by the NI vents and drains system.

9.2.4.1 Design Basis

The Potable Water System supplies potable water for human consumption, cleaning and other domestic purposes, plus process water to other systems, during periods of normal operation, shutdown, maintenance and construction. The Potable Water System provides potable water at a flow rate sufficient to meet demand and keep potable water pressure above connected equipment's or systems' pressures. Potable water supplied to, and equipment provided for, emergency eyewash stations and emergency showers complies with the requirements of ANSI Z358.1, Emergency Eyewash and Shower Equipment (ANSI, 2004).

The Sanitary Waste Water System conveys sanitary wastes from their point of origin, and provides necessary treatment of the non-radiologically contaminated waste water, during periods of normal operation, shutdown, maintenance and construction. Where piping for the Sanitary Waste Water System is buried, provisions are made to assure adequate separation from Potable Water System piping. Where local conditions prevent this separation, controls on layout and installation provide similar assurance of protection of potable water from contamination.

9.2.4.2 System Description

9.2.4.2.1 General Description

The U.S. EPR FSAR includes the following COL Item in Section 9.2.4.2.1:

> A COL applicant that references the U.S. EPR design certification will provide site-specific details related to the sources and treatment of makeup to the PSWS along with a simplified piping and instrumentation diagram.

This COL Item is addressed as follows:

{Potable Water System

The Potable Water System is shown schematically in Figure 9.2-1. It provides potable-grade water throughout the plant, for human consumption, cleaning and sanitation, and other domestic and selected process purposes. The Potable Water System supplies water that meets the requirements of local, state and federal codes and specifications regarding potability. The system is designed to satisfy peak anticipated demand for potable water, including hot water, during all phases of plant operation.

The Potable Water System consists of treatment of incoming water from the desalinization plant for potability, a potable water storage tank, pressure maintenance pumps, distribution piping and valves, water heaters, and electrical components and instrumentation for system monitoring, operation and control.

Clean water is supplied to the system from the desalinization plant, with the water passing through physical and/or chemical treatment to ensure its potability prior to its entry into the potable water storage tank (or the system if the storage tank is being bypassed). The potability treatment can be bypassed for maintenance, provided appropriate condition of the supply/makeup water from the desalinization plant is confirmed.

Sanitary Waste Water System

The Sanitary Waste Water System is shown schematically in Figure 9.2-2.

Sanitary waste water or sanitary water is the term applied to the drainage from water closets, urinals, showers, bathroom/washroom sinks, kitchen and janitorial sinks, clothes washing and dish washing machines. Sanitary waste loading usually includes biological waste (including fecal matter), soaps, cooking grease and food scraps. However, at the CCNPP Unit 3, the sanitary waste stream is processed in two different ways depending on the source, due to differing contaminants.

The following locations within the NI have sanitary waste streams that have the potential to contain radioactive material. However, because these particular waste streams do not contain biological waste, cooking grease or food scraps, it is acceptable to collect them in the NI vents and drains system and direct them to the Liquid Waste Management System for processing as potentially radioactive waste:

- Personnel decon showers and decon sinks in the Access Building.
- Contaminated laundry facility in the Radioactive Waste Processing Building.

U.S. EPR FSAR Section 9.3.3 provides a discussion of the NI vents and drains system. The Liquid Waste Management System is discussed in U.S. EPR FSAR Section 11.2.

The following locations within the NI have sanitary waste water streams that are directed to the Waste Water Treatment Facility, because they have no connections to systems with the potential to carry radioactive materials:

- Water closets, urinals, hand wash sinks and personnel showers in the following areas:
  - Non-radiologically controlled area (non-RCA) in the Access Building.
  - Non-RCA in the Safeguards Buildings.
- Sink and dishwasher in the kitchen in Safeguards Building 2.
- Hand wash sinks in the Emergency Power Generating Buildings 1 through 4.

The waste stream from each of these locations/components is collected by the Sanitary Waste Water System and flows to collection pits or tanks, from which it drains by gravity to the Waste Water Treatment Facility.

The Waste Water Treatment Facility takes sanitary waste water and puts it through a process of mechanical, biological and chemical processing to prepare it for discharge and disposal. The primary driver of the process is aerobic microbes that digest the sewage. Filtration and dewatering of solid material and separation of emulsified oil is followed by disinfection. The liquid effluent is then discharged through the seal well and discharge structure to the

Chesapeake Bay. Dewatered sludge (solids) is transported offsite for disposal at a municipal landfill.

9.2.4.2.2 Component Description

Potable Water System

Desalinization Plant

Clean water is supplied to the Potable Water System from the desalinization plant.

Potable Water Storage Tank

The potable water storage tank has a usable volume sufficient to accommodate demand surges during peak periods of potable water usage. It is equipped with isolable inlet and outlet lines, an overflow line and a vent, as well as instrumentation for level control, indication and alarm functions. A bypass line is provided so that supply water can bypass the storage tank during periods of tank maintenance. The tank is constructed of material compatible with drinking-quality water.

Potable Water Transfer Pumps

Two 100% capacity pumps are provided to maintain system pressure within the prescribed operating range. These pumps are made of materials compatible with drinking-quality water. Each pump is equipped with a discharge check valve and suction and discharge isolation valves.

Piping and Valves

Branch connections to equipment, including hose bibs, or to other systems are individually isolable and are equipped with backflow preventers to prevent backflow and potential contamination of the Potable Water System. Connections to sinks or showers do not require backflow preventers, because there is an air gap between the potable water and the receiving drains. However, siphon breakers are installed where needed.

Recirculation lines are included as a protective measure for the potable water transfer pumps to provide a recirculation path back to the potable water storage tank during periods when the operating pump must run continuously, but at a reduced flowrate demand. The automatic recirculation valve, located in each recirculation line, throttles open, as required, to allow water to flow back to the potable water storage tank.

Water Heaters

Water heaters are provided for showers, wash and janitorial sinks, lunchroom, kitchen, laundry, and eyewash stations, and are sized, installed and controlled in such fashion as to supply on-demand hot water. Eyewash stations and emergency showers also include pre-set temperature control valves to deliver tepid water, per OSHA requirements.

Sanitary Waste Water System

Piping and Valves

Sanitary waste water piping is sized for peak anticipated loading during outage periods and as required to meet national and local plumbing code requirements.

Collection Pits and Tanks

Sanitary waste collection pits are concrete lined with steel. Tanks are constructed of steel.

Waste Water Treatment Facility

The Waste Water Treatment Facility is a separate building for the treatment of sanitary waste. It includes tanks for collection, pre-treatment, and sludge for holding purposes, macerating pumps, oil/water separator, aeration blowers, and clarifiers.

9.2.4.2.3 Operations

No departures or supplements.

9.2.4.3 Safety Evaluation

Potable Water System

The Potable Water System is not a safety-related system. Therefore, it does not require a safety evaluation with respect to plant design basis events.

With respect to compliance with Criterion 60 of Appendix A to 10 CFR 50, the Potable Water System is not connected to any components or other systems that have the potential to carry radiological material, nor do any systems discharge to it with the exception of the desalination plant that supplies makeup. Further, under normal operating conditions, system pressure is maintained above the pressure of supplied components or systems, thus preventing backflow from that supplied component / system.

In addition, a backflow preventer and isolation valve are provided at ”hard” connections to supplied components or systems, including hose bibs. These devices are on the potable water side of the connection to prevent backflow under abnormal, reversed differential pressure conditions.

Where potable water is delivered to buildings, there is no path for water from the supplied buildings to be recirculated back to upstream components (i.e., potable water storage tank, transfer pumps or recirculation lines).

At sinks or showers, an air gap between the potable water supply and the receiving drain prevents possible contamination from backflow. There are also siphon breakers where necessary on supply risers.

With respect to flooding concerns, the potable water storage tank is located such that even its catastrophic failure would not threaten the functionality of safety-related SSCs. Intervening topography and site drainage configuration would direct released water away from areas where it might otherwise cause damage. Site flooding is discussed in Section 2.4.10.

Sanitary Waste Water System

The Sanitary Waste Water System provides no safety-related function. Therefore, it does not require a safety evaluation with respect to design basis events.

Sanitary waste water from decon showers, decon sinks and the laundry in the Access Building is directed to the Liquid Waste Management System, through the NI vents and drains system. Although drainage from showers, sinks and laundry is typically classified as sanitary water, the decon showers and sinks are used exclusively for radiological decontamination of personnel, and the laundry is used for personnel anti-contamination clothing and equipment (e.g., respirators). This does not result in biological waste loading, and is acceptable for forwarding to the Liquid Waste Management System.

With respect to compliance with Criterion 60 of Appendix A to 10 CFR 50 (CFR, 2008), sanitary waste piping in the Access Building leads from the non-RCA through the portion of the Sanitary Waste Water System that collects domestic waste water. This sanitary waste piping is completely separate from the NI vents and drains system. Further, the portion of the Sanitary Waste Water System that collects domestic waste water in the Access Building, the Safeguards Buildings, and outside (underground) areas in the NI is not connected to any other system, so there is no potential for inadvertent introduction of radioactive material. The remainder of the Sanitary Waste Water System is outside the NI portion of the plant, and does not connect to any system or equipment that has the potential to carry/contain radiological contamination.

With respect to flood protection:

- The sanitary waste water collection pits or tanks are located at or below grade and in areas that are separated from safety-related SSCs. The drain lines from these pits or tanks are embedded in floor slabs and run underground outside the buildings. Inside the buildings, flooding from pits, tanks or broken sanitary lines will be effectively controlled by building floor drain systems that are designed to handle larger flows from, for example, the Fire Protection System (refer to U.S. EPR FSAR Section 9.3.3 for discussion of floor drains). Therefore, failures of the Sanitary Waste Water System, including failures of pits or tanks, will not jeopardize safety functions by flooding.

- The Waste Water Treatment Facility is physically separated and located down-grade from safety-related SSCs, in a separate building. In addition, buildings that house safety-related SSCs are constructed with ground floor slabs elevated above grade and with surrounding site drainage established to direct potential flood waters away, as described in Section 2.4.10. Therefore, failures of the Waste Water Treatment Facility, including failures of tanks, will not jeopardize safety functions by flooding.

9.2.4.4 Inspection and Testing Requirements

Potable Water System

Once the system is placed in service, periodic routine sampling of the water provides ongoing verification of potability.

Sanitary Waste Water System

The Sanitary Waste Water System, including the Waste Water Treatment Facility, is visually inspected to verify installation in accordance with design drawings and documents, and functionally tested to demonstrate proper system operation.

9.2.4.5 Instrumentation Requirements

Instrumentation includes level, temperature, pressure and flow as required for process automation, and for the visual and audible indication and alarms necessary for monitoring of system performance.

9.2.4.6 References

This section is added as a supplement to the U. S. EPR FSAR.

ANSI, 2004. Emergency Eyewash and Shower Equipment, ANSI Z358.1, American National Standards Institute, 2004.

CFR, 2008. Control of Releases of Radioactive Materials to the Environment, Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 60, U. S. Nuclear Regulatory Commission, 2008.}

9.2.5 Ultimate Heat Sink

{No departures or supplements.}

9.2.5.1 Design Basis

A COL Applicant that references the U.S. EPR FSAR design certification will provide site specific design information corresponding to U.S. EPR FSAR 9.2.5-2 [[Conceptual Site Specific UHS Systems]].

The conceptual design information is addressed as follows:

{ESWS support systems are schematically represented in Figure 9.2-3. For the two operational cooling tower basins, normal essential service water makeup provides a maximum of 648 gpm (2,452.68 lpm) of desalinated water to replenish ESWS inventory losses due to evaporation, blowdown, drift, and provide makeup water to the UHS Makeup Water System to compensate for valve seat leakage and other minor losses during normal operations and shutdown/cooldown. ESWS cooling tower blowdown discharges up to 61 gpm (231 lpm) of water to the retention basin to maintain ESWS chemistry. This quantity is based on maintaining ten cycles of concentration in the cooling tower basin.

During the post-72 hour design basis accident condition, the ESWS Cooling Tower for one train has a maximum evaporative loss of 249 gpm (943 lpm).

To replenish the UHS cooling tower basin losses due to evaporation, system leakages and other losses, starting 72 hours post-accident, the UHS Makeup Water pumps provide makeup water to each operating UHS cooling tower basin at a maximum flow rate of approximately 750 gpm (2,835 lpm), and when the intermittent traveling screen wash system is operating the makeup flow rate to the basin is reduced to approximately 510 gpm (1,930 lpm).

The UHS Makeup Water System is designed to permit periodic inspection of components necessary to maintain the integrity and capability of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 45.

The UHS Makeup Water System is designed to permit operational functional testing of safety-related components to ensure operability and performance of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 46.}

9.2.5.2 System Description

The U. S. EPR FSAR includes the following COL Items in Section 9.2.5.2:

> A COL applicant that references the U.S. EPR design certification will provide site-specific information for the UHS support systems such as makeup water, blowdown and chemical treatment (to control biofouling).
>
> A COL applicant that references the U.S. EPR design certification will compare site-specific chemistry data for normal and emergency makeup water to the parameters in EPR 9.2.5-5. If the specific data for the site fall within the assumed design parameters in EPR 9.2.5-5, then the U.S. EPR standard design is bounding for the site. For site-specific normal and emergency makeup water data or characteristics that are outside the bounds of the assumptions presented in EPR 9.2.5-5, the COL applicant will provide an analysis to confirm that the U.S. EPR UHS cooling towers are capable of removing the design basis heat load for a minimum of 30 days without exceeding the maximum specified temperature limit of the ESWS and minimum required basin water level.
>
> A COL applicant that references the U.S. EPR design certification will provide a description of materials that will be used for the UHS at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.

The COL Items are addressed as follows:

{Sections 9.2.5.2.1 through 9.2.5.2.4 are added as a supplement to the U. S. EPR FSAR.

Section 9.2.5.3.2 provides a description of materials used for the UHS Makeup Water System, including the basis.}

9.2.5.2.1 Normal ESWS Makeup

{Normal ESWS makeup water is provided to the ESWS cooling tower basins using desalinated water from the desalinization plant. FSAR Section 9.2.9 provides additional discussion of the Raw Water Supply System and the desalinization plant.

Normal ESWS makeup water is delivered from the desalinization plant to the power block area. A separate line feeds each ESWS division. Each ESWS division's normal makeup line ties into its ESWS emergency makeup line (i.e., UHS makeup water line) through a safety-related motor operated valve (MOV) in the ESWS pumphouse at the ESWS cooling tower basin. The tie-in point is inboard of (or downstream of) the UHS makeup water system isolation MOV. The safety-related normal makeup water isolation MOV ensures the integrity of the ESWS cooling tower basin and the UHS Makeup Water System by closing in the event of a design basis accident (DBA).}

9.2.5.2.2 Blowdown

{Blowdown from the ESWS cooling tower basins is a nonsafety-related function. The site-specific blowdown arrangement for each ESWS cooling tower basin is a line that runs from the

ESWS pump's discharge piping to a header in the yard area where all four blowdown lines join. The header then runs to the waste water retention basin.

The connection at the ESWS pump discharge is made through a safety-related MOV that closes automatically in the event of a DBA to ensure ESWS integrity.

An emergency blowdown path is provided from the same pump discharge connection through a second safety-related MOV in case the normal path is unavailable.

Under normal operating conditions and shutdown/cooldown conditions, the normal blowdown valves automatically modulate blowdown flow from their ESWS trains to the retention basin to help ensure cooling water chemistry remains within established limits.

During a DBA, blowdown flow can be manually controlled from the main control room by adjustment of the safety-related MOV.}

9.2.5.2.3 {UHS Makeup Water System

{Emergency makeup water for the ESWS is provided by the site-specific, safety-related UHS Makeup Water System that draws water from the Chesapeake Bay. The Chesapeake Bay is channeled through the existing Units 1 and 2 intake channel, under the Units 1 and 2 baffle wall into the Unit 3 inlet area then piped to the CWS and UHS common forebay. The common forebay is shared between the CWS makeup water system and UHS makeup water system. During normal plant operation the maximum flow of water from the Unit 3 inlet area is approximately 49,000 gpm (185,485 lpm) for both the CWS demand and surveillance testing of the UHS Makeup Water. Two buried 60” safety-related carbon steel pipes internally lined with cement and externally coated with a high solids epoxy provide a flow path for Chesapeake Bay water to enter the common forebay. Both pipes are designed to account for head losses in the pipe and provide sufficient flow for the CWS makeup and UHS makeup. Both pipes are normally in operation, however, either pipe can be isolated for maintenance as the other pipe is capable of providing 100% flow for CWS makeup and UHS makeup. Due to the head loss through the pipes, the design low water level at the common forebay for the UHS makeup intake is at EL. -10.2 ft NGVD29, which is lower than the predicted minimum low water level in the Chesapeake Bay of -7.7 ft NGVD29. The common forebay invert elevation is at -22.5 ft NGVD29, which provides ample additional margin in pump submergence during UHS operation with one or two intake pipes. The Chesapeake Bay is the largest estuary in the U.S with a watershed area in excess of 64,000 square miles (165,700 square km). The existing Unit 1 & 2 inlet area draws over 2 million gpm (7,570,000 lpm) of Chesapeake Bay water through the inlet area. With the Unit 3 safety-related UHS Makeup Water system draw of 1,500 gpm (5,678 lpm) during a design basis accident and combined CWS makeup and UHS Makeup Water maintenance testing draw of approximately 49,000 gpm (185,485 lpm) during normal plant operation, the Unit 3 Chesapeake Bay draw will not impact the ability of the bay to provide water through the Unit 1 & 2 Intake Forebay to safely bring any unit to an orderly shutdown or cooldown following a design basis accident.

The UHS Makeup Water Intake Structure houses four bar screens and four dual-flow traveling screens that remove large debris and trash that may be entrained in the flow. Each traveling screen is located in a separate enclosure and provides the required flow to the associated UHS Makeup Water Pump. Each traveling screen is equipped with a screen wash system which provides a high pressure spray to remove debris from the traveling screens. The bar screens and framing of the traveling screens are provided with heat tracing as defense-in-depth to remove potential ice build up.

There are four independent UHS Makeup Water System trains, one for each ESWS division. Each train has one vertical turbine type wet pit pump, a discharge check valve, a manual isolation valve, a self-cleaning strainer, and a pump discharge isolation MOV (all housed in four separate rooms at the UHS Makeup Water Intake Structure), plus the buried piping running up to and into the ESWS pumphouse at the ESWS cooling tower basin. The UHS Makeup Water System isolation MOV is located inside the ESWS pumphouse at the connection to the ESWS cooling tower basin.

The UHS Makeup Water system is equipped with UHS Makeup Keep-Fill line and Post- DBA UHS Makeup Keep-Fill line. The UHS Makeup Keep-Fill line delivers makeup water from the site-specific non safety-related normal makeup water system to the safety-related UHS Makeup Water system to keep the system piping full of water and replenish the system water losses due to valve seat leakage. The UHS Makeup Keep-Fill line runs from upstream of the normal makeup water motor operated isolation valve 30PED10/20/30/40 AA019) at the ESWS cooling tower basin, through safety-related isolation valve (30PED10/20/30/40 AA028) and safety-related check valve (30PED10/20/30/40 AA222), to the UHS Makeup Water System line upstream of the safety-related ESWS Emergency Makeup Water line motor operated isolation valve(s) (30PED10/20/30/40 AA021). The safety-related UHS Makeup Keep-Fill isolation valve(s) are normally opened, and remain opened during post DBA. The UHS Makeup Keep-Fill line check valve(s) will ensure the system's integrity.

The Post-DBA UHS Makeup Keep-Fill line delivers water from the safety-related ESW System return line to the UHS Makeup Water System to keep the system piping full of water and replenish the system water losses due to valve seat leakage. The Post-DBA UHS Makeup Keep-Fill line runs from upstream of the ESW System return line motor operated isolation valve 30PED10/20/30/40 AA010) at the ESWS cooling tower basin, through safety-related isolation valve (30PED10/20/30/40 AA029), safety-related check valve (30PED10/20/30/40 AA223), and safety-related flow restriction orifice, to the UHS Makeup Water System line upstream of the safety-related ESWS Emergency Makeup line motor operated isolation valve(s) (30PED10/20/30/40 AA021). The flow restriction orifice restricts the makeup flow to the UHS Makeup Water System based on the system leakage rate specified by the plant owner. The safety-related Post-DBA UHS Makeup Keep-Fill isolation valve(s) are normally opened, and remain opened during post DBA. The Post-DBA UHS Makeup Keep-Fill line check valve(s) will ensure the system's integrity.

During post-DBA operation, the UHS Makeup Water System becomes operational and the UHS Makeup Water System is pressurized by the makeup water pump. The safety-related check valve installed in the Post-DBA UHS Makeup Keep-Fill line prevents UHS (emergency) makeup water from flowing into the ESWS. Depending on the differential pressure between the two systems, during post-DBA operation, the safety-related check valve may or may not allow ESW water to flow to the UHS Makeup Water System. There is no loss of water from the ESWS during this operation, as the ESWS water returns to the cooling tower basin.

In addition, each train has a test bypass line that runs from just upstream of the isolation MOV at the ESWS cooling tower basin, through a safety-related valve, to the blowdown line upstream of the blowdown flow meter. The latter safety-related valve is normally closed, and will remain closed, providing assurance of UHS Makeup Water System integrity. The test bypass valves are locked closed to provide assurance of the UHS Makeup Water System integrity.

Instrumentation and controls are provided in the main control room (MCR) and remote shutdown station (RSS) for monitoring and controlling individual components and system functions. Electrical equipment supplying power to the pump, traveling screen, and MOVs of each train are located in its associated UHS Makeup Water pump room and UHS Makeup Water transformer room. Safety-related components of each of the four UHS Makeup Water System trains are powered by the Class 1E electrical bus for each division and the respective emergency diesel generator (EDG).

A general area drawing of the site-specific CCNPP Unit 3 UHS Makeup Water Intake and Circulating Water Makeup Water Intake Structures is shown in Figure 9.2-4. Plan views of the UHS Makeup Water Intake Structure are shown in Figure 9.2-5 and Figure 9.2-6. A section view is shown in Figure 9.2-8. The UHS Makeup Water System is shown in Figure 9.2-9.}

9.2.5.2.4 ESWS Makeup Water Chemical Treatment

{There are chemical additives used in the ESWS cooling towers to reduce scaling and corrosion, and to treat potential biological contaminants, which are added via the normal ESWS piping. The ESW makeup chemical treatment system provides the chemistry control in both instances.

The treatment system consists of multiple skid-mounted arrangements, one for each division's ESWS cooling tower. Each skid contains the equipment, instrumentation and controls to fulfill the system's function of both monitoring and adjusting water chemistry.

The specific chemicals and addition rates are determined by periodic water chemistry analyses. The chemicals are divided into six categories, based on function:

- biocide - prevents buildup of potentially damaging aquatic life, such as zebra mussels, and controls bacterial growth in the ESWS cooling towers (particularly Legionellae).
- algaecide - prevents buildup of potentially damaging algae and plant growth.
- pH adjuster - counteracts the acidic effects of the algaecide.
- corrosion inhibitor - prevents corrosion of piping and components due to saltwater environment and exposure.
- scale inhibitor - prevents buildup of scale and mineral deposits that could inhibit process flow.
- silt dispersant - prevents buildup of hard silt deposits.

Additions to the ESWS cooling towers are made as necessary on a periodic or continuing basis.

In a comparison of the CCNPP Unit 3 site-specific water chemistry with the parameters listed in U.S. EPR FSAR Table 9.2.5-3, it was determined that the site-specific data for both ESWS normal (desalinated) makeup water and UHS emergency (Chesapeake Bay) makeup water do not fall within the assumed design parameters of U.S. EPR FSAR Table 9.2.5-5, for both normal makeup water and UHS emergency makeup water. Therefore, the site-specific UHS Cooling Tower normal and emergency makeup water chemical constituents are not bounded by the values presented in U.S. EPR FSAR Table 9.2.5-5.

The CCNPP Unit 3 UHS Cooling Tower is designed for an initial Total Dissolved Solids (TDS) value of 5,000 ppm, cooling water flow rate of 19,200 gpm, and inlet wet bulb temperature of 81°F. An analysis of the UHS Cooling Tower Basin Chemistry indicated that, for the first 72 hours post DBA, considering no makeup water to the basin, the TDS of the cooling water in the basin will increase from 5,000 ppm to 8,134 ppm. An analysis of the U.S. EPR Ultimate Heat Sink, which is also applicable to Calvert Cliffs Unit 3, indicated that the UHS Cooling Tower basin maximum water temperature for the first 72 hours post DBA does not exceed the 95°F design cooling water temperature. This analysis considered basin cooling water initial TDS of 5,000 ppm of desalinated water and the worst environmental conditions from the 30-year hourly regional climatological data coincident with maximum heat load to the cooling tower. During this period, makeup water is not provided to the cooling tower. For the CCNPP Unit 3 UHS Cooling Tower, makeup water will be introduced to the cooling tower basin from the Chesapeake Bay after 72 hours post DBA. An analysis of the UHS Cooling Tower Basin Chemistry indicated that at the end of the thirty days, the TDS concentration of the cooling water in the basin may reach up to 72,460 ppm. This concentration in the cooling water could potentially reduce the thermal performance of the cooling tower. However, an analysis of the U.S. EPR UHS Sizing Criteria indicated that the cooling tower heat load decreases significantly, with no anticipation of increase after the first 6 hours of DBA, and is approximately 33.62% of the maximum heat load after 72 hours post DBA. Based on the analysis performed by the prospective cooling tower vendor, at the end of the thirty days, the cooling tower basin water temperature will remain below 95°F and any impact of the reduced cooling tower thermal performance due to the concentrated TDS levels will be off-set by the reduced heat load on the cooling tower.

An analysis of the UHS Basin Height indicated the minimum water level required for ESW pump NPSH and Vortex Suppression, or minimum pump submergence from the bottom of the cooling tower basin, is 119 inches plus 6 inches for instrumentation uncertainty for the total of 125 inches. Considering the foot print of the UHS Cooling Tower basin is 12,426 ft^2, the available mass of water at this level for ESW pump NPSH and Vortex Suppression is approximately 8,068,000 lbm. An analysis of the UHS Cooling Tower Basin Chemistry during Design Basis Accident (DBA) post 72 hour to 30 days evaluated the amount of water available in the cooling tower basin every 24 hours after DBA. The mass of water available in the cooling tower at the end of the 72 hours after DBA, without any makeup water from the normal or emergency makeup water system, is 9,111,035 lbm. This mass results in a basin height that is 16 inches higher than the height of water required for ESW pump NPSH and Vortex Suppression. After 72 hours post DBA, makeup water will be provided to the cooling tower basin from the UHS (emergency) Makeup Water System at a flow rate of greater than or equal to 300 gpm. This will increase the cooling tower basin water level due to lower evaporation from the cooling tower. Therefore, the UHS Cooling Tower Basin water level will not decrease below the minimum required basin water level for the ESW pump NPSH and Vortex Suppression. In conclusion, the U.S. EPR UHS Cooling Towers are capable of removing the design basis heat load for a minimum of 30 days without exceeding the maximum specified temperature limit for ESWS and minimum required basin water level.}

9.2.5.3 Component Description

9.2.5.3.1 Mechanical Draft Cooling Towers

The U.S. EPR FSAR includes the following COL Items in Section 9.2.5.3.1:

> A COL applicant that references the U.S. EPR design certification will confirm that the site characteristic sum of 0% exceedance maximum non-coincident wet bulb temperature and the site-specific wet bulb correction factor does not exceed the value provided in EPR 9.2.5-2. If the value in EPR 9.2.5-2 is exceeded, the maximum UHS cold-water return temperature of 95°F is to be confirmed by analysis (see Section 9.2.5.3.3).

> A COL applicant that references the U.S. EPR design certification will perform an evaluation of the interference effects of the UHS cooling tower on nearby safety-related air intakes. This evaluation will confirm that potential UHS cooling tower interference effects on the

safety related air intakes does not result in air intake inlet conditions that exceed the U.S. EPR Site Design Parameters for Air Temperature as specified in EPR 2.1-1.

The COL Items are addressed as follows:

An analysis determined the site characteristic sum of 0% exceedance maximum non-coincident wet bulb temperature and the site-specific wet bulb correction factor does exceed the value provided in U.S. EPR FSAR Table 9.2.5-2. Confirmation that an analysis was completed to determine that the sum of the 0% exceedance maximum non-coincident wet bulb temperature and site-specific wet bulb correction factor do not result in a UHS cold-water return temperature greater than 95°F is provided in Section 9.2.5.3.3.

Confirmation that potential UHS cooling tower interference effects on the safety-related air intakes does not result in air intake inlet conditions that exceed the U.S. EPR FSAR 2.1-1, Site Design Envelope Parameters for Air Temperature, is provided in Section 9.2.5.3.3.

9.2.5.3.2 Piping, Valves, and Fittings

No departures.

{The following sections are added as a supplement to the U.S. EPR FSAR.

Normal ESW Makeup Isolation Valves

The normal ESWS Makeup Water System isolation valves are safety-related MOVs designed to ASME Section III, Class 3 requirements, and made of super austenitic stainless steel, which is compatible with the brackish UHS makeup water.

UHS Makeup Water Intake Structure Bar Screens and Traveling Screens

The UHS Makeup Water Intake Structure has four bar screens and four dual-flow traveling screens. The screens prevent debris from passing into the UHS Makeup Water System. The traveling screens are equipped with a safety-related Seismic Category I screen wash system. The UHS Makeup Water pumps provide a high pressure spray to remove debris from the traveling screens. The traveling screens are sized to resist high flow-induced loading to the screens, which includes a full 9.8 ft w.c. (3 m w.c.) static differential head across the screens, a starting head differential of 6.6 ft w.c. (2 m w.c.) by the screen driver, and a full 3.3 ft w.c. (1 m w.c.) dynamic differential across the screen during screen operation. These traveling screens are classified as safety-related and are designed as Seismic Category I. The structure housing the traveling screens will protect them from natural phenomena, such as earthquakes, tornados, hurricanes, floods, and external missiles. The concrete UHS Makeup Water Intake structure also provides separation between the screens for each of the four divisions. During normal operation, the traveling screens are powered from the Normal Power Supply System. Backup (Class IE) power supply is provided to operate the traveling screens post-DBA through the Emergency Power Supply System. The framing of traveling screens and the bars screens are equipped with heat tracing as defense-in-depth to prevent potential ice buildup during freezing water conditions.

UHS Makeup Water System Pumps

There are four vertical turbine pumps, each rated at 750 gpm (approximately 2835 lpm). Each pump is driven by an electric motor, and is equipped with a discharge check valve, a manual isolation valve, and motor operated isolation valve. Opening of the motor-operated isolation valve is initiated once the minimum required pump flow is established through the minimum flow recirculation line. A minimum flow recirculation valve opens on a specified time delay associated with the start of the pump, to assure pump minimum flow requirements are satisfied. The four vertical pumps are designed to ASME Section III, Class 3 requirements, and constructed of super austenitic stainless steel, which is compatible with the brackish UHS makeup water. During normal operation, the UHS makeup water pumps are powered from the Normal Power Supply System. Backup (Class 1E) power supply is provided to operate the pumps post-DBA through the Emergency Power Supply System.

Minimum water levels in the UHS Makeup Water Intake Structure basin considers minimum submergence requirements to prevent vortex effects and net positive suction head (NPSH) to prevent cavitation of the UHS Makeup Water pump. The minimum available NPSH is approximately 40.5 ft. The excess margin at the most limiting condition between the available and required NPSH is approximately 33.3 feet. The total developed head (TDH) for the UHS Makeup Water pump is 180 ft. TDH is calculated considering the pressure drop through the piping, valves and components, suction head, and the static head. In order to provide a more conservative result for the UHS Makeup Water pump TDH, a 10% margin is included in the calculated value of 180 ft. Water level is continuously measured and monitored by safety-related instrumentation in the UHS Makeup Water Intake Structure to initiate proper (automatic or operator initiated) operation of the traveling screen. Hence the minimum water level is maintained for safe pump operation. The design low water level at the UHS Makeup Water pump suction pit is at EL -11.7 feet. The minimum water level at the UHS Makeup Water pump suction pit considers a head loss of 1.5 ft across the traveling screen.

UHS Makeup Water System Isolation Valves

The UHS Makeup Water System isolation valves are safety-related MOVs and manual valves designed to ASME Section III, Class 3 requirements, and are made of super austenitic stainless steel, which is compatible with the brackish UHS makeup water. For each train, there are MOVs for the UHS Makeup Water System Pump isolation, minimum flow recirculation, pump discharge strainer blowdown isolation, traveling screen wash isolation, and the U.S. EPR Emergency Makeup Water System isolation at the ESWS cooling tower basin. Manual valves are provided for the UHS Makeup Water System test bypass isolation, UHS Makeup Keep-fill line isolation, and Post-DBA UHS Makeup Keep-fill isolation.

Leakage rates for boundary isolation valves are based on ASME OM Code 2004 Edition, Subsection ISTC. The design of the UHS Makeup Water System pump capacity considers the expected valve seat leakage for the boundary isolation valves. Since UHS Makeup pump capacity has significant margin, boundary valve leakage rates are inconsequential.

For operating trains, the following describes the operation of key systems valves:

The UHS Makeup Water pump discharge isolation valves, 30PED10/20/30/40 AA001, are normally closed. Upon the receipt of SI signal, the ESWS normal blowdown valves (30PEB 10/20/30/40 AA016) and emergency blowdown motor operated valves (30PEB 10/20/30/40 AA003) are automatically closed, the ESWS emergency makeup water motor operated isolation valves (30PEB 10/20/30/40 AA0021) are automatically opened, and the ESWS normal makeup water motor operated isolation valves (30PEB 10/20/30/40 AA019) are automatically closed. Operator action is required to start the UHS Makeup Water pumps manually against the closed motor operated UHS Makeup Water pumps discharge isolation valves from the main control room within 72 hours after the receipt of a safety injection signal to maintain the UHS Cooling Tower basin water level. The pump minimum flow valves are automatically opened to establish the pump minimum flow requirement. Once minimum flow is achieved, the pumps discharge isolation valves will be automatically opened to fill the UHS cooling tower basin with Chesapeake Bay water and maintain the basin water level within the established operating limits. The UHS Makeup Water pump discharge isolation valves are automatically closed on a pump stop signal.

The UHS Makeup Water pump minimum flow valves, 30PED10/20/30/40 AA002, are normally closed during normal operations. Following an SI signal coincident with a Low-Low UHS cooling tower basin water level signal and manual operation to start the UHS Makeup water pump, the pump minimum flow recirculation valves are automatically opened and modulate to maintain the pump minimum flow requirement. Once the pump's minimum flow requirement is achieved, UHS Makeup Water pump discharge valves (30PEB 10/20/30/40 AA001) start opening and minimum flow recirculation valves start closing to provide makeup water to the UHS tower basin. Once the UHS cooling tower basin is filled to its operating level, the ESW Emergency makeup water isolation valve (30PEB 10/20/30/40 AA021) is automatically closed and the UHS Makeup Water pump minimum flow valve (30PEB 10/20/30/40 AA002) start reopening to maintain the pump minimum flow requirement.

The UHS Makeup water traveling screen wash isolation valve, 30PED10/20/30/40 AA005 is closed during normal plant operation. The traveling screen wash isolation valve automatically opens on a differential water level across the screens or on a timer basis, once the UHS Makeup pump has established the minimum required pump flow. With the traveling screen wash isolation valve open, pressurized water cleans the traveling screens of debris as the screens rotate. The traveling screen wash isolation valve automatically closes once the differential water level across the screens is at normal operating level or when the timer sequence is completed.

The UHS Makeup Water pump discharge strainer blowdown isolation valve, 30PED10/20/30/40 AA006, is cycled open and shut automatically as necessary during UHS Makeup Water System pump operation to provide a flow path for debris removal from the pump discharge strainer during the automatic backwash cycle. The pressure relief backwash process of the filter is initiated by either the signal of differential pressure measuring system, a timer, after the start of the UHS Makeup Water pump, or via manual operator initiation. The pump discharge strainer blowdown isolation valve opens and the drive motor is energized.

The manual UHS Makeup Water System test bypass isolation valve, 30PED10/20/30/40 AA008 is locked closed during normal operation and remains locked closed for post accident operations.

The manual UHS Makeup Keep-Fill line isolation valve, 30PED10/20/30/40 AA028 and the manual Post-DBA UHS Makeup Keep-Fill line isolation valve 30PED10/20/30/40 AA029 are open during normal plant operation and remain open during post accident conditions.

UHS Makeup Water System Self Cleaning Strainers

There are four UHS Makeup Water System self-cleaning strainers, one on the discharge side of each UHS Makeup Water pump. They are designed to ASME Section III, Class 3 requirements, and constructed of super austenitic stainless steel, which is compatible with the brackish UHS makeup water.

The strainers remove debris from the process flow that is not trapped by the bar screens and traveling screens.

UHS Makeup Water System Piping

The 8" diameter buried and aboveground UHS Makeup Water System piping and fittings that perform safety functions are designed to ASME Section III, Class 3 requirements, including normal operation and anticipated transient conditions. They are constructed of super austenitic stainless steel, which is compatible with the brackish UHS makeup water.

The buried portion of the 60" diameter CWS/UHS Makeup Water System piping, which travels from the Unit 3 Inlet area to the common CWS/UHS Forebay, is constructed of carbon steel internally lined with mortar using Type II cement per ASTM C 150, per the recommendation of ANSI/AWWA C205, and installed with a qualified installation program. For the buried portion of the 60" diameter CWS/UHS Makeup Water piping, appropriate external coating (e.g. epoxy) is also used to protect from external corrosion.

Pipe diameters for all branches of the UHS Makeup Water System are based on limiting the flow velocity to 10 ft/sec for normal modes of operation (during DBA). Pipe diameters for normal makeup and blowdown lines are also based on limiting the flow velocity to 10 ft/sec for normal operation, shutdown/cooldown conditions and Design Basis Accident conditions.

The UHS Makeup Water System piping is normally in a state of wet layup and is exposed to brackish water at all times. All piping, valves and fittings are made of super austenitic stainless steel. Additionally, the exterior surface of both 8" and 60" diameter buried piping exposed to the soil is cathodically protected.

Chemical Treatment System Components

The UHS Makeup Water system piping, valves and fittings are constructed of super austenitic stainless steel that is flushed quarterly with the brackish Chesapeake Bay water. Super austenitic stainless steel is compatible with the Chesapeake Bay water and resistant to pitting, corrosion, scaling, and microbiological influenced corrosion. Flushing the system quarterly minimizes any potential fouling from biological containments in the system.

The components of the chemical treatment system upstream of the safety-related ESW normal makeup MOV are nonsafety-related. They include:

Metering pumps - These are positive displacement pumps capable of delivering adjustable, measured amounts of chemical product.

Tanks - These storage tanks are provided for each category of chemical.

Control Valves - These are needle valves that can be adjusted for precise control of the rate of chemical addition.

Sample Valves/Lines - There are several sample points located at representative points in the normal and UHS makeup piping for confirmatory sampling of makeup water chemistry.

pH Monitor - This device monitors makeup water pH.

Conductivity meter - This device measures makeup water conductivity.

All of these components are constructed of materials compatible with the chemicals utilized in the treatment system.

ESWS Cooling Tower Blowdown System Isolation Valves

These are safety-related MOVs that isolate blowdown at the branch connection on the ESWS pump discharge, for assurance of ESWS integrity in the event of an accident. The valves and the branch connections up to the valves are designed to ASME Section III, Class 3 requirements, and constructed of materials compatible with the brackish UHS makeup water.

ESWS Cooling Tower Blowdown System Piping, Valves and Fittings

The ESWS Cooling Tower Blowdown System components downstream of the MOV are non-safety-related. They are made of carbon steel material because the normal blowdown is non-brackish water from the normal ESWS makeup system.

Screen Wash System Components

The screen wash system consists of piping, valves and instruments for each train. The screen wash system components are classified as safety-related, and are designed as Seismic Category I. All of these components are constructed of materials compatible with the brackish UHS makeup water.}

9.2.5.3.3 Cooling Tower Basin

The U.S. EPR FSAR includes the following COL Items in Section 9.2.5.3.3:

> A COL applicant that references the U.S. EPR design certification will confirm by analysis of the highest average site-specific wet bulb and dry bulb temperatures over a 72-hour period from a 30-year hourly regional climatological data set that the site-specific evaporative and drift losses for the UHS are bounded by the values presented in Table 9.2.5-3.
>
> A COL applicant that references the U.S. EPR design certification will confirm that the maximum UHS cold-water return temperature of 95°F is met by an analysis that confirms that the worst combination of site-specific wet bulb and dry bulb temperatures over a 24-hour period, from a 30-year hourly regional climatological data set is bounded by the values presented in Table 9.2.5-4.
>
> A COL applicant that references the U.S. EPR design certification will confirm that the site-specific UHS makeup capacity is sufficient to meet the maximum evaporative and drift water loss after 72 hours through the remainder of the 30-day period consistent with RG 1.27.

The COL Items are addressed as follows:

{Conditions for Maximum Evaporation in the Ultimate Heat Sink

In accordance with Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants" (NRC, 1976), the meteorological conditions resulting in maximum evaporation and drift loss should be the worst 30-day average combination of controlling parameters (wet bulb and dry bulb temperatures). The design of the UHS, as stated in U.S. EPR FSAR Section 9.2.5.3.3, is based on meteorological conditions that exist for 72 hours, and is consistent with the sizing of the UHS cooling tower basin. For CCNPP Unit 3, the worst meteorological conditions resulting in maximum evaporation and drift loss of water for the UHS over a 72 hour period are shown in the table below. The U.S. EPR and CCNPP Unit 3 use the same 72-hour period of temperature data to determine maximum evaporation of water from the UHS. Therefore, the worst CCNPP

Unit 3 meteorological conditions resulting in maximum evaporation and drift loss of water for the UHS over a 72 hour period are bounded by U.S. EPR FSAR Table 9.2.5-3.

A software routine used in the Ultimate Heat Sink analysis calculation evaluated 30 years of meteorological data (PAXNAS) for Patuxent River Naval Air Station (11 miles from CCNPP Unit 3) and determined the worst 72 hour period from the perspective of maximum evaporation (highest evaporation potential, based on the combined effect of the dry bulb temperature and its coincident wet bulb temperature). These ambient temperature conditions are imposed on the cooling tower model for the first 72 hours of the design basis accident (DBA).

The table below provides a comparison of the Table 9.2.5-3 values in the U.S. EPR FSAR and the CCNPP site-specific values used for maximum evaporation from the UHS.

	US EPR FSAR Table 9.2.5-3		**Calvert Cliffs Site-Specific Value**	
Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)
1	69.87	84	69.87	84
2	68.69	82	68.69	82
3	66.82	78	66.82	78
4	67.02	77	67.02	77
5	69.04	78	69.04	78
6	68.48	78	68.48	78
7	68.14	77	68.14	77
8	67.10	74	67.10	74
9	67.10	74	67.10	74
10	67.80	76	67.80	76
11	67.23	76	67.23	76
12	69.79	82	69.79	82
13	70.98	84	70.98	84
14	72.71	86	72.71	86
15	74.15	89	74.15	89
16	74.71	93	74.71	93
17	74.98	94	74.98	94
18	75.82	93	75.82	93
19	74.98	98	74.98	98
20	74.20	97	74.20	97
21	74.19	97	74.19	97
22	74.16	95	74.16	95
23	74.15	93	74.15	93
24	72.22	90	72.22	90
25	70.49	86	70.49	86
26	71.03	86	71.03	86
27	71.03	86	71.03	86
28	71.03	86	71.03	86
29	71.03	86	71.03	86
30	70.02	81	70.02	81
31	68.24	79	68.24	79
32	68.25	79	68.25	79
33	68.13	77	68.13	77
34	68.13	77	68.13	77
35	69.70	80	69.70	80
36	71.79	83	71.79	83

	US EPR FSAR Table 9.2.5-3		Calvert Cliffs Site-Specific Value	
Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)
37	72.98	85	72.98	85
38	75.02	88	75.02	88
39	76.71	92	76.71	92
40	77.49	95	77.49	95
41	78.24	98	78.24	98
42	78.72	100	78.72	100
43	78.48	99	78.48	99
44	77.91	99	77.91	99
45	77.91	99	77.91	99
46	77.10	98	77.10	98
47	76.85	97	76.85	97
48	75.24	93	75.24	93
49	74.14	91	74.14	91
50	72.99	87	72.99	87
51	70.96	84	70.96	84
52	69.33	84	69.33	84
53	68.90	81	68.90	81
54	69.46	81	69.46	81
55	69.13	80	69.13	80
56	69.69	80	69.69	80
57	67.70	79	67.70	79
58	67.70	79	67.70	79
59	68.58	80	68.58	80
60	71.53	84	71.53	84
61	72.40	85	72.40	85
62	73	87	73	87
63	73.29	88	73.29	88
64	73.58	89	73.58	89
65	73.58	89	73.58	89
66	73.33	92	73.33	92
67	73.08	93	73.08	93
68	73.36	94	73.36	94
69	74.42	94	74.42	94
70	74.14	93	74.14	93
71	74.68	93	74.68	93
72	73.28	88	73.28	88

Makeup Capacity

The Ultimate Heat Sink analysis calculation uses 3-day meteorological data that maximizes inventory loss.

Review of the Ultimate Heat Sink sizing criteria calculation indicates the DBA heat load decreases, with no anticipated increases, during the period t=72 hours through t=720 hours. As heat load decreases, the cooling tower range decreases. Lower cooling tower range values yield lower evaporation rates for a given ambient wet bulb temperature. The 72nd hour of the DBA scenario represents the peak anticipated evaporation loss during the last 27 days of the DBA. The worst CCNPP Unit 3 meteorological conditions that result in the maximum evaporation loss of water from the UHS Cooling Tower over a 72 hour period is bounded by the value presented in the U.S. EPR FSAR Table 9.2.5-3.

Drift loss is a fixed percentage of the cooling water flowrate and is provided by the cooling tower vendor based on the drift eliminator configuration used. The drift loss value is independent of ambient environmental conditions. Seepage loss is an estimated value that is assumed to remain constant throughout the 30-day DBA scenario. Valve seat leakage is assumed to remain constant, based on a calculated value considering the number of closed boundary valves and valve sizes used in the system. Blowdown is secured during the DBA.

Makeup flow to the UHS towers under DBA conditions is the sum of the evaporation loss, valve seat leakage loss, drift loss, and seepage loss. The UHS makeup water system consists of four independent safety-related trains which provide makeup water from the Chesapeake Bay to the ESW System to meet the maximum evaporative and drift, seepage, and valve seat leakage water losses for the period from 72 hours post-accident up to 30 days post-accident. The CCNPP Unit 3 UHS Cooling Tower maximum drift loss (percent of water flow) for a single cooling tower will not exceed 0.005% as described in U.S. EPR FSAR Table 9.2.5-2. However, to be conservative, 0.01% of cooling water flow has been considered as the design drift loss. This maximum drift loss is bound by the value presented in the U.S. EPR FSAR Table 9.2.5-3. The makeup flow to the cooling tower, when based on the inventory loss at the end of the initial 72-hour period, is sufficient to replenish losses through the end of the 30-day DBA scenario. The CCNPP Unit 3 UHS Makeup Water System provides ≥ 300 gpm of makeup water to the UHS Cooling Tower basin starting 72 hours post DBA. The CCNPP Unit 3 UHS Makeup Water pumps are sized to provide a maximum of approximately 750 gpm to the UHS Cooling Tower basin. This flow is sufficient to provide the minimum required flow even when the intermittent traveling screen wash and the intermittent strainer wash systems are operating. Therefore, even during the screen wash process, makeup water provided post DBA is adequate to maintain the water level in the basin above the required minimum water level for the ESW pump Net Positive Suction Head (NPSH) and Vortex Suppression, considering the maximum evaporation and drift loss after 72 hours and up to 30 days post DBA. U.S. EPR FSAR Table 9.2.5-2, Ultimate Heat Sink Design Parameters, states the required cooling tower emergency makeup flow, post DBA (72 hours through 30 days) as ≥ 300 gpm. The U.S. EPR design 72 hour meteorological conditions resulting in maximum evaporation and drift from the UHS Cooling Tower, as depicted in U.S. EPR FSAR Table 9.2.5-3, are identical to the CCNPP Unit 3 values for the 72 hour meteorological conditions, resulting in maximum evaporation and drift loss, as shown in the comparison table in COLA FSAR Subsection 9.2.5.3.3. Therefore, the CCNPP Unit 3 UHS Makeup Water capacity is bounded by U.S. EPR Makeup Water capacity, to meet the maximum evaporation and drift loss starting 72 hours post DBA through the remainder of the 30 day period.

Figure 9.2-3 provides the interface between the ESW and the UHS makeup water system. U.S. EPR FSAR Section 9.2 provides a detailed discussion of the ESW system, including a simplified flow arrangement for the ESW system.

Design Inlet Wet Bulb Temperature

The U.S. EPR FSAR also states that the design of the UHS is based on a consideration of air temperature parameters listed in U.S. EPR FSAR Table 2.1-1 and U.S. EPR FSAR Table 9.2.5-2. Site-specific values for these parameters were determined using 30 years (1978-2007) of meteorological data from Patuxent River Naval Air Station (NAS), Maryland, a nearby representative site (NCDC, 2008). The 0% exceedance maximum dry bulb and coincident wet bulb temperature values are 102°F (39°C) and 80°F (27°C), respectively. The definition of the maximum/minimum zero percent exceedance temperature values is the highest/lowest value that can occur for two or more consecutive hours and can only be exceeded one hour at a time (i.e., no consecutive hourly temperature values can exceed it. The hourly data set for the Patuxent River Naval Air Station (NAS) (1978-2007) did not include wet-bulb temperature values. As a result, wet bulb temperature values were determined using the provided ambient temperature, dew point temperature, and atmospheric pressure hourly values and an algorithm from the National Weather Service. Observations that had valid values for ambient temperature, dew-point temperature, and atmospheric pressure were used in the analysis. The design values listed in U.S. EPR FSAR Table 2.1-1 bound the calculated values for CCNPP Unit 3 listed above. This comparison is shown in Table 2.0-1.

The temperature data provided in U.S. EPR FSAR Tables 9.2.5-3 and 9.2.5-4 envelops the temperature data for the Calvert Cliffs Site.

A computational fluid dynamics (CFD) analysis of the CCNPP Unit 3 UHS Cooling Tower discharge plumes was completed to determine the increase in ambient wet bulb temperature of cooling tower intake air for cooling towers due to recirculation and interference effects. Worst case assumptions were made regarding availability of electrical power that resulted in only two UHS cooling towers operating (each with two operating cells and associated discharge plumes) for the analysis. The CFD analysis considered both cells of two adjacent UHS Cooling Towers, or one each from either side of the power block, operating at a maximum wet bulb temperature (85.3 °F). The UHS Cooling Tower heat load considered for the analysis (194.2 MBtu/hr) is an approximate one-hour average of the heat load from a design basis accident (Large Break LOCA) during its peak input to the UHS Cooling Tower. This is the worst case UHS Cooling Tower heat load.

Meteorological data with regard to wind speeds is considered from six years of measurements of wind speed at directions from the meteorological tower at CCNPP Unit 1 & 2. Isothermal CFD simulations were run for 16 individual and equally spaced wind directions (each at 22.5 degrees apart), using no heat load (neutrally buoyant) discharge from the UHS Cooling Tower to determine the worst case wind directions. The recirculation effect is determined by using an iterative approach, where the discharge condition calculations are updated using intermediate CFD results at the UHS Cooling Tower air intakes, which iterate until convergence of the discharge parameters is achieved. The worst case condition of wind direction and UHS Cooling Tower operations was evaluated at various wind speeds to determine what conditions produced the highest ingestion of UHS Cooling Tower discharge. Sensitivity runs were made at wind speeds of 1 m/s, 2.5 m/s, 5 m/s, and 10 m/s at 60 meters. 10 m/s was determined to be an upper bound through review of meteorological data. It was concluded that for low wind speeds (below 2.5 m/s [5.6 mph]), the cooling tower discharge rose high vertically, and the recirculation and interference are negligible. Wind speeds between the range of 5.0 m/s (11.2 mph) and 10 m/s (22.4 mph) at various wind directions yielded results with the highest associated increase in UHS Cooling Tower intake wet bulb temperature. From the neutrally buoyant runs the 135° direction from true north in the clockwise direction was the worst case for UHS tower interference and recirculation.

CFD analyses were performed on the worst cases determined from the neutrally buoyant studies, as described above, incorporating buoyancy and iteratively updated the UHS Cooling Tower discharge and intake analyses. Sensitivity runs were made at 5 degree plus and minus wind direction increments from the 135° direction. The worst case was determined to be wind from the South East (130° from true north in the clockwise direction) at 10 meters/second with the UHS Cooling Towers associated with Divisions 3 and 4 operating. These CFD analyses result in a dry bulb temperature and water vapor mass fraction at the cooling tower intake that are converted into an increase in wet bulb temperature at the UHS cooling tower over the ambient value. This increase of wet bulb temperature over the ambient value is the UHS Cooling Tower intake wet bulb correction for interference and recirculation. This value was calculated to be 2.4° F (2.28 ± 0.08 °F).

The site-specific wet and dry bulb temperatures were determined using the guidance of Regulatory Guide 1.27 (NRC, 1976) and 30 years of climatology data (1976-2006) from Patuxent River Naval Air Station, just south of the site. The data analysis yielded a maximum calculated wet bulb temperature, when applying a 0% exceedance criterion, of 85° F (29° C) with a coincident dry bulb temperature of 99° F (37° C). This temperature is in excess of the U.S. EPR FSAR Table 9.2.5-2 site design parameter for the 0% exceedance non-coincident wet bulb temperature. This variance is acceptable because the cooling tower performance at its design point is analyzed for the worst case, time-dependent meteorological conditions, and the similarly time-dependent DBA heat rejection curve. The time-dependent meteorological conditions, noted below, were modified for UHS Cooling Tower recirculation and interference, which included the sum of the highest recorded wet bulb temperature of 85.3 °F (29.6 °C) and the EPR wet bulb temperature correction factor for interference and recirculation of 2.5°F (1.4°C). This analysis confirms that the UHS cold-water return temperature does not exceed 95 °F. The 0% exceedance criterion means that the wet bulb temperature does not exceed the 0% exceedance value for more than two consecutive data occurrences, and the Patuxent River data was recorded hourly.

The Essential Service Water System (ESWS) cooling towers are designed in accordance with Regulatory Guide 1.27 guidance. The tower design is based on a wet bulb temperature of 81° F (27° C) at a specific heat load yielding a specific outlet water temperature. A 1° F increase was added for conservatism. The tower design satisfies the supply water temperature requirement under limiting conditions as described below.

The wet bulb temperature is the controlling factor for establishing the tower basin water temperature because of the more limited ability of the ambient air to absorb heat energy in moving through the tower. Refer to U.S. EPR FSAR Table 9.2.5 -4 for the worst case 24 hour meteorological period for ESWS cooling which envelopes the site-specific highest wet bulb temperature of 85° F. Alternatively, the higher difference between wet and coincident dry bulb temperatures indicates lower humidity and resultant higher evaporation rate, thus making this the controlling factor for determining both makeup water demand and required tower basin water volume. Refer to U.S. EPR FSAR Table 9.2.5-3 for the worst case 72 hour meteorological period for ESWS evaporation and refer to U.S. EPR FSAR Table 9.2.5-2 for the minimum basin water volume at the start of the DBA. In applying these factors to CCNPP Unit 3, the resulting maximum ESWS tower basin water temperature is less than the 95° F (35° C) worst-case design basis for the ESWS and the Component Cooling Water System (CCWS) heat exchangers. Based on the analysis of the Ultimate Heat Sink (UHS) System with the worst combination of site-specific wet bulb temperature and dry bulb temperature over a 24 hours period from a 30 year hourly Regional meteorological dataset, it has been determined that the maximum ESWS supply temperature is less than 95° F (35° C) and the maximum evaporative loss from a UHS cooling tower during the post-72 hour Design Basis Accident condition is 249 gpm (943 lpm), and the minimum UHS cooling tower basin water volume to be present in the basin at the start of Design Basis Accident (DBA) is 319,970 ft^3.

Minimum Cooling

The meteorological conditions resulting in minimum cooling due to evaporation of water are presented in the table below.

The site wet bulb temperature was calculated using site dry bulb temperature, dew point temperature, and station atmospheric pressure. The evaporation potential was determined as the difference between the moisture content of saturated air at the dry bulb temperature minus the actual moisture content of the air. The computer program used a rolling average to establish the 72-hour period of dry-bulb and wet bulb temperatures, and the evaporation potential. Any missing hourly data was filled in using the last temperature reading (e.g., if the temperature data was missing at 1200h, the data at 1100h is used). The computer program skipped any non-hourly data (e.g., data at 1430 hours), and the maximum number of missing hours allowed in any 72-hour running average was four. The rolling average data set was not used if the maximum number of missing hours over the 72-hour period exceeded four.

A software routine used in the Ultimate Heat Sink analysis calculation evaluated 30 years of meteorological data (PAXNAS) for Patuxent River Naval Air Station (11 miles from CCNPP Unit 3) and determined the worst 24 hour period from the perspective of minimum cooling. To maximize the basin cooling water temperature, the 24 hour metrological dataset has been shifted so that the peak ambient wet bulb temperatures coincide with the peak cooling tower heat loads. These ambient temperature conditions are imposed on the cooling tower model with the highest average wet bulb temperature coincident with the peak cooling tower heat load for the first 24 hours of the DBA. The U.S. EPR and CCNPP Unit 3 use the same 24-hour period of temperature data to determine the worst 24 hour period from the perspective of minimum cooling. Therefore, the worst CCNPP Unit 3 meteorological conditions resulting in minimum cooling for the UHS over a 24 hour period are bounded by U.S. EPR FSAR Table 9.2.5-4.

The table below provides a comparison of the Table 9.2.5-4 values in the U.S. EPR FSAR and the CCNPP site-specific values used for minimum cooling from the UHS.

	US EPR FSAR Table 9.2.5-4		Calvert Cliffs Site-Specific Value	
Time (hr)	**Wet Bulb Temp (°F)**	**Dry Bulb Temp (°F)**	**Wet Bulb Temp (°F)**	**Dry Bulb Temp (°F)**
1	82.0	93.0	82.0	93.0
2	84.6	99.0	84.6	99.0
3	85.3	99.0	85.3	99.0
4	85.3	99.0	85.3	99.0
5	84.2	100.0	84.2	100.0
6	84.2	100.0	84.2	100.0
7	84.6	99.0	84.6	99.0
8	83.9	99.0	83.9	99.0
9	83.9	99.0	83.9	99.0
10	82.6	96.0	82.6	96.0
11	82.6	93.0	82.6	93.0
12	82.1	91.0	82.1	91.0
13	82.1	91.0	82.1	91.0
14	81.9	90.0	81.9	90.0
15	80.7	88.0	80.7	88.0
16	80.7	88.0	80.7	88.0
17	79.5	86.0	79.5	86.0
18	79.5	86.0	79.5	86.0
19	75.8	82.0	75.8	82.0
20	76.1	83.0	76.1	83.0
21	76.1	83.0	76.1	83.0
22	77.3	85.0	77.3	85.0
23	79.7	89.0	79.7	89.0
24	80.8	91.0	80.8	91.0

A marine weather dataset from the International Comprehensive Ocean Atmosphere Data Set (ICOADS) maintained by the National Center for Atmospheric Research (NCAR) Computational & Information Systems Laboratory (CISL) for the period 1940 through 2005 was reviewed for a region extending from 33° latitude to 41° latitude and from 277° longitude to 288° longitude to determine the historical maximum sea surface temperature experienced in the region nearest the plant (NCAR, 2006). This area encompasses a rectangle of approximately 480 miles by 600 miles, centered on the CCNPP Unit 3 site. This review indicates a maximum surface temperature of the water in Chesapeake Bay of 93° F which is less than the maximum allowable ESW inlet temperature of 95° F as described in U.S. EPR FSAR Section 9.2.1. Therefore, UHS makeup water flow to the cooling tower will not increase the cooling tower basin water temperature beyond 95° F, and therefore, will not adversely impact ESW system safety function.

Each cooling tower basin has an ESW basin external access pipe provided to allow water to be drawn from the basin, as described in Section 9.2.1. Figure 9.2-3 provides the interface between the ESW and the UHS makeup water system. U.S. EPR FSAR Section 9.2 provides a detailed discussion of the ESW system, including a simplified flow arrangement for the ESW system.

UHS Cooling Tower Interference on Safety-Related Ventilation Intakes

An evaluation has been performed of the interference effects of the UHS cooling tower plumes on nearby safety-related air intakes. The evaluation concluded that there is no effect due to insensitivity to higher wet bulb temperatures and design features that isolate the fresh air intake of the system, and that there is sufficient margin in the system to accommodate the minor effects of a small wet bulb temperature increase. The conclusion of the evaluation is that the functions performed by safety-related ventilation systems are not adversely affected.

The following safety-related air intakes have been evaluated for potential adverse effects from the UHS cooling tower plumes:

1. Main Control Room (MCR) Air Conditioning System
2. Safeguards Building Ventilation, including Controlled-Area and Electrical Division
3. Emergency Power Generating Building Ventilation, including Diesel Hall, Electric Room, Main Tank Room and Combustion Air
4. Essential Service Water Pump Building Ventilation
5. Containment Building Ventilation, Annulus Ventilation, and Fuel Building Ventilation

Given the significant distance from the UHS Cooling Towers to the UHS Makeup Water Intake Structure (MWIS) – approximately 2000 feet, and the lower elevation of the UHS MWIS – ventilation intake for MWIS lower by approximately 130 feet from the UHS Cooling Tower plume discharge point, any effect on the UHS Makeup Water Intake Structure Ventilation system will be negligible.

Calculation of Wet Bulb Temperature Increase at MCR and Safeguard Building Ventilation Air Intakes

A computational fluid dynamic (CFD) analysis of the CCNPP Unit 3 UHS Cooling Tower plumes and surrounding structures was performed to determine the increase in ambient wet bulb temperature of intake air for MCR and Safeguard Building Division 1 & 2 ventilation systems. Worst case assumptions were made regarding availability of electrical power that resulted in only two UHS cooling towers operating (each with two operating cells and associated discharge plumes) for the analysis. The CFD analysis considered both cells of two adjacent UHS Cooling Towers operating at the design ambient conditions for the HVAC systems (102°F dry bulb and 80°F wet bulb). The UHS Cooling Tower heat load considered for the analysis (194.2 MBtu/hr) is an approximate one-hour average of the heat load from a design basis accident (Large Break LOCA) during its peak input to the UHS Cooling Tower. This is the worst case UHS Cooling Tower heat load. Meteorological data with regard to wind speeds were considered from six years of measurements of wind speed, at directions from a meteorological tower at CCNPP Unit 1 & 2.

Isothermal CFD simulations were run for 16 individual and equally spaced wind directions (each at 22.5 degrees apart), using no heat load (neutrally buoyant) discharge from the UHS Cooling Tower. The dry bulb and wet bulb temperatures for MCR and Safeguard Building Division 1 & 2 HVAC air intake are based on the worst case conditions of wind direction and cooling tower operations, as determined by analysis. Sensitivity runs were made at wind speeds of 5 m/s, and 10 m/s at 60 meters. This worst case condition of wind direction and UHS Cooling Tower operations was then evaluated at various wind speeds to determine what conditions produced the greatest wet bulb temperature increase at the MCR HVAC air intakes. It was concluded that for low wind speeds (below 2.5 m/s [5.6 mph]) the cooling tower discharge plume rose high vertically, therefore recirculation and interference effects are negligible. Wind speeds between the range of 5.0 m/s (11.2 mph) and 10 m/s (22.4 mph) at various wind directions yielded results with the highest associated increase in safety-related HVAC ventilation intake wet bulb temperature. Based on wind data, wind speeds considered in the analysis were limited to 10 m/s (22.4 mph).

The UHS Cooling Tower discharge conditions were determined using an iterative approach, where the discharge condition calculations were updated using intermediate CFD results for humidity and dry bulb temperature at the UHS Cooling Tower air intakes. Recirculation and interference cause these parameters to differ from ambient field values.

CFD analyses were then performed on these worst case conditions of wind speed, wind direction, and operating scenario determined from the neutrally buoyant studies, as described above, incorporating buoyancy and iteratively updating the UHS Cooling Tower discharge and its effect on the MCR HVAC intake conditions. The worst case was determined to be wind from the East (90° from true north) at 10 meters/second with the UHS Cooling Towers associated with Divisions 1 and 2 operating. These CFD analyses result in a dry bulb temperature and water vapor mass fraction at the MCR ventilation intake that are converted into an increase in wet bulb temperature over the ambient value. A CFD analysis was performed for the Safeguard Building Division 1 & 2 HVAC intakes considering the worst case conditions determined from the analysis of the UHS Cooling Tower effect on the MCR HVAC intakes.

Considering the worst case wind direction, wind speed, and divisional combination, the results of the CFD analysis showed a negligible dry bulb temperature increase and a small (approximately 2.2°F) wet bulb temperature increase above ambient temperatures at the most affected safety-related MCR and Safeguard Building HVAC intake.

The CFD analysis determined the worst case wind direction (due East), wind speed (10 m/s), and divisional equipment combinations (UHS Cooling Tower Divisions 1 and 2), which resulted in the negligible dry bulb temperature increase and a small (approximately 2.2°F) wet bulb temperature increase at the most affected MCR or Safeguard Building Ventilation intake. A review of the 0% exceedance dry bulb and coincident wet bulb temperature values was performed using the same 30-year data set used to determine the site-specific values of 102°F and 80°F. Using only hourly records when the winds were from the east direction sector, the review determined that the 0% exceedance dry bulb temperature value would be 91°F, or 11°F lower than the site value of 102°F, and that the 0% exceedance coincident wet bulb temperature value would be 75.5°F, or 4.5°F lower than the site value of 80°F.

Main Control Room and Safeguard Building Ventilation Impact

A small wet bulb temperature increase, due to UHS Cooling Tower plume interference, for the safety-related HVAC fresh air intake systems has no adverse impact on system performance due to the following factors:

1. For the Main Control Room HVAC system:

   There is 13°F margin between 0% exceedance dry bulb temperature for the CCNPP Unit 3 site (102°F) and the 0% exceedance dry bulb temperature used in the design of the system (115°F). This results in a smaller heat transfer rate from the outside to the Main Control Room to be removed by the ventilation system. This margin more than offsets the small increase in latent heat resulting from the worst case increase in wet bulb temperature (approximately 2.2°F) caused by the UHS Cooling Tower plume.

2. For the Safeguard Buildings HVAC systems:

   There is 13°F margin between 0% exceedance dry bulb temperature for the CCNPP Unit 3 site (102°F) and the 0% exceedance dry bulb temperature used in the design of the system (115°F). This results in a smaller heat transfer rate from the outside to the Safeguard Building to be removed by the ventilation system. This margin, combined with the margin in the Safety Chilled Water system cooling capacity, more than offsets the increase in latent heat resulting from the worst case small increase in wet bulb temperature (approximately 2.2°F) caused by the UHS Cooling Tower plume.

Emergency Power Generating Building Ventilation Impact

Each emergency diesel division has its own building. Each of the four buildings has one safety-related air intake, which supplies fresh air for diesel combustion as well as building ventilation.

Diesel Combustion Air

Any fresh air wet bulb temperature increase has no effect on the Emergency Diesel Generator combustion air intake, since diesel combustion is not adversely affected by wet bulb temperature. The effects of UHS Cooling Tower plumes on combustion air will be addressed in the specification for the design of the emergency diesel generators.

Diesel Hall and Main Tank Room

For the Diesel Hall and Main Tank rooms, any fresh air wet bulb temperature increase has no effect, since this is a once through ventilation system with no cooling coil to be impacted by an additional latent heat load from the cooling tower. Once through cooling systems are affected by increases in dry bulb temperature, but not wet bulb temperature increases. Therefore, the maximum design temperature for the components of the Diesel Hall and Main Tank rooms is not challenged.

Electrical Room

Any fresh air wet bulb temperature increase has no effect on the components in the Emergency Power Generating Building electrical room. The safety-related isolation damper at the air intake to the nonsafety-related cooling system will close when the outside air exceeds 100°F. The safety-related cooling system operates in recirculation mode, cooling the electrical components in the Emergency Power Generating Building electrical room with divisional cooling coils supplied by the Essential Service Water System.

Essential Service Water Pump Building (ESWB) Ventilation Impact

Any fresh air wet bulb temperature increase has no effect on the components in the four ESWB. The safety-related isolation damper at the air intake to the nonsafety-related cooling system will close when the outside air exceeds 100°F. The safety-related cooling system operates in recirculation mode with no drawn in fresh air.

Other Safety-Related Ventilation Systems

Other safety-related ventilation systems such as the Containment Building Ventilation System (CBVS), Annulus Ventilation System (AVS), and Fuel Building Ventilation System (FBVS) have been evaluated for the effects of an increase in wet bulb temperature. All of these systems are supplied air from the Nuclear Auxiliary Building Ventilation System (NABVS). If a condition existed within the NABVS such that the safety related function of the downstream systems could be adversely affected, including excessive moisture or temperature in the air supply, the air supply can be manually isolated for each affected system utilizing the safety related supply dampers. These systems do not require fresh air supply to support a safety related function, and will perform their safety functions as required without air supply from NABVS. Therefore, the CBVS, AVS and FBVS are not affected due to an elevated wet bulb temperature caused by the UHS Cooling Tower plume.

Conclusion

The safety-related ventilation systems are not adversely affected by UHS cooling tower interference. These systems have either been analyzed using CFD, or determined not to be affected by moisture, or can be isolated. Further, for those safety-related HVAC systems that continue to draw outside fresh air, the percentage of drawn in fresh air is small in relation to recirculation air flow rate for these systems. It is also extremely unlikely that worst case wind and UHS cooling tower plume conditions would occur simultaneously with design ambient conditions for the systems, and the duration of such worst case conditions would be short (on the order of a few hours) during which time any effect on the thermal inertia of the systems would be negligible.}

9.2.5.3.4 Coarse and Fine Screens

No departures or supplements.

9.2.5.4 System Operation

9.2.5.4.1 Normal Operating Conditions

{The normal ESWS makeup is supplied from the desalinization plant. The two operating ESWS divisions have the normal makeup MOVs open, while the two standby divisions' normal makeup MOVs are closed.

Blowdown from each train is aligned to the waste water retention basin, with flow rate controlled by manual adjustment of the safety-related motor operated blowdown isolation valve.

The UHS Makeup Water System for each division is in standby mode, with the ESW System Emergency Makeup Water System isolation MOV at the ESWS cooling tower basin closed, the pump isolation MOV closed, the UHS Makeup Keep-Fill isolation valve open, the UHS Makeup Keep-Fill line check valve open or closed, the post-DBA UHS Makeup Keep-Fill isolation valve open, the post-DBA UHS Makeup Keep-Fill line check valve open or closed, as required to maintain the UHS Makeup Water System full. The test bypass isolation valve is also closed.

Periodic surveillance testing is conducted to demonstrate UHS Makeup Water System operability. Quarterly functional testing is performed to verify UHS Makeup Water pump performance, and flush the piping system to the isolation MOV at the ESWS cooling tower basin.}

9.2.5.4.2 Abnormal Operating Conditions

{During plant normal operation, the UHS makeup Keep-Fill line and Post-DBA UHS Makeup Keep-Fill line manual isolation valves are open. During DBA, these valves will remain open to allow makeup water flow path to the UHS Makeup Water System. During abnormal operation condition, operator action is manually initiated from the main control room or locally, based on operators' judgment resulting from prevailing conditions and indications. This includes initiating the safety-related UHS Makeup Water System to any and/or all ESWS cooling tower basins, as well as blowdown from any and/or all ESWS cooling tower basins.}

9.2.5.5 Safety Evaluation

{This section of the U.S. EPR FSAR is incorporated by reference with the following supplemental information.

Section 9.2.5.5 of the U.S. EPR FSAR discusses the need to verify that the makeup water supply is sufficient for the site-specific ambient conditions. Per the U.S. EPR FSAR, this is addressed as a part of COL Item 2.0-1. CCNPP Unit 3 utilizes Table 2.0-1 in order to respond to COL Item 2.0-1. Table 2.0-1 refers to FSAR Section 9.2.1 with respect to the acceptability of site-specific temperature characteristics for the U.S. EPR FSAR, UHS Design.

Normal ESWS makeup is a non-safety-related function, and thus requires no safety evaluation with respect to design basis events. Similarly, both cooling tower blowdown and chemical treatment are non-safety-related functions and require no safety evaluation. However, the connections to safety-related piping through which these functions are made and the accompanying isolation valves are safety-related, which ensures the integrity of the safety-related piping in the event of a DBA.

The UHS Makeup Water System function is to provide reliable makeup to the ESWS cooling tower basins, starting no later than 72 hours after receipt of an accident signal, to ensure that sufficient makeup flow is provided so the ESWS can fulfill its design requirement of shutdown decay heat removal for a minimum of 30 days following a DBA.

This function is assured because the UHS Makeup Water System:

- Meets the requirements of GDC 2 and GDC 5.
- Meets the requirements of Regulatory Guide 1.27 and GDC 44.
- Is designed, procured, constructed and operated in accordance with the criteria for ASME Section III, Class 3 safety-related systems, structures and components, and Seismic Category 1 requirements, including the tie-in piping and isolation valves for normal makeup, and sampling.
- Has four equivalent and completely independent trains, any two of which are capable of providing the required worst case makeup flow.
- Has components, including the UHS Makeup Water System pump and its associated valves, strainer, Motor Control Center, traveling screens, and other components that are protected against the effects of external and internal flooding as described in Section 3.4.3.10.
- Has an UHS Makeup Water Intake Structure which is designed and built for protection against seismic and missile hazards.
- Has each UHS Makeup Water System pump installed such that its function is protected against the worst case low water event.
- Has seismically qualified and installed (buried) piping runs from the UHS Makeup Water Intake Structure to the individual ESWS cooling tower basins.
- As described in FSAR Section 3.5.2, the UHS makeup water system buried components, including underground piping, cables, and instrumentation from the UHS makeup water intake structure to the essential service water pump building are buried at a sufficient depth to withstand the effects of postulated missile hazards.
- Is periodically performance tested and sampled to confirm operability and verify system water chemistry requirements.
- Has a set of dual-flow traveling screens for each division that are designed and built as safety-related and Seismic Category I.
- Is powered by the Class 1E electrical bus for each division and the respective emergency diesel generator (EDG).

The UHS Makeup Water System piping is normally in a state of wet layup. This system is not used during plant normal operations, and is designed to provide a backup source of makeup water to the UHS cooling tower basin starting 72 hours post-accident when the normal source of makeup water is unavailable. In the event that makeup water to the UHS cooling towers from the UHS Makeup Water System is required starting 72 hours post accident, operator action will start the desired UHS Makeup Water pumps to the respective system trains as per the plant emergency operating procedures. Prior to the start of the pumps, operators ensure that there is adequate water level in the pump bay, and the traveling screens are rotated at least ¼ turn to ensure that they are not blocked, to supply the necessary water flow path. In addition, each train has a UHS Makeup Keep-Fill Line equipped with manual isolation valve and check valve to maintain the UHS Makeup Water System full due to leakage, and keep the piping full during plant normal operation. The UHS Makeup Keep-Fill Line delivers water from the site-specific non safety-related normal makeup water system to the UHS Makeup Water System during plant normal operation. Also, each train has a Post-DBA UHS Makeup Keep-Fill line equipped with manual isolation valve, check valve, and flow restricting orifice. The Post-DBA UHS Makeup Keep-Fill line delivers water from the safety-related ESW System return line to the UHS Makeup Water System to maintain the UHS Makeup Water System full due to leakage during Post-DBA.

Following the receipt of a safety injection signal, operating procedures and low water level alarms associated with the UHS cooling tower basin will direct operators to start the UHS Makeup Water pumps. The pumps are started manually against the closed motor operated discharge isolation valves. Automatic air release vents are provided to release air at the discharge of the pump to expel any entrapped air. The minimum recirculation valves are automatically opened to ensure that minimum flow required for the pumps is achieved. Once minimum flow through the pumps is achieved, the pump discharge isolation valves are automatically fully opened and the recirculation valves are automatically closed. Once the UHS Makeup Water pumps are started manually, subsequent operations are accomplished automatically to provide flow to the UHS cooling tower basins. The traveling screen wash isolation valves are automatically opened as required to provide high pressure spray water to the traveling screens.

The UHS Makeup Water System will incorporate additional design provisions that minimize the effect of hydraulic transients upon the functional capability and the integrity of the system components. These design features include slow stroke motor-operated isolation valves, automatic air release valves, UHS Makeup Keep-Fill Line function that operates with the Normal Makeup Water pumps and Post-DBA UHS Makeup Keep-Fill Line function that operates with the ESWS pumps running to maintain the system full at all times, valve control and interlock features that ensure correct valve line up prior to pump start, and discharge isolation valves that open and close with pump start and stop signals.

In addition, reconciliation of the site-specific climatology data has demonstrated that the ESWS cooling tower performance maintains the ESWS temperature below the required 95° F (35° C).}

9.2.5.6 Inspection and Testing Requirements

{The UHS Makeup Water System components, including the safety-related motor operated isolation valves for makeup and blowdown are procured and fabricated in accordance with the quality requirements for safety-related ASME Section III, Class 3 systems, structures and components to ensure compliance with approved specifications and design documents.

Installation of individual components and overall system construction are inspected to verify the as-built condition is in accordance with approved drawings. A preoperational test is performed, as described in Section 14.2.14, to verify the ability of the UHS Makeup Water System to perform its safety function.

Inservice inspection of the UHS Makeup Water System including piping, valves, pumps and components is performed as identified in FSAR Section 6.6, in accordance with the requirements of ASME Section XI and ASME OM Code. The installation and design of the UHS Makeup Water System provides accessibility, as described in FSAR Section 6.6.2, for the performance of periodic inservice inspection. The frequency of inservice inspection, via flow or pressure tests, for buried piping segments is described in FSAR Section 6.6.4, to ensure system integrity beyond the ASME Section XI code requirement.

Inservice testing of the UHS Makeup Water System including valves, pumps and components, is performed as identified in FSAR Section 3.9.6, in accordance with the requirements of the ASME OM Code. The installation and design of the UHS Makeup Water System provides accessibility for the performance of periodic inservice testing. Periodic testing of safety-related equipment verifies its structural and leak-tight integrity, availability, and ability to fulfill its safety function. Inservice inspection and testing are in accordance with ASME Section XI and ASME OM Code requirements. Refer to U.S EPR FSAR Tier 2 Chapter 16, Generic Technical Specification Surveillance Requirements (SR) 3.7.19.5 and SR 3.7.19.6 for surveillance requirements that verify continued operability of the UHS Makeup Water System.

Pursuant to the recommendations included in Generic Letter 89-13, the design of safety-related UHS makeup water system considers the potential for capability and performance degradation and subsequent system failure due to silting, erosion, corrosion, protective coating failure, and the presence of organisms that subject the system to microbiological influenced corrosion as well as macro fouling.

In order to identify and reduce the incidence of flow blockage problems from biofouling near the intake structure and traveling screens, the UHS Makeup intake pipes, traveling screens and pump forebay will be inspected once per refueling cycle to ensure that there is no biological growth, sedimentation and corrosion. Inspection will be performed by either scuba divers or by dewatering the intake structure or by other comparable methods, and fouling accumulations will be removed.

UHS Makeup Water System supplies makeup water to the UHS cooling tower basin starting 72 hours post accident as needed. Silting, erosion, corrosion and biological fouling are a concern for normally operating wet systems. However, the UHS Makeup Water System piping is super austenitic stainless steel, which is compatible with the Chesapeake Bay brackish water to prevent erosion and corrosion pitting. Silting and biological fouling are prevented by quarterly flushing of the system.

Routine inspection and maintenance activities as established by the plant procedures identify any degradation and correct performance gaps due to corrosion, erosion, protective coating failure, silting and biofouling.

The ability to visually inspect the interior of 60" diameter UHS System buried piping (e.g., vaults with removable spool pieces) and provision for dewatering any of the two pipes will be designed into the system during detailed design phase. Periodic inspection requirements of interior lining of buried piping will be part of an appropriate plant inspection program.

Finally, in accordance with U.S. EPR Surveillance Requirements provided in Chapter 16, periodic surveillance testing of the system, including the safety-related isolation valves, provides continuing assurance of the system's ongoing capability to perform its design function. Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The inspection and testing provisions described above are subject to programmatic requirements and procedural controls as described in Section 13.5.}

{Safety-related Instrumentation and Control (I&C) functions of the UHS Makeup Water System as well as the local supporting power systems equipment will be allocated to the Safety Automation System (SAS). The Human Machine Interface (HMI) for monitoring and operating the safety-related equipment associated with the UHS Makeup Water System is the Safety

Information and Control System (SICS) and the Process Information and Control System (PICS). The PICS displays and workstations are located in the Main Control Room and Remote Shutdown Station}

9.2.5.7 Instrumentation Applications

{Safety-related Instrumentation and Control (I&C) functions of the UHS Makeup Water System, as well as the local supporting power systems equipment, will be allocated to the Safety Automation System (SAS). The Human Machine Interface (HMI) for monitoring and operating the safety-related equipment associated with the UHS Makeup Water System is the Safety Information and Control System (SICS) and the Process Information and Control System (PCIS).

The PICS displays and workstations are located in the Main Control Room and Remote Shutdown Stations

Instrumentation is applied to the ESWS Normal Makeup Water System, UHS Makeup Water System and blowdown, to the extent necessary to monitor essential component conditions and verify real time system performance. This includes limit switches that provide remote position indication for valves. It also includes pressure, temperature and differential pressure sensors that provide local and remote display of system pressure, temperature and flow. In addition, temperature and amperage sensors can be used for indirect flow indication and direct indication of component status. Radiation monitors in the ESWS will detect a potential radiation leak and provide an alarm in the main control room for operator action.

System performance can also be assessed using level indication on the cooling tower basins.

9.2.5.7.1 System Monitoring

The UHS Makeup Water System is monitored for the following parameters.

- Traveling screen differential level
- Fluid flow rate and pressure downstream of the UHS Makeup Water pumps
- Differential pressure at the UHS Makeup Water pump discharge strainer
- Bearing Temperature of the UHS Makeup Water pump
- UHS Makeup Water discharge strainer operating status (energized/de-energized)
- UHS Makeup Water traveling screen operating status (energized/de-energized)
- MOV position status
- UHS Makeup Water pump operating status (energized/de-energized)
- Pressure of the UHS Makeup Water traveling screen wash system
- Bearing Temperature of the UHS Makeup Water traveling screen

9.2.5.7.2 System Alarms

- High differential level across traveling screen
- High pressure at UHS Makeup Water pump discharge

- Low pressure at UHS Makeup Water pump discharge
- Low flow at UHS Makeup Water pump discharge
- High differential pressure across the pump discharge strainer
- High bearing temperature of UHS Makeup Water pump
- Loss of UHS Makeup Water System heat tracing
- High Pressure of the UHS Makeup Water traveling screen wash system
- Low Pressure of the UHS Makeup Water traveling screen wash system
- High bearing temperature of the UHS Makeup Water traveling screen
- Low UHS Makeup Water Pump Forebay Level

9.2.5.7.3 UHS Makeup Water System Safety Related I&C Functions

Upon the receipt of a safety injection signal, the following valves will receive a signal to automatically align to their post accident position as indicated.

- ESWS emergency makeup water isolation valve (opened)
- ESWS normal makeup water isolation valve (closed)
- ESWS normal and emergency blowdown isolation valves (closed)

9.2.5.7.3.1 Operator Action to fill the UHS Cooling Tower Basin

After the receipt of a safety injection signal, operator action is required to start the UHS makeup water pump manually from the main control room to maintain UHS tower water level.

There are no interlocks or permissives for starting the UHS makeup water pumps. This is a departure from the U.S. EPR FSAR, Tier 2 Table 9.2.1-3, which lists a pump start permissive associated with "Cooling tower basin water level Lo-Lo-Lo."

9.2.5.7.3.2 Auto Actuation after Pump Start Manually

The following take place automatically after the start of the UHS Makeup Water pump

- The UHS Makeup Water pump minimum flow recirculation valves are opened
- The UHS Makeup Water pump discharge isolation valves are opened after the flow through the UHS Makeup Water pump exceeds the minimum pump flow required.
- The UHS Makeup Water pump minimum flow recirculation valves closes and modulates as needed to maintain minimum flow.

9.2.5.8 References

{**NCDC, 2008.** U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Climatic Data Center, Integrated Surface Hourly Observations Dataset, Patuxent River Naval Air Station, Maryland, 1978-2007, purchased 2008.

PAXNAS. Hourly Surface Observations, 1975-2006, obtained from the National Climatic Data Center.}

9.2.6 Condensate Storage Facilities

No departures or supplements.

9.2.7 Seal Water Supply System

No departures or supplements.

9.2.8 Safety Chilled Water System

No departures or supplements.

9.2.9 Raw Water Supply System

The U. S. EPR FSAR includes the following conceptual information and COL Item in Section 9.2.9:

> [[The RWSS contains water received from a site-specific natural source and supplies it directly to the points of use where it may be further processed by the receiving plant systems. The raw water for demineralized water, potable water, fire protection, and ultimate heat sink (UHS) normal makeup is preprocessed as required by filtration, reverse osmosis, chemical treatment, and desalinization of brackish raw water sources prior to use.]] The conceptual design of the RWSS is shown in EPR 9.2.9 -1—[[Conceptual Site-Specific Raw Water Supply System]].
>
> [[The RWSS does not provide any safety-related function. There is no connection between raw water and the components of other systems that have the potential to contain radiological contamination.]]
>
> [[Non-safety-related normal makeup water is provided to the UHS cooling tower basins as clean (desalinated) water.]]
>
> The RWSS and the design requirements of the RWSS are site-specific and will be addressed by the COL applicant.

The conceptual information and COL Item are addressed as follows:

{Raw water is the term usually applied to untreated water. At CCNPP Unit 3, raw water is supplied from the Circulating Water System Makeup Water System (which draws water from the Chesapeake Bay) and is directed to the desalinization plant. The desalinization plant processes raw brackish water through filtration and reverse osmosis, with auxiliary chemical treatment, delivering clean water to the desalinated water storage tanks. The water from the tanks then provides all of the clean water suitable for various plant services, including feed to the demineralized water and potable water systems, and use by the fire protection and essential service water systems. This encompasses all of the plant water demands, with the exception of Circulating Water System makeup and UHS makeup during emergency conditions.

Sections 9.2.9.1 through 9.2.9.7 are added as a supplement to the U. S. EPR FSAR.

9.2.9.1 Design Basis

No cross connections exist between raw Chesapeake Bay water supplied to the desalinization plant and any system with the potential to carry radioactive material. This design requirement satisfies Criterion 60 of Appendix A to 10 CFR 50 (CFR, 2008).

Raw water from the Circulating Water System Makeup Water System is supplied to the desalinization plant. Desalinated water is then supplied to the demineralized water, potable water, fire protection, and essential service water (except under emergency operating conditions) systems during periods of normal power operation, shutdown, maintenance and construction. The emergency makeup to essential service water is provided by a dedicated, safety-related system. The UHS Makeup Water System is discussed in Section 9.2.5.

The proposed chemical treatment and relevant chemicals for the desalination process are as follows:

- Sodium Bisulfite for dechlorination upstream of the RO membranes.
- Sulfuric Acid: continuous feed to the pretreated water prior to desalination for pH adjustment.
- Scale inhibitor: proprietary (supplier-specific) - continuous feed to the pretreated water prior to desalination.

9.2.9.2 System Description

Raw water is delivered to the desalinization plant through a non-safety-related line. The desalinization plant is a non-safety-related, non-seismic system that provides all of the water for plant use, with the exception of Circulating Water System Makeup and, under emergency conditions, ESWS makeup.

The desalinization plant supplies water for initial fill and makeup to the following systems:

- Essential service water during all but emergency conditions.
- Demineralized water.
- Potable water.
- Fire protection.

The raw water/desalinated water supply is schematically represented in Figure 9.2-7.

Raw water is supplied by diverting part of the Circulating Water System makeup flow. The Circulating Water system makeup pumps provide the motive force for this diversion flow, which is directed to the desalinization plant located adjacent to the Circulating Water System cooling tower.

The raw water is processed through desalinization, which consists of filtration, reverse osmosis and chemical treatment, and then sent to the desalinated water storage tanks. From the storage tanks, the desalinated water is distributed to the demineralized water, potable water, fire protection, and essential service water systems for their initial fill, and as needed for makeup. Emergency makeup to the ESWS is provided by the dedicated UHS Makeup Water System, described in Section 9.2.5.

During normal operation, desalinated water demand is approximately 812 gpm (3,073 lpm). Peak demand of approximately 1,580 gpm (5,980 lpm) occurs for approximately 4 to 6 hours during normal plant shutdown/cooldown operations, and is driven by additional makeup to the ESWS. The makeup for this type of peak demand is met from the desalinated water storage tanks

The current computation for design pressure and temperature for the RWSS is 130 psig (8.97 bars) and 100° F (37.8° C), respectively.

Two separate normal power supplies shall be provided to the desalinization/water treatment building to allow RWSS equipment supporting desalination to remain operational if one power supply is lost. The RWSS and desalinated water plant are not credited to be available during a Loss of Offsite Power or Station Blackout event.

9.2.9.3 Component Descriptions

Raw Water Piping

Raw water flows from the Circulating Water System Makeup System to the desalinization plant through an underground pipe.

Desalinization Plant

The desalinization plant consists of pumps, tanks, filters, reverse osmosis and other process equipment necessary for desalinating the brackish Chesapeake Bay water.

Desalinated Water Storage Tank

There are two 300,000 gallon (1.14 million liter) tanks, which are sized for 8 hours of storage at the maximum desalinated water production rate of 1225 gpm (4637 lpm). The tanks are equipped with level sensors, a vent, a drain and an overflow line.

Desalinated Water Transfer Pumps

These are horizontal centrifugal pumps that forward water to the supplied systems. Each pump is equipped with a discharge check valve, suction and discharge isolation valves, and a recirculation line for maintaining system pressure while meeting minimum flow requirements. Two 100% capacity transfer pumps supply the demands of essential service water, fire protection and feed to the demineralized water system. Duplicate full capacity transfer pumps makes online inspection and maintenance of these pumps possible without unduly affecting system operation.

The two 100% capacity desalinated water transfer pumps have been sized based upon a total developed head (TDH) of a nominal 200 ft (61 m) at a nominal 790 gpm (2992 lpm) each. This includes consideration of the normal demands of the desalinated water users and those simultaneous peak demands that have been deemed credible (i.e., 4 ESW cooling towers simultaneously in operation). Each of the desalinated users' headers have been sized to accommodate peak flowrates with the desalinated water transfer pumps' suction and discharge piping sized to accommodate peak flowrates for the required demands.

Desalinated Water Distribution Piping and Valves

The piping and valves which connect the system components to each other and to the supplied systems are made of materials compatible with the process fluid.

The RWSS piping, tanks, pumps and other system components' materials are compatible with the Chesapeake Bay water quality prior to treatment and desalinated water quality for the remainder of the system. As such, RWSS components will be fabricated from corrosion resistant materials (such as FRP, HDPE or equivalent for underground, and glass fiber reinforced epoxy, steel or equivalent for aboveground). Appropriate corrosion inhibitors will be specified for the system.

9.2.9.4 Safety Evaluation

Raw water supply and the desalinization plant provide no safety-related function. Therefore, no safety evaluation is required with respect to plant design basis events.

There is no connection between raw water supplied to the desalinization plant, or the desalinization plant itself, and components or other systems that have the potential to carry radiological contamination. This complies with Criterion 60 of Appendix A to 10 CFR 50 (CFR, 2008).

With respect to potential flooding caused by failures of piping or components, the raw water delivery piping and the desalinization plant are located remote from any safety related systems or equipment, except for the lines connecting to the ESWS cooling tower basins. Failures will not adversely impact safety functions because intervening topography and the plant storm water controls are designed to divert surface water flow, including that which would result from catastrophic failure of the desalinated water storage tanks. The system boundary from the nonsafety-related RWSS to the safety-related ESWS occurs at the ESWS isolation valve located in the pumphouse buildings.

The nonsafety-related RWSS piping supplying makeup water to the UHS cooling tower terminates at the interface with the ESW Building.

In the event of a break of the RWSS piping at the interface with the ESW system at the building wall, with the discharge directly against the ESW Building wall, the wall will act as a dissipation baffle, reducing the force of the flow. The interface penetration anchor, designed and constructed in conformance to RG 1.29, Revision 4 regulatory position C.2, does not allow flow through the penetration anchor inside the building.

The buried RWSS pipe enters the ESW Building approximately 6 ft below grade. For a complete RWSS pipe failure outside the building (at the interface), the least resistance flow path will be upward. Therefore, the flow will find its way toward the surface after eroding the top soil cover. In essence, the pipe failure will result in soil erosion of the pipe surrounding area at the break location creating a localized scour hole. The eroded soil will be entrained with water and will move with the flow in the upward direction creating a gully or localized scour hole. The scour hole will function as an energy dissipation pool, dissipating the forces associated with the high pressure flow. The bottom of the ESW structure is approximately 10 ft lower than the buried RWSS pipe. Soil erosion towards the structure bottom is less likely, since the distance upward is shorter. This will result in a dissipation pool surrounding the failed pipe in the ground. The size of the scour holes are substantially less than the footprint of the ESW structure and hazard to the structure associated with the scouring is insignificant.

9.2.9.5 Inspection and Testing Requirements

Visual inspections are conducted during construction to verify that the as-built condition is in accordance with design documents. Pressure testing and functional testing are conducted during post-construction pre-commissioning and startup, as necessary to confirm system integrity and proper operation of individual components and the total system. Portions of the system are demonstrated with leak testing where such method does not jeopardize other systems/equipment and is sufficient to demonstrate proper operation.

Ongoing system operation provides continuing demonstration of the system's functionality.

9.2.9.6 Instrumentation Requirements

Instrumentation includes sensing and display of various parameters as necessary to automate system function, and to provide for local and remote system monitoring, including alarms. These parameters include desalinization system tank levels, flows, temperatures and pressures, as well as desalinated water tank level and temperature, essential service water makeup flow, demineralized water system feed flow, and potable water system feed flow. Valve position indication for selected valves and pump power on/off indication are also provided.

9.2.9.7 References

CFR, 2008. Control of Releases of Radioactive Materials to the Environment, Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 60, U. S. Nuclear Regulatory Commission, 2008.}

9.2.10 Turbine Building Closed Cooling Water System

No departures or supplements.

Table 9.2-1 — {Design Parameters UHS Makeup Water System}

Temperature (° F)	Flow Rate (gpm)		Design Pressure (psig)	Comments
Max	Min	Max	170	Design parameters during Post DBA.
100	300	750		

Table 9.2-2 — {UHS Makeup Water System Alarm Summary}
(Page 1 of 2)

MCR/RSS Display	Division	Setpoint Name	Function
UHS Makeup Water Traveling Screen Differential Level	1/2/3/4	Max 1 Max 2 Max 3 Max 4	Max 1: Traveling screen wash isolation valve open and Traveling Screen Start Max 2: Traveling screen high speed Max 3: Alarm (Alerts the operator of Traveling Screen Blockage) Max 4: UHS Makeup Water Pump Trip
UHS Makeup Water Pump Discharge Flow	1/2/3/4	Min 1 Min 2	Min 1: Alarm (Pump discharge Flow Low) Min 2: Alarm (Pump discharge Flow Low-Low) and Pump Trip
UHS Makeup Water pump discharge pressure Hi / Lo	1/2/3/4	Max 1 Max 2 Min 1 Min 2	Max 2: Alarm and Pump Trip Max 1: Alarm Min 1: Alarm (if Pump is Running) Min2: Alarm and initiates Train Switchover Sequence (if Pump is Running)
UHS Makeup Water pump discharge strainer differential pressure Hi	1/2/3/4	Max 4 Max 3 Max 2 Max 1	Max 4: Alarm and Pump Trip Max 3: Alarm Max 2: Auto-Start Strainer Motor Max 1: Status display in MCR
UHS Makeup Water pump abnormal (bearing temperature Hi)	1/2/3/4	Max 2 Max 1	Max 2: Alarm and Pump Trip Max 1: Alarm
UHS Makeup Water traveling screen wash pressure Hi	1/2/3/4	Max 2 Max 1	Max 2: Close traveling screen wash isolation valve Max 1: Alarm (Alerts operator of spray wash nozzle blockage)
UHS Makeup Water traveling screen wash pressure LOW	1/2/3/4	Min 1	Min 1: Alarm (Alerts operator of low wash water flow to traveling screen wash system)
UHS Makeup Water traveling screen abnormal (bearing temperature Hi)	1/2/3/4	Max 2 Max 1	Max 2: Alarm and Traveling Screen Trip Max 1: Alarm
UHS Makeup Water System Heat Tracing Failure	1/2/3/4	Max 1	Max 1: Alarm (Alerts operator of equipment failure

Table 9.2-2 — {UHS Makeup Water System Alarm Summary}
(Page 2 of 2)

MCR/RSS Display	Division	Setpoint Name	Function
UHS Makeup Water Pump Forebay Level	1/2/3/4	Min 1 Min 2	Min 1: Alarm (Alerts operator of low water level in UHS Makeup Water Forebay) Min 2: Alarm (Alerts operator that UHS Makeup Water Forebay is at or above Technical Specification Low Water Level)
UHS Makeup Water System Full Level	1/2/3/4	Min 1 Min 2	Min 1: Status display in MCR Min 2: Alarm (Operator to determine the source of leakage in the UHS Makeup Water System and take corrective action)

Figure 9.2-1 — {Potable Water System}

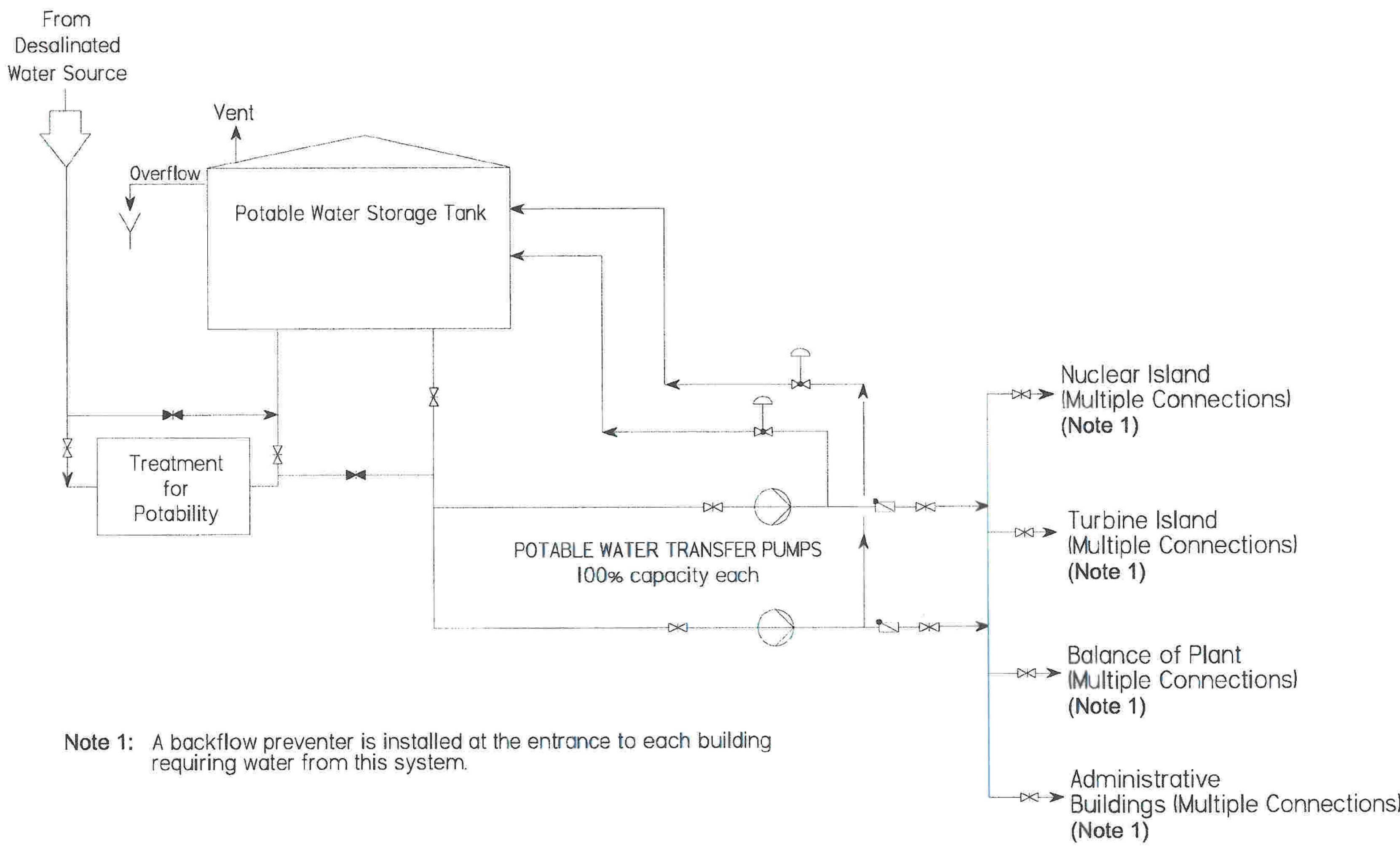


Figure 9.2-2 — {Sanitary Waste Water System}

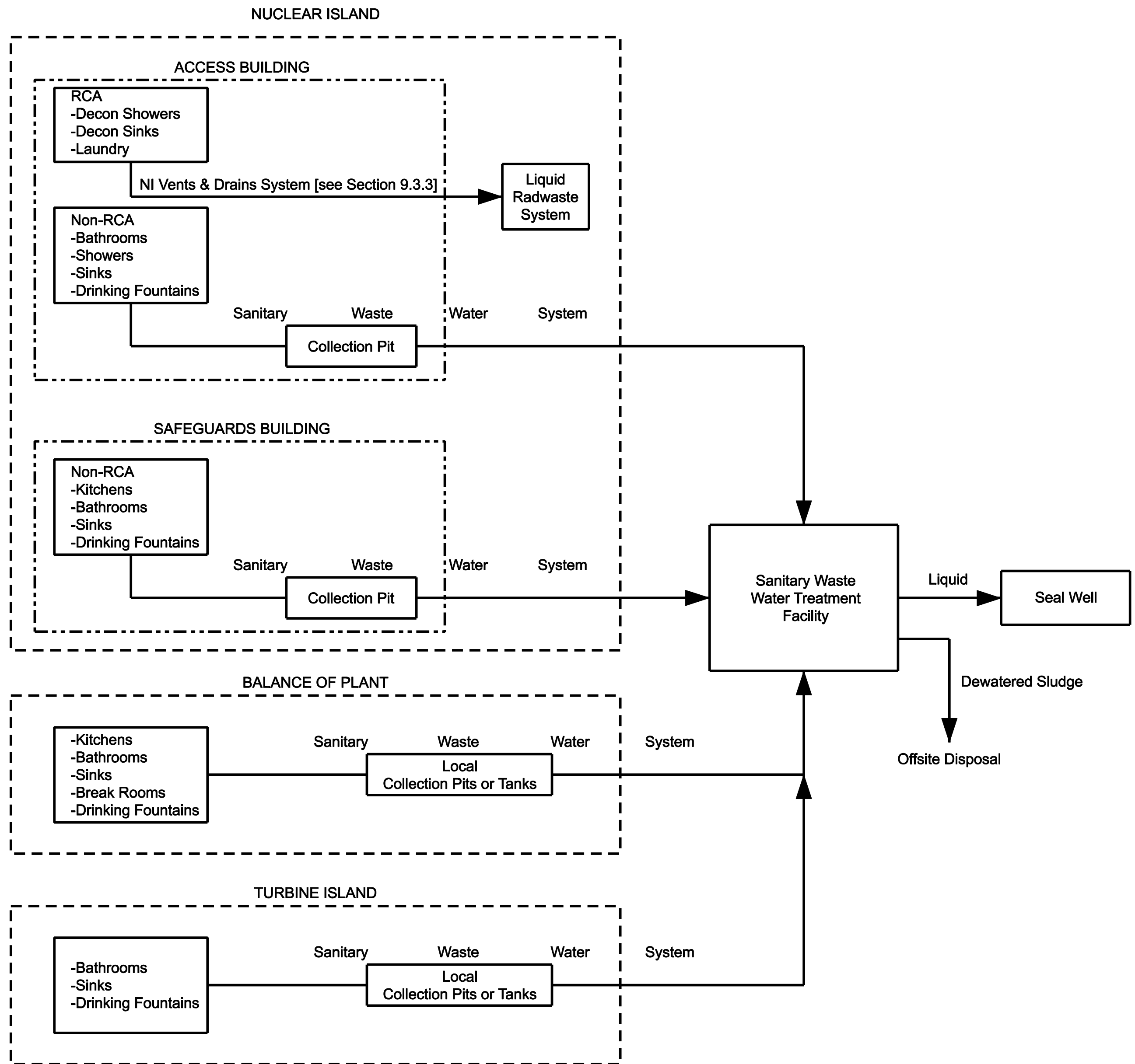
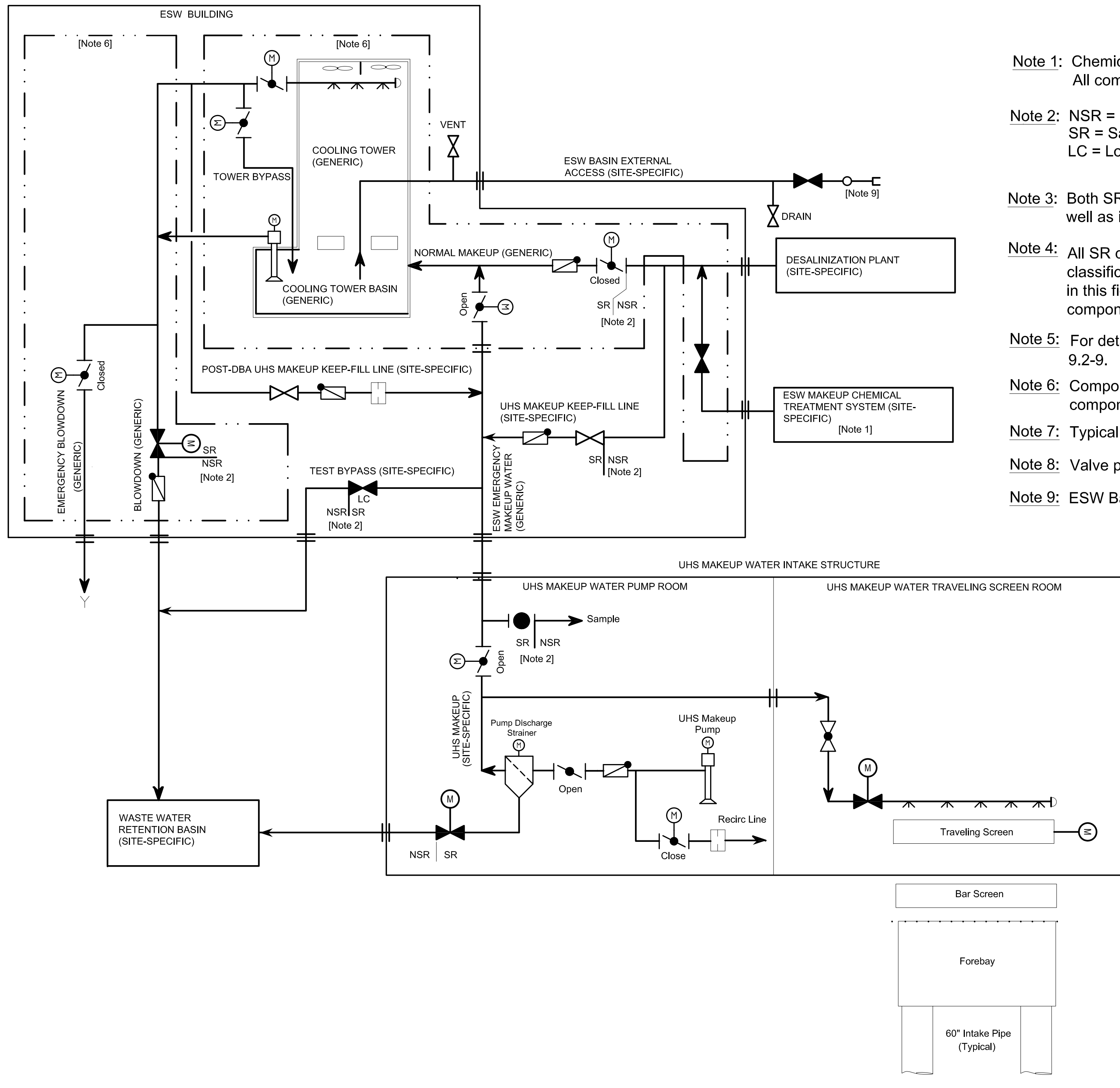


Figure 9.2-3 — {Normal Makeup, Emergency Makeup, Blowdown & Chemical Treatment}



Note 1: Chemical treatment system treats 4 normal makeup trains. All components in this system are NSR

Note 2: NSR = Non Safety Related
SR = Safety Related [typ.]
LC = Lock Closed

Note 3: Both SR blowdown MOVs are utilized for throttling as well as isolation.

Note 4: All SR components in this figure are quality group classification C. NSR components in SR structures in this figure are quality group classification D. All other NSR components in this figure are quality group classification E.

Note 5: For details of the UHS Makeup Water System see Figure 9.2-9.

Note 6: Components within the dashed line are for generic plant and components outside of the dashed lines are for site-specific.

Note 7: Typical for each of 4 independent trains.

Note 8: Valve positions shown reflect post 72 hour DBA operation.

Note 9: ESW Basin External Access Piping 6-way output connection header.

Figure 9.2-4 — {General Area - UHS Makeup Water Intake Structure, CW Intake Structure, and Forebay}

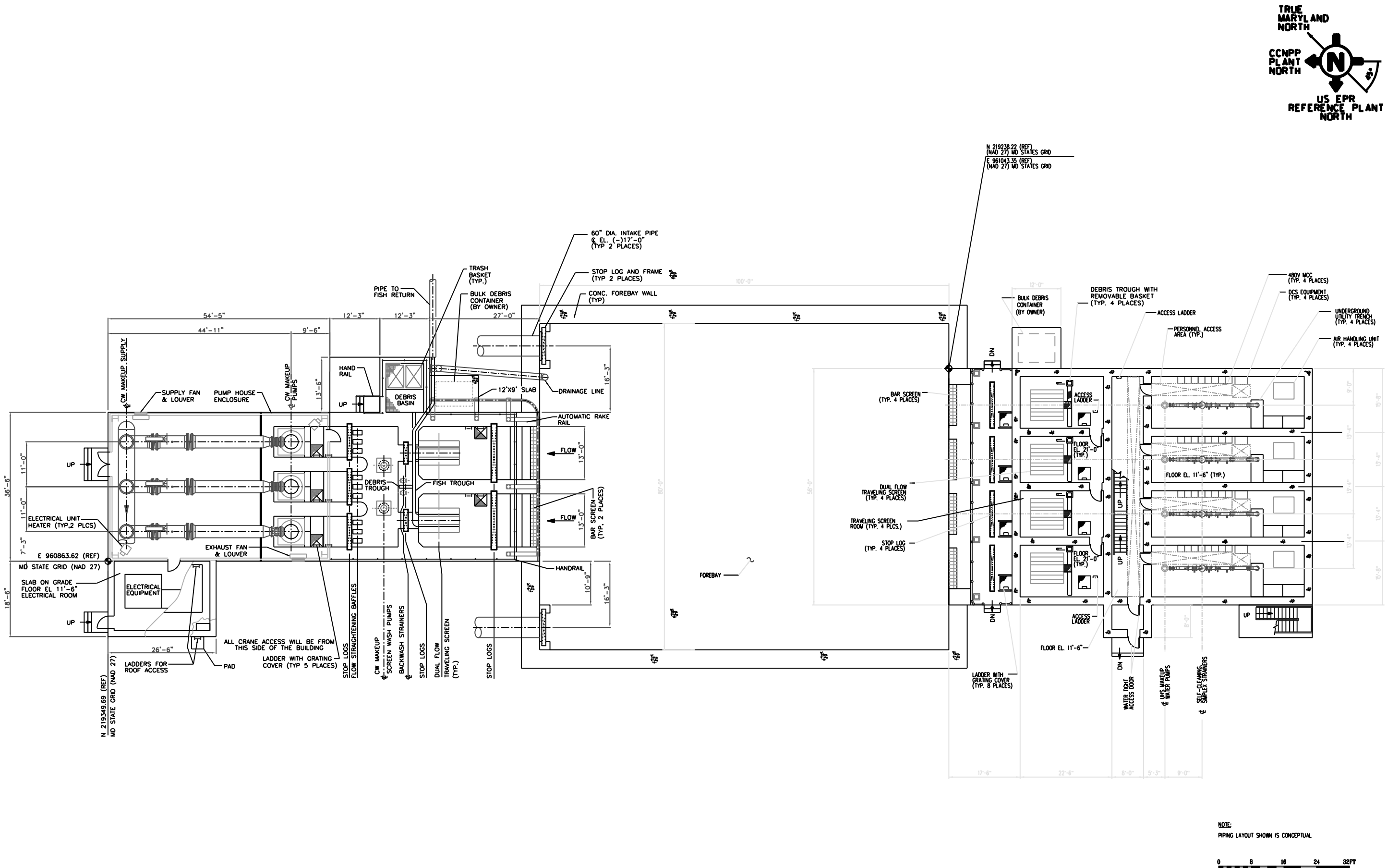


Figure 9.2-5 — {UHS Makeup Water Intake Structure - Plan View at Elevation 11’- 6”}

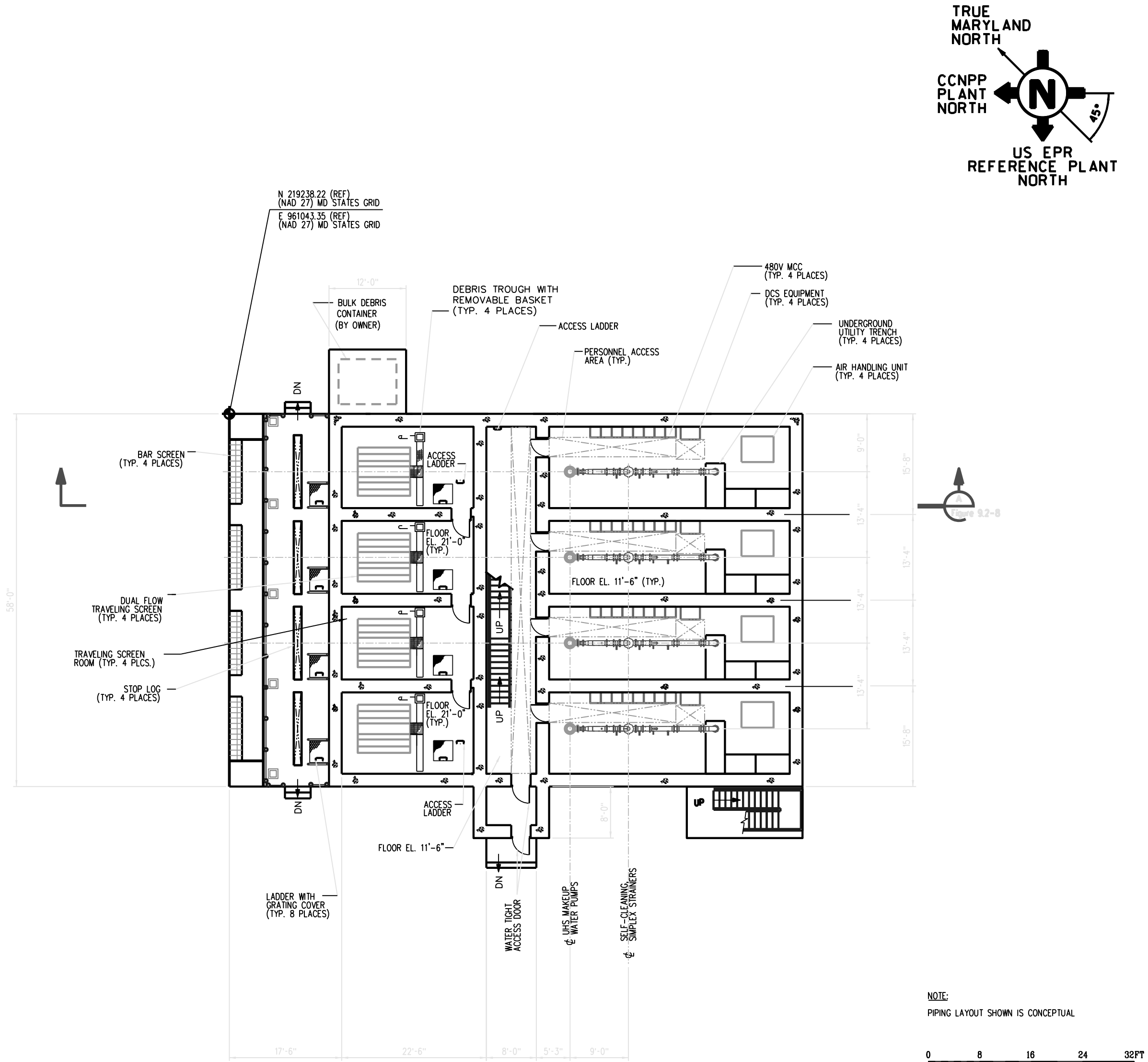


Figure 9.2-6 — {UHS Makeup Water Intake Structure - Plan View at Elevation 26′- 6″}

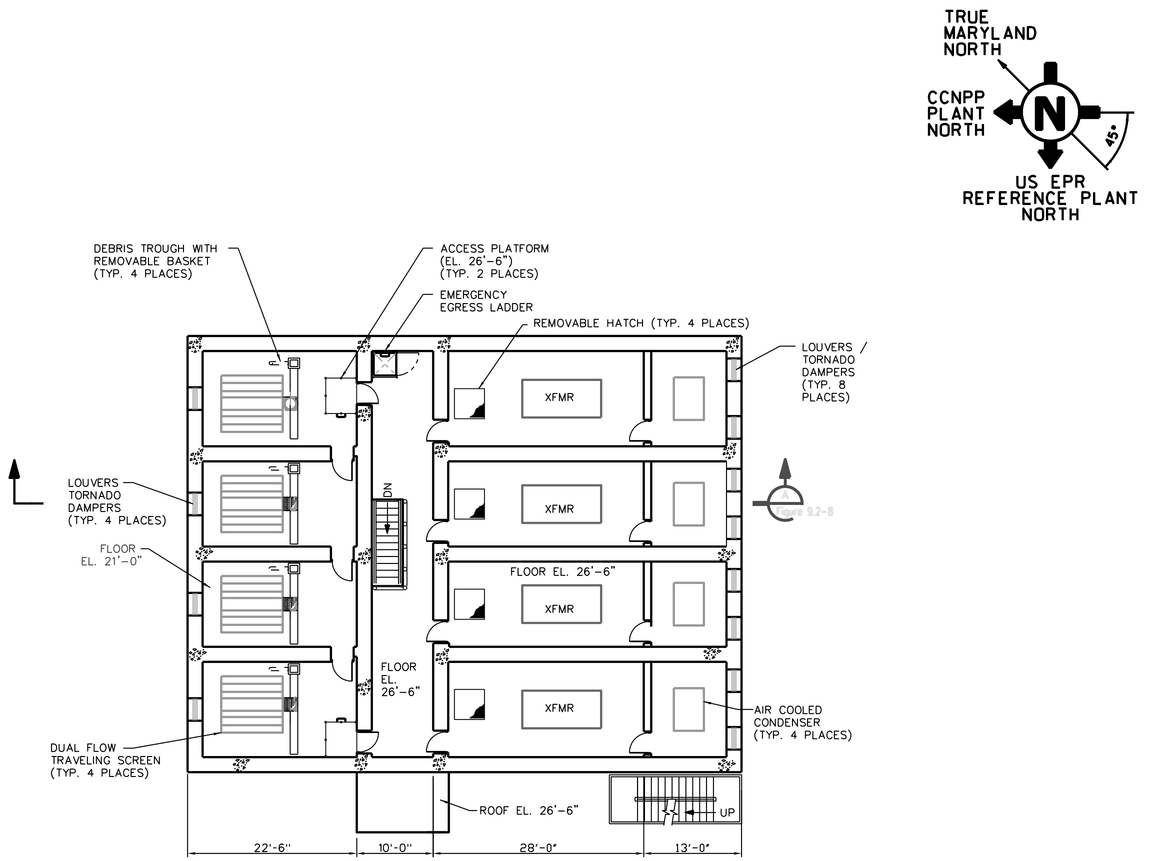


Figure 9.2-7 — {Raw Water and Desalinated Water Supply}

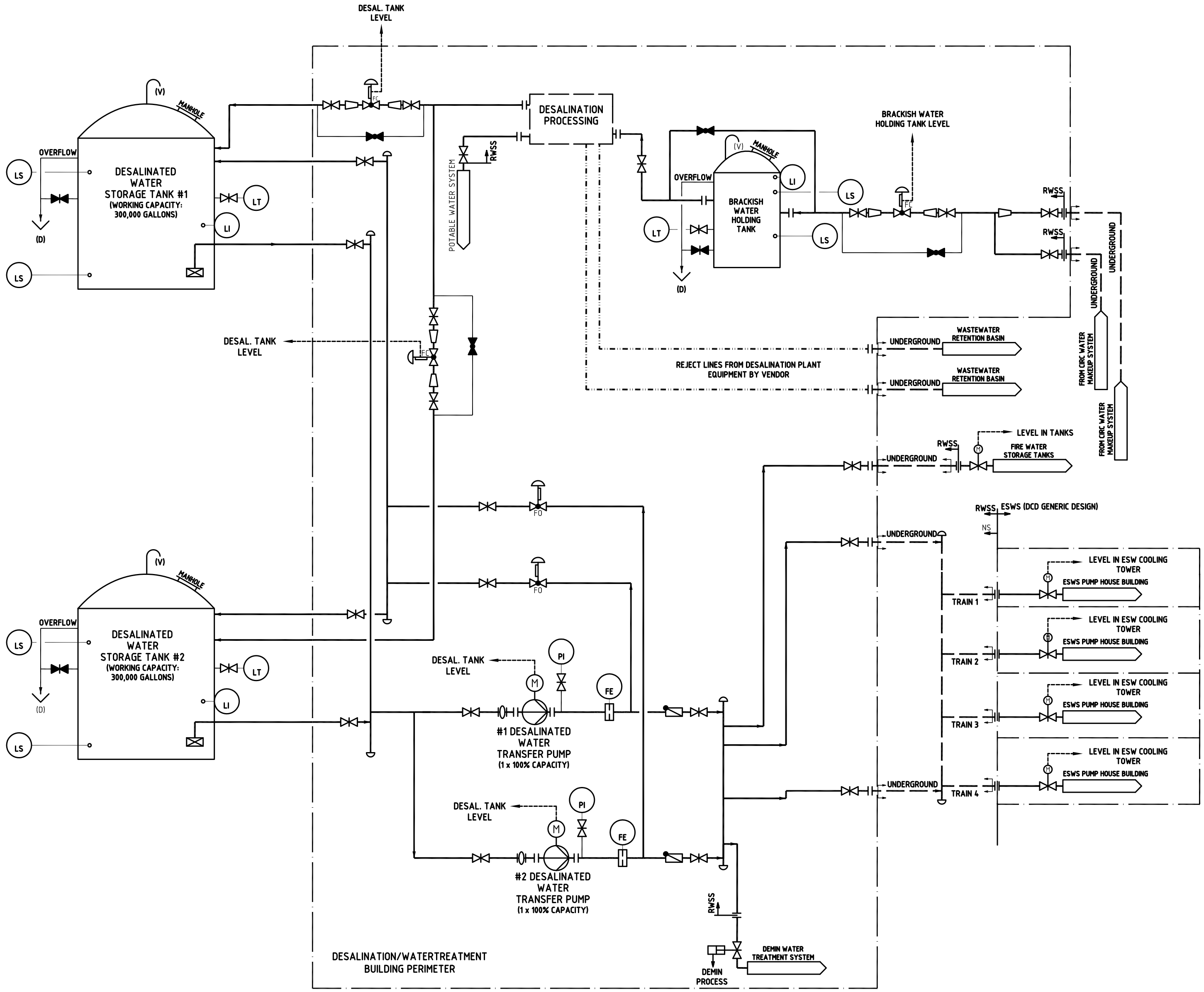


Figure 9.2-8 — {UHS Makeup Water Intake Structure - Section View}

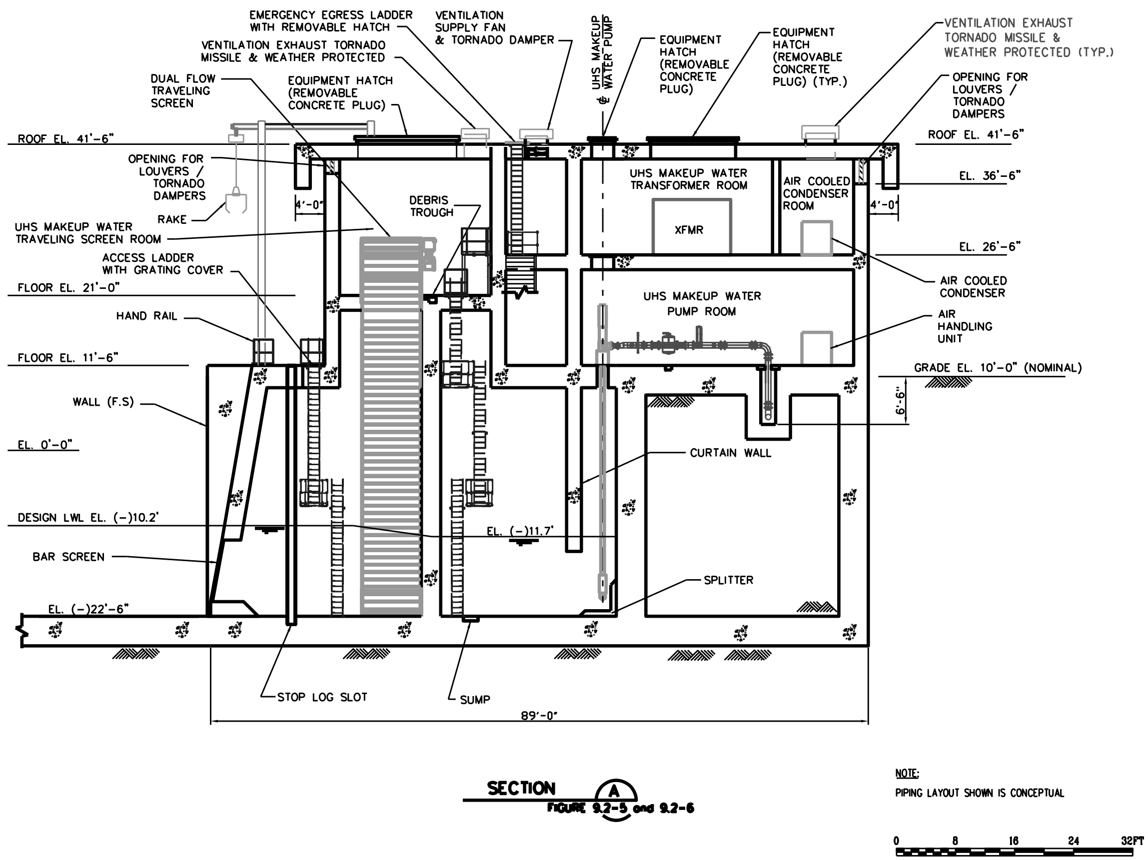


Figure 9.2-9 — {UHS Makeup Water System}

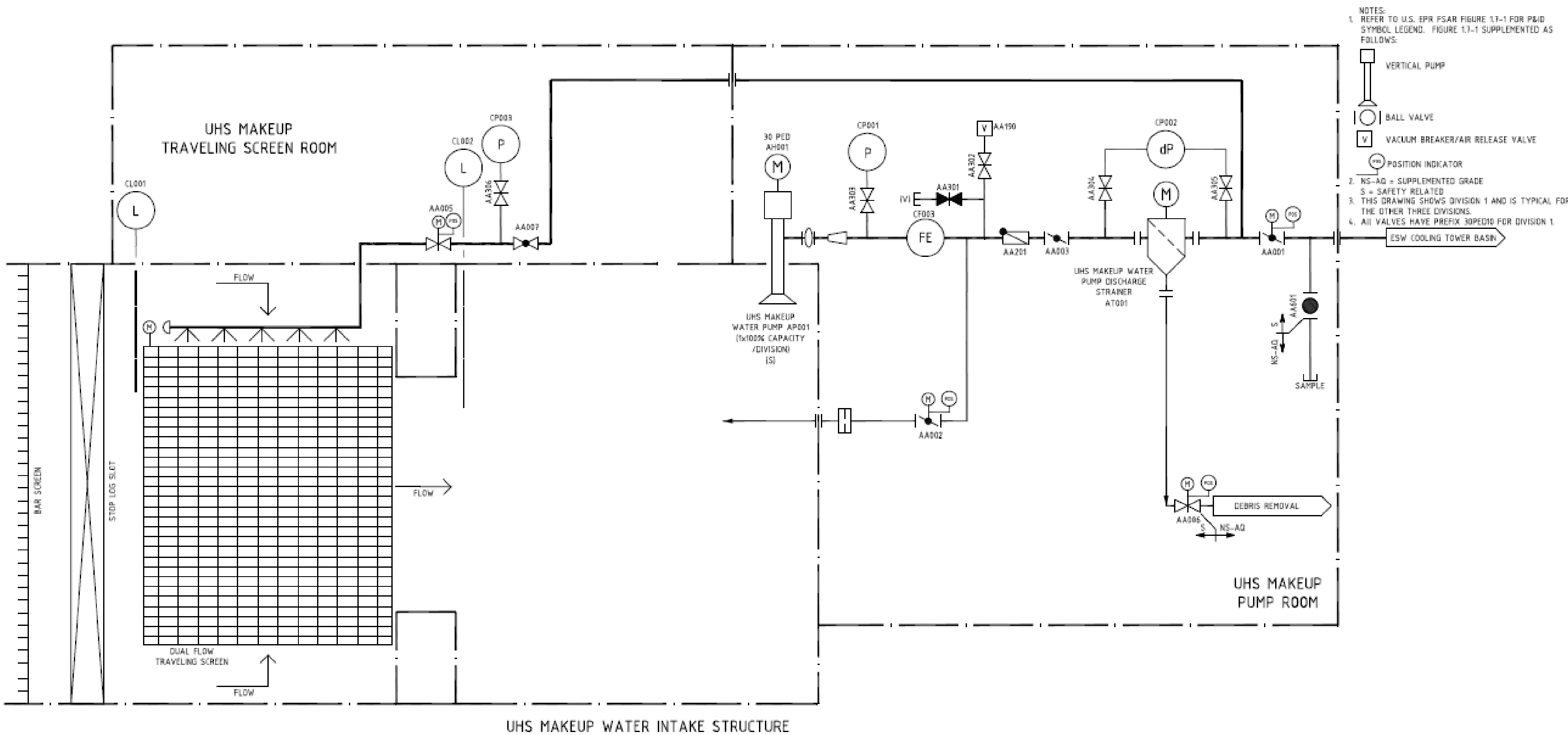
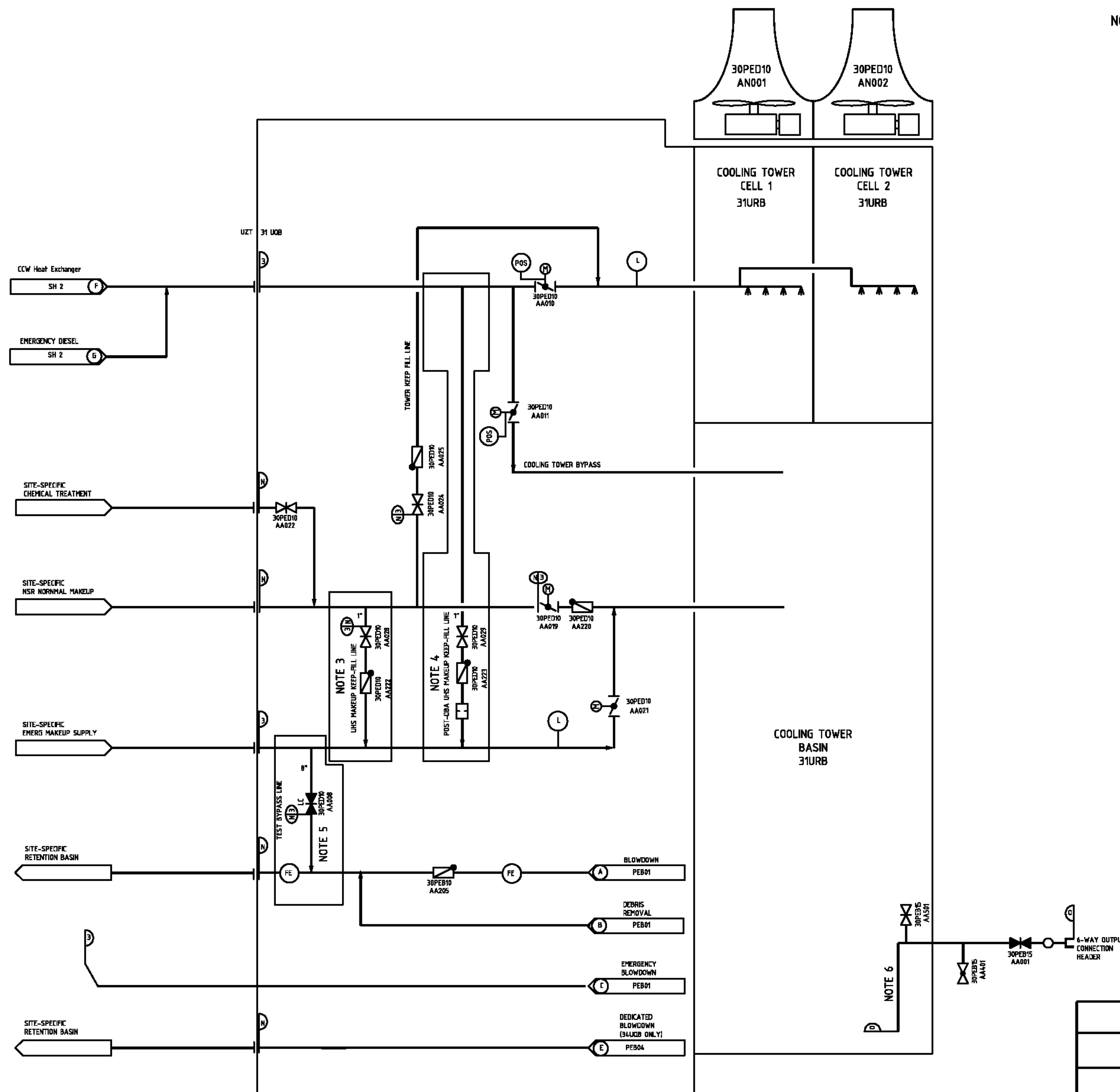


Figure 9.2-10 — {ESWS Emergency Makeup Water System Piping and Instrumentation Diagram}



NOTE:

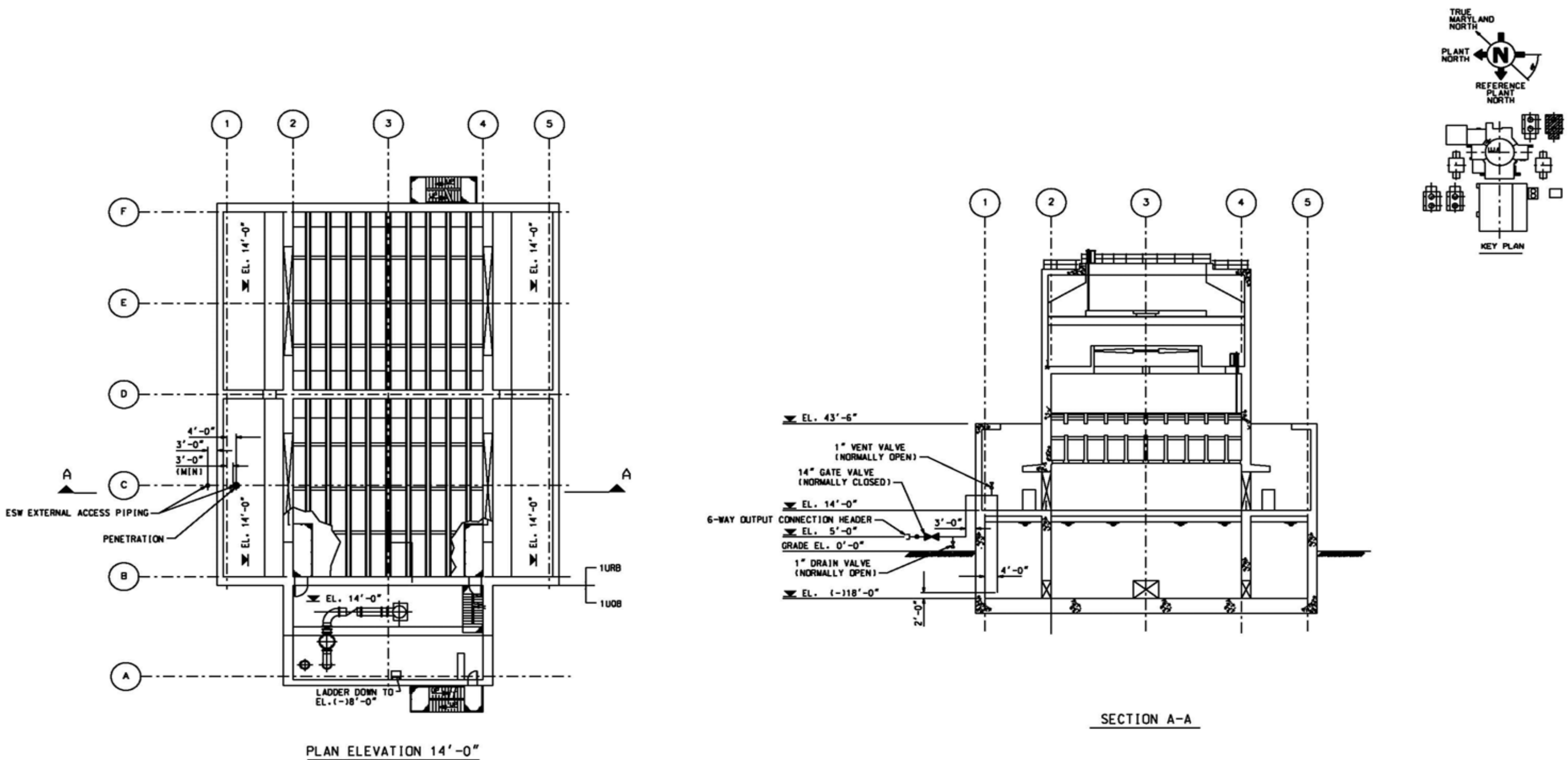
1. THIS DRAWING IS A GENERAL REPRESENTATION OF U.S. EPR FSAR FIGURES 9.2.1-1 & 9.2.5-1 OF TRAIN 1. TRAINS 2, 3, AND 4 ARE SIMILAR, EXCEPT WHERE NOTED.
2. DEFINITION FOR ABBREVIATION USED IN THIS DIAGRAM.
   - PEB - ESSENTIAL SERVICE WATER PIPING SYSTEM
   - PED - ESSENTIAL SERVICE WATER RECIRCULATING SYSTEM
   - 31UQB - ESSENTIAL SERVICE WATER PUMP BUILDING, DIVISION 1.
   - UZT - OUT DOOR AREA.
   - 31URB - ESSENTIAL SERVICE WATER COOLING TOWER STRUCTURE, DIVISION 1.
   - LC - LOCK CLOSED
3. THE UHS MAKEUP KEEP-FILL LINE PROVIDES DESALINATED WATER FROM NON-SAFETY RELATED MAKEUP WATER SYSTEM TO KEEP THE EMERGENCY MAKEUP WATER SYSTEM LINE FULL DURING PLANT NORMAL OPERATION..
4. THE POST-DBA UHS MAKEUP KEEP-FILL LINE PROVIDES MAKEUP WATER FROM SAFETY-RELATED ESW SYSTEM RETURN LINE TO KEEP THE EMERGENCY MAKEUP WATER SYSTEM LINE FULL DURING POST DBA.
5. THE UHS MAKEUP WATER SYSTEM TEST BYPASS LINE PROVIDES CAPABILITY TO BYPASS THE UHS TOWER WITH SALINE WATER DURING MAKEUP WATER SYSTEM TESTING.
6. THE ESW BASIN EXTERNAL ACCESS PIPING PROVIDES CAPABILITY TO DRAIN WATER FROM THE ESW BASIN FOR EMERGENCY USE TO MITIGATE A POTENTIAL LOSS OF LARGE AREA DUE TO EXPLOSION OR FIRE.

LEGEND:

- GATE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- LEVEL
- FLOW
- REDUCER/INCREASER
- ELECTRIC MOTOR, GENERAL

0	N/A	CS-I
N	N/A	II
3	3	I
DESIGN AREA	ASME CLASS	SSC SEISMIC CLASS

Figure 9.2-11 — {ESW Basin External Access Piping - Plan View at Elevation 14’0” and Section A-A}



9.3 PROCESS AUXILIARIES

This section of the U.S. EPR FSAR is incorporated by reference.

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

9.4.1 Main Control Room Air Conditioning System

No departures or supplements.

The interference effects of the UHS cooling tower plumes on the MCR ventilation intake is discussed in Section 9.2.5.3.3.

9.4.2 Fuel Building Ventilation System

No departures or supplements.

9.4.3 Nuclear Auxiliary Building Ventilation System

No departures or supplements.

9.4.4 Turbine Island Ventilation System

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Items in Section 9.4.4:

> A COL applicant that references the U.S. EPR design certification will provide site-specific design information for the turbine building design information for the turbine building ventilation system (TBVS).
>
> A COL applicant that references the U.S. EPR design certification will provide site-specific design information for the switchgear building ventilation system, turbine island (SWBVS).

The COL Items are addressed as follows:

The Turbine Island Ventilation System is comprised of the TBVS and the SWBVS. The site-specific design information for the TBVS and SWBVS are provided in Sections 9.4.4.1 through 9.4.4.6. The information provided applies to both the TBVS and SWBVS, unless otherwise stated.

9.4.4.1 Design Basis

The Turbine Building (TB) and Switchgear Building (SWGB) do not contain safety-related equipment. Therefore, the TBVS and SWBVS do not serve any safety-related functions, have no safety design basis, and are not required to operate during or following a design basis accident. As such, single failure, environmental qualification and redundancy are not applicable to the TBVS and SWBVS.

Turbine Building Ventilation System

The TBVS operates during startup, shutdown, and normal plant operations to maintain acceptable air temperatures in the Turbine Building for equipment operation and for personnel working in the building. The system is not relied upon during Station Blackout and Abnormal (e.g. Loss of Off-Site Power) operation.

The TBVS is sized to provide the heating, ventilation, and cooling requirements during startup, shutdown, and normal plant operations. The system is designed to maintain a positive pressure to mitigate intrusion of dust and dirt into the Turbine Building.

The ambient outside design conditions for the TBVS are established as -10°F for the minimum temperature and 100°F for maximum temperature. The TBVS maintains the bulk average temperature within the Turbine Building during normal plant operation at or above 50°F during winter design conditions and at or below 115°F during summer design conditions.

The rate of ventilation is based on maintaining permissible temperatures in areas with appreciable heat gains. For areas with no appreciable heat gains, the rate of ventilation is based on the number of air changes per hour, depending on the specific area being ventilated.

Switchgear Building Ventilation System, Turbine Island

The SWBVS operates during startup, shutdown, and normal plant operations to maintain acceptable air temperatures in the SWGB for equipment operation and for personnel working in the building. The station blackout (SBO) diesel generators divisions 1 & 2 and associated electrical equipment are located inside the Switchgear Building. Ventilation is provided to the SBO rooms by an independent ventilation system, not by the SWBVS described in this section.

The independent station blackout room ventilation system is described in U.S. EPR FSAR Section 9.4.10.

The SWBVS is sized to provide heating, ventilation, and cooling requirements during startup, shutdown, and normal plant operations in the SWGB electrical rooms (battery rooms, Motor Control Center (MCC) rooms, DCS rooms and equipment rooms), and auxiliary boiler rooms.

The ambient outside design conditions for the SWBVS HVAC systems are established as -10°F for the minimum temperature and 100°F for the maximum temperature. The ambient outside design temperature for the once-through ventilation systems of the SWBVS is established as -5°F for the minimum temperature and 95°F for the maximum temperature.

The TBVS and SWBVS provide the following functions:

- Maintain personnel comfort in normally occupied areas of the building
- Maintain closed space ambient conditions for proper equipment operation within the Turbine Building and Switchgear Building
- Remove heat generated by equipment
- Provide fire dampers to separate the different fire zones
- Smoke venting of the turbine hall and Switchgear Building, after a fire in the area
- Availability of system operation with manual or automatic actuation for essential system functions
- Provide ventilation for the battery rooms, within the Switchgear Building

9.4.4.2 System Description

Turbine Building Ventilation System

The Turbine Building Ventilation System is shown in Figure 9.4-1.

Outside air is supplied to the Turbine Building by fans via intake louvers and exhausted to the atmosphere by roof exhaust ventilators. During normal operation outside air is mixed with recirculated air to maintain a positive pressure in the Turbine Building.

The TBVS removes heat generated by equipment and from the environment to maintain acceptable indoor ambient conditions. Unit heaters are used to maintain the minimum room temperatures within the Turbine Building.

An air conditioning unit in the sampling room located on the basement floor maintains the sample lab equipment at a design minimum temperature of 50°F, and a design maximum temperature of 95°F.

There are no radiation or safety actuation signals associated with the TBVS. No TBVS realignment or operator action is required in response to plant radiation or safety actuation signals.

The TBVS is designed as a non-seismic system since there are no seismic Category I SSCs inside the Turbine Building.

Switchgear Building Ventilation System, Turbine Island

Each SWGB electrical distribution train will have its own independent and identical heating, ventilation, and air conditioning (HVAC) system. Outside makeup air supplied via intake louvers is mixed with the recirculated air returned from the equipment rooms, before it enters the air conditioning unit to be filtered, heated or cooled, and humidified. A portion of the recirculated air from the equipment rooms is exhausted back to the atmosphere. The battery rooms have 100% of the air exhausted to the atmosphere. The air conditioning units maintain the electrical and occupied rooms at the associated design temperatures. During cold weather, electric heaters in the supply ducts maintain the required minimum temperature in SWGB battery rooms and workstations.

The SWBVS removes heat generated by equipment and from the environment to maintain acceptable indoor ambient conditions.

The SWBVS also provides independent and identical ventilation of the spreading rooms, cable chases, and HVAC equipment rooms for each distribution train. During cold weather, electric unit heaters recirculate the air in the room to maintain the required minimum temperature.

The SWBVS provides ventilation of the stair towers along with the auxiliary boiler room, equipment rooms and electrical room. During cold weather, electric unit heaters recirculate the air in the rooms to maintain the required minimum temperature.

There are no radiation or safety actuation signals associated with the SWBVS. No SWBVS realignment or operator action is required in response to plant radiation or safety actuation signals.

The SWBVS is designed as a non-seismic system since there are no seismic Category I SSCs inside the SWGB.

9.4.4.2.1 Component Description

The following major components of the TBVS and SWBVS are designed to the codes and standards identified below. Components are non-seismic and non safety-related.

Air Conditioning Units

The TBVS air conditioning unit for the sampling room is located on the basement floor of the Turbine Building. The SWBVS air conditioning units serve the electrical equipment rooms, battery rooms, workstations and access corridors; each unit is sized based on the occupancy and environmental conditions associated with the area under consideration. The cooling and heating coils are designed per ASME AG-1-2003 (ASME, 2003).

Ventilation Fans

Two basic types of ventilation fans are used for air supply, exhaust, and recirculation. These are propeller fans for low pressure, and axial fans for higher pressure (ducted) applications. Fan performance is rated to Air Moving and Conditioning Association ANSI/AMCA 210 (ANSI, 1999), ANSI/AMCA 211 (ANSI, 1987), and ANSI/AMCA 300 (ANSI, 1985).

Roof Exhaust Fans

To maintain acceptable pressures within the TB, roof exhaust fans are provided which work in conjunction with the relief vents. Fan performance is rated to Air Moving and Conditioning Association ANSI/AMCA 210 (ANSI, 1999), ANSI/AMCA 211 (ANSI, 1987), and ANSI/AMCA 300 (ANSI, 1985).

Relief Vents

TB supply fans that are associated with relief vents are capable of recirculating the air as well as providing air to a room. The relief vents provide a flow out of the room. The relief vents are designed per ASME AG-1-2003 (ASME, 2003).

Electric Unit Heaters and Hot Water Space Heaters

To maintain the minimum room temperatures within the Turbine Building and Switchgear Building, electric unit heaters or hot water space heaters are provided. Hot water space heaters are supplied from the space heating system with either the secondary steam or auxiliary boiler. Heaters are designed to commercial standards.

Air Filters

Air filters are provided for various fans to reduce the amount of dust within the ventilated area and prevent large particles from entering the system. The air conditioning units contain a high efficiency air filter to reduce the amount of dust on the cooling coils. The remaining ventilation fans use moderate efficiency filters. The filters are replaceable modular filter elements. The filters are designed per ASME AG-12003 (ASME, 2003) and tested per ANSI/ASHRAE Standard 52.2 (ANSI/ASHRAE 1999).

Louvers

Outside air is supplied by fans via intake louvers. The louvers are designed per ASME AG-1-2003 (ASME, 2003).

Dampers (manual, pneumatic, motor-operated, fire)

Manual dampers are used in the ducted system to balance airflow. Dampers are adjusted during initial plant testing to establish accurate flow balance between the rooms.

Pneumatic dampers are used to control the flow of the air through the various ductwork branches and to maintain a slight positive pressure in the TB. In cases where the dampers modulate (i.e., variable intake/recirculation supplies), the dampers are of opposed blade design. Dampers used for shut-off are of parallel blade design. Dampers in ductwork that exceed certain higher flow rates use airfoil shaped blades. This minimizes the pressure drop across the damper. TBVS motor operated dampers fail "as-is" in the case of power loss. SWBVS motor operated dampers fail to "close" or "open" position in case of power loss, depending on the function of the dampers.

When ductwork passes through a fire barrier wall, fire dampers are installed in the wall with the ductwork mounted on either side. A fire is detected by a fire sensor and reported in the fire alarm system, which automatically closes the corresponding fire damper. Fire dampers are also automatically closed via a fusible link. Duct access is provided for inspecting and replacing fire damper fusible links. The fire dampers have a fire rating consistent with the associated fire barrier wall rating. The dampers are designed per ASME AG-1-2003 (ASME, 2003) and UL 555-2006 (UL, 2006).

Ductwork and Accessories

The supply and exhaust air ducts are constructed of galvanized sheet steel and are structurally designed for fan shutoff pressure plus margin. The ductwork meets the design, testing, and construction specifications of ASME AG-1-2003 (ASME, 2003).

Humidifiers

Humidifiers are installed to maintain ambient humidity conditions in the electrical rooms. Humidity levels are controlled by the humidity sensors in the room.

9.4.4.2.2 System Operation

Turbine Building Ventilation System

The TBVS is manually controlled. Roof exhaust fans and supply fans are manually started and stopped as required to satisfy space temperature conditions and to maintain a positive pressure in the Turbine Building.

Electric unit heaters and hot water space heaters are controlled automatically or manually. In the automatic mode, the electric unit heater fan motors are thermostatically controlled by their respective space thermostats. The space heating system supplies hot water to the hot water space heaters from either the secondary steam or auxiliary boiler.

Switchgear Building Ventilation System, Turbine Island

The SWBVS maintains the required ambient conditions in each electrical division of the SWGB, including the workstations, access corridors and equipment rooms. The main electrical equipment rooms (battery room, UPS equipment rooms and common equipment room) and occupied spaces are provided with outside air mixed with recirculated air that is processed through air conditioning units per train. The battery rooms' air is completely exhausted to the outside via redundant exhaust fans. The temperature and humidity are controlled by local temperature and humidity sensors. The battery rooms and workstation rooms have electric heaters installed in the supply ducts to maintain the minimum temperatures in the rooms.

The SWBVS maintains the required ambient condition in each division of the cable tray chases, spreading rooms, stair towers and HVAC equipment rooms by supplying filtered outside air to each room and exhausting the air to outside to maintain the required ventilation requirements. During winter conditions, electric unit heaters recirculate the air in each room to maintain the minimum required temperature. The unit heaters are thermostatically controlled by their respective area thermostats.

The auxiliary boiler room, along with its associated electrical and equipment rooms, are provided with supply air fans that draw outside air through filters to provide the required air delivery flow rates. Exhaust fans are used to exhaust the air from the room to the outside. During winter conditions, electric unit heaters recirculate the air in each room to maintain the minimum required temperature. The unit heaters are thermostatically controlled by their respective area thermostats.

Components of the Switchgear Building Ventilation System, Turbine Island will be powered from the Normal Power Supply Systems (NPSS). Redundant components will be separated into different trains so that the system can remain operable during maintenance or in the case of a failure of one electrical train.

9.4.4.3 Safety Evaluation

The TBVS and SWBVS perform no safety-related functions; therefore a systems failure analysis is not required. The TBVS and SWBVS are not required to operate during or following a design basis accident. TBVS and SWBVS components are non safety-related and non-seismic.

There are no safety-related SSCs or important to safety SSCs in the Turbine Building or Switchgear Building; therefore GDC 2 is not applicable to the TBVS or SWBVS.

The non safety-related TBVS and SWBVS share no SSCs between units; therefore this does not adversely impair any safety-related system, as required by GDC 5.

The TBVS and SWBVS are not exposed to any radiological contamination; therefore the requirements of GDC 60 are not applicable.

9.4.4.4 Inspection and Testing Requirements

Shop inspection and testing are performed by the manufacturer for major components, including heating and cooling coils and controls.

The TBVS and SWBVS are designed to permit periodic inspection of system components during normal plant operation. The operating equipment is accessible for visual inspection during all plant operating modes.

Fans are rated and tested in accordance with the standards of Air Moving and Conditioning Association (ANSI/AMCA 210 (ANSI, 1999), ANSI/AMCA 211 (ANSI, 1987), and ANSI/AMCA 300 (ANSI, 1985).

The performance and testing requirements of the isolation dampers are per ASME AG-1-2003 (ASME, 2003).

The filters meet the specifications of ANSI/ASHRAE Standard 52.2 (ANSI/ASHRAE, 1999).

The ductwork meets the design, construction, and testing requirements of ASME AG-1-2003 (ASME, 2003).

9.4.4.5 Instrumentation Requirements

Indication of the operational status of the equipment, position of remotely operated dampers, instrument indications and alarms are provided in the Main Control Room (MCR). TB Fans, motor-operated dampers, and electric unit heaters are manual and auto-operable from the MCR. The SWBVS is controlled by the Process Automation System (PAS). Local instruments are provided to measure differential pressure across filters, flow, temperature, and pressure. The fire detection and sensors information will be delivered to the fire detection systems.

9.4.4.6 References

ANSI, 1985. Air Moving and Conditioning Association (ANSI/AMCA) 300, Reverberant Room Method of Testing Fans for Rating Purpose, American National Standards Institute, 1985.

ANSI, 1987. Air Moving and Conditioning Association (ANSI/AMCA) 211, Certified Ratings Program-Air Performance, American National Standards Institute, 1987.

ANSI, 1999. Air Moving and Conditioning Association (ANSI/AMCA) 210, Laboratory Methods of Testing Fans of Aerodynamics Performance Rating, American National Standards Institute, 1999.

ANSI/ASHRAE, 1999. Standard 52.2, Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size, American National Standards Institute, 1999.

ASME, 2003. ASME AG-1-2003, Code of Nuclear Air and Gas Treatment, American Society of Mechanical Engineers, 2003.

UL, 2006. Underwriters Laboratories' Standard UL 555, Standard for Safety Fire Dampers, 2006.

9.4.5 Safeguard Building Controlled-Area Ventilation System

No departures or supplements.

The interference effects of the UHS cooling tower plumes on the Safeguard Building ventilation intake is discussed in Section 9.2.5.3.3.

9.4.6 Electrical Division of Safeguard Building Ventilation System (SBVSE)

No departures or supplements.

9.4.7 Containment Building Ventilation System

No departures or supplements.

9.4.8 Radioactive Waste Building Ventilation System

No departures or supplements.

9.4.9 Emergency Power Generating Building Ventilation System

No departures or supplements.

The interference effects of the UHS cooling tower plumes on the EPG ventilation intake is discussed in section 9.2.5.3.3.

9.4.10 Station Blackout Room Ventilation System

No departures or supplements.

9.4.11 Essential Service Water Pump Building Ventilation System

No departures or supplements.

The interference effects of the UHS cooling tower plumes on the ESW ventilation intake is discussed in section 9.2.5.3.3.

9.4.12 Main Steam and Feedwater Valve Room Ventilation System

No departures or supplements.

9.4.13 Smoke Confinement System

No departures or supplements.

9.4.14 Access Building Ventilation System

No departures or supplements.

9.4.15 {UHS Makeup Water Intake Structure Ventilation System

The section was added as a supplement to the U.S. EPR FSAR.

9.4.15.1 Design Bases

The UHS Makeup Water Intake Structure Ventilation System maintains acceptable temperatures to support operation of the UHS Makeup Water Intake System pumps, traveling screens, and associated electrical distribution equipment, which are required to operate under design basis accident conditions. The UHS Makeup Water Intake Structure Ventilation System also maintains acceptable room temperatures within the intake structure personnel access areas. The UHS Makeup Water Intake Structure Ventilation System maintains a minimum temperature of 41° F (5° C) and a maximum temperature of 104° F (40° C) in the UHS Makeup Water Intake Structure, based on the 0% exceedance winter design basis outdoor ambient air temperature of 0°F DB, and the 0% exceedance summer design-basis outdoor ambient air temperatures of 102°F DB/ 80°F WB, respectively. The system support operation of the UHS Makeup Water Intake System pumps, dual flow traveling screens, screen wash system and associated electrical distribution equipment as well as to support personnel access to these spaces. This temperature range maintains a mild environment in the building, as defined in US EPR FSAR Section 3.11.

Components of the UHS Makeup Water Intake Structure Ventilation System are located inside the applicable divisions' UHS Makeup Water Pump rooms, transformer rooms, air-cooled condenser rooms, the intake structure personnel access areas and traveling screen rooms. The UHS Makeup Water pump, traveling screen, transformer and air-cooled condenser rooms are designed to withstand the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, and external missiles (GDC-2).

9.4.15.2 System Description

9.4.15.2.1 General Description

A drawing of the UHS Makeup Water Intake Structure Ventilation System is shown in Figure 9.4-2 The UHS Makeup Water Intake Structure Ventilation System consists of three (3) sub-systems: the makeup pump room ventilation system, the Intake Structure personnel access areas ventilation system, and the traveling screen room ventilation system.

The UHS Makeup Water Intake Structure Ventilation System supplies conditioned air for cooling, heating, and ventilating each divisional UHS Makeup Water System pump and transformer room in the UHS Makeup Water Intake Structure. A safety-related split-system air conditioner is provided to cool and ventilate each UHS Makeup Water System pump and transformer room. Each air conditioning system recirculates room air and draws outside air to ventilate the rooms. The supply air flow path includes a missile-protected outside air intake, tornado damper, and an outside air makeup connection to the safety-related air handling unit, ducted from the air-cooled condenser room. The air-cooled condenser room forms the supply air plenum for the air-cooled condenser and the makeup air supply. Distribution ductwork supplies air from the air handling unit to the pump room and the transformer room above. Air is returned to the air handling unit via recirculation ductwork from the pump and transformer rooms. A nonsafety-related exhaust fan is provided to exhaust a portion of the pump and transformer rooms air. The exhaust air flow path consists of exhaust ductwork from each room drawn via an exhaust fan, which discharges into an exhaust plenum shared with the exhaust from the air-cooled condenser. The exhaust plenum discharges through the roof of the building through a check damper, tornado damper and missile shield.

Nonsafety-related supply and exhaust fans are provided to heat and ventilate the intake structure personnel access areas corridors. The supply air ductwork is provided with a nonsafety-related duct heater to heat the supply air in the winter. Both supply and exhaust openings are protected from missiles and provided with tornado dampers.

Each traveling screen room is ventilated by a safety-related exhaust fan which draws outside air through a missile protected outside air intake (located above the EL. 33.2 ft (10.11 m) flood level), tornado damper and motor operated isolation damper. A safety-related unit heater is provided in each traveling screen room to maintain the minimum required temperature of 41° F (5° C) in the winter. The traveling screen room exhaust air flow path consists of exhaust ductwork, check damper, tornado damper and missile shield.

9.4.15.2.2 Component Description

Air Conditioning (AC) Units

The air conditioning systems utilize safety-related split-system units. Each systems' air-cooled condenser section (i.e., condenser fan, coil and compressor) is located in its own room, which forms a supply air plenum to provide cooling air from outdoors via missile protected openings located above the EL. 33.2 ft. (10.11 m) flood level. Each evaporator section (i.e., filter, evaporator coil, electric heating coil and supply air fan) is located in its divisional pump room. AC unit capacities are based on the design ambient conditions and the required room temperature range. The air conditioning equipment shall be designed in accordance with ASME AG-1 2003 (ASME, 2003).

Ductwork and Accessories

Ductwork is constructed of galvanized steel and is structurally designed for the fan shutoff pressure. The ductwork meets the design, construction and testing requirements of ASME AG-1-2003 (ASME, 2003).

Air Conditioning Unit Condensate Drip Pans

Each air conditioning unit has a drip pan installed to collect the condensate that forms in the evaporator section and directs the condensate to the local sump.

Air Supply Fans

Fans are centrifugal or axial type with electric motor drive. Fan performance is rated in accordance with ANSI/AMCA-210-1999 (ANSI, 1999), ANSI/AMCA-211-1987 (ANSI, 1987), and ANSI/AMCA-300-1985 (ANSI, 1985). The traveling screen room axial exhaust air fan is designed as safety-related and Seismic Category I.

Unit Heaters

Safety-related and Seismic Category I unit heaters, consisting of fans, thermostats and electric heating coils are provided in each traveling screen room to maintain a minimum room temperature above the lower design temperature limit of 41°F, based on a minimum outside ambient temperature of 0°F. Unit heaters meet the design, construction and testing requirements of ASME AG-1-2003 (ASME, 2003).

Dampers

Dampers meet the design, construction and testing requirements of the applicable portions of ASME AG-1-2003 (ASME, 2003).

Electrical Duct Heater

An electric duct heater is provided to temper the air supplied to the UHS Makeup Water Intake Structure personnel access areas.

9.4.15.2.3 System Operation

Normal Plant Operation

During normal plant operation, the UHS Makeup Water System pumps are not in operation, except for the performance of periodic surveillance tests. The UHS Makeup Water Intake Structure Ventilation System functions to maintain acceptable room temperatures for starting and operating the UHS Makeup Water System pumps, traveling screens and screen wash system, as well as supporting the operation of the electrical distribution equipment for the UHS Makeup Water System and for personnel comfort. The room temperature is monitored and controlled using the temperature sensors located in each pump room, transformer room, the intake structure personnel access areas and each traveling screen room. In the event cooling is required in any UHS Makeup pump or transformer room(s), the associated divisions' UHS Makeup Water System Intake Structure Ventilation is started on high room temperature to supply cold conditioned air to the associated division's pump and transformer room. When the temperature in the traveling screen room reaches the high temperature set point, the associated vane axial exhaust fan is started to draw cooler ambient air into the room and exhaust the warmer air, to maintain the room below 104°F (40 °C).

Abnormal Operating Conditions

The UHS Makeup Water System (UHSMWS) is comprised of four (4) independent trains, each supported by its dedicated, safety-related UHSMWS Ventilation System. Two out of the four trains are required for the UHSMWS to perform its safety function. If one or more components of a UHS Makeup Pump Room Ventilation System fail, that ventilation system may not be able to maintain the required ambient conditions in the associated UHS Makeup Water pump, traveling screen, or transformer room. Failure of one UHS Makeup Pump Room Ventilation System may result in inoperability of that train of the UHS Makeup Water System. However, this failure does not affect the other three (3) redundant trains of the UHS Makeup Water Ventilation System. The heating and ventilating systems serving the UHS Makeup Water Intake Structure personnel access areas and the exhaust air system of the makeup pump room(s) and transformer room(s) are NS-AQ, and not required to operate in order for any UHS Makeup Water System to perform its safety function.

Plant Accident Conditions

The UHS Makeup Water Intake Structure Ventilation System also maintains the required ambient conditions in each trains' UHS Makeup Water pump, traveling screen, and transformer room, in case the UHS Makeup Water pumps, traveling screens and screen wash system are required to operate.

9.4.15.3 Safety Evaluation

The UHS Makeup Water Intake Structure Ventilation System has sufficient heating and cooling capacity to maintain each trains' pump, traveling screen, and transformer room at temperatures between 41° F (5°C) and 104° F (40°C), when the UHS Makeup Water System equipment operates at rated load (cooling mode), and, is on standby (heating mode).

The safety-related portions of the UHS Makeup Water Intake Structure Ventilation System are designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other similar natural phenomena. Sections 3.3, 3.4, 3.5, 3.7, and 3.8 provide the bases for the adequacy of the structural design of the building.

No single failure compromises the safety functions of the UHS Makeup Water System; however, active failure of an air conditioning system or safety-related traveling screen room exhaust fan will render the associated UHS Makeup Water System inoperable. Power supplies to safety-related electrical components and controls for the UHS Makeup Water Intake Structure Ventilation System are provided from their respective divisional Class 1E Emergency Power Supply system.

9.4.15.4 Inspection and Testing Requirements

Section 14.2.14.8 provides the initial plant startup testing for the UHS Makeup Water Intake Structure Ventilation System.

After the plant is brought into operation, periodic inspections and tests of the UHS Makeup Water Intake Structure Ventilation System are performed to verify proper operation. Scheduled inspections and tests are necessary to verify system operability.

Testing to verify the UHS Makeup Water Intake Structure Ventilation System continued capability to remove design heat loads will be coordinated with full flow performance testing of each division's respective UHS Makeup Water System to establish equipment room design basis heat loads to the maximum extent practical. Testing to verify the systems maintain the minimum room design temperature will be performed with all equipment secured.

9.4.15.5 Instrumentation Requirements

Safety-related Instrumentation and Control (I&C) functions of the UHS Makeup Water Intake Structure Ventilation System, as well as their local supporting power systems equipment, will be allocated to the Safety Automation System (SAS). The Human Machine Interface (HMI) for monitoring and operating the safety-related equipment associated with the UHS Makeup Water Intake Structure Ventilation System is the Safety Information and Control System (SICS) and the Process Information and Control System (PICS).

Initial in-place testing of safety-related components of the UHS Makeup Water Intake Structure Ventilation System is performed in accordance with ASME AG-1-2003 (ASME, 2003) and ASME N510-1989 (ASME, 1989).

9.4.15.6 References

ANSI, 1985. Reverberant Room Method for Sound Testing of Fans, ANSI/AMCA-300-1985, American National Standards Institute/Air Movement and Control Association International, Inc.,1985.

ANSI, 1987. Certified Ratings Program-Product Rating Manual for Fan Air Performance, ANSI/AMCA-211-1987, American National Standards Institute/Air Movement and Control Association International, Inc.,1987.

ANSI, 1999. Laboratory Methods of Testing Fans for Aerodynamic Performance Rating, ANSI/AMCA-210-1999, American National Standards Institute/Air Movement and Control Association International, Inc.,1999.

ASME, 1989. Testing of Nuclear Air-Treatment Systems, ASME N510-1989, American Society of Mechanical Engineers, 1989.

ASME, 2003. Code on Nuclear Air and Gas Treatment, ASME AG-1, American Society of Mechanical Engineers, 2003.}

9.4.16 Fire Protection Building Ventilation System

{This section was added as a supplement to the U.S. EPR FSAR.

The Fire Protection Building Ventilation System provides an environment suitable for the operation of the Fire Protection System pumps. This system provides an ambient air flow quantity to maintain a safe and satisfactory indoor environment for the operation of the fire protection pumps as well as to support personnel access to the three pump rooms.

9.4.16.1 Design Bases

The Fire Protection Building Ventilation System, located in the two, 100% capacity diesel engine driven pump rooms, is an augmented quality system designed to meet SSE requirements {(Conventional Seismic-I)}. The ventilation system in the electric motor driven pump room is a non-seismic, augmented quality system.

The Fire Protection Building Ventilation System maintains acceptable ambient conditions for the fire protection system diesel engine driven pumps, diesel fuel oil tanks, electric motor driven pump, jockey pump, pump drivers and controllers. The diesel engine driven pumps and associated equipment are required to operate after a seismic event.

The Fire Protection Building Ventilation System maintains a minimum temperature of 40°F, based on an ambient temperature of -10°F, and a maximum temperature of 120°F, based on an outside ambient temperature of 100°F. This system will support operation of the Fire Protection System pumps and drivers, as well as to support personnel access to these spaces.

Components of the Fire Protection Building Ventilation System are located inside the two diesel engine driven pump rooms and one electric motor driven pump room. Each pump room contains components of the ventilation system to modulate the temperature in their respective rooms.

9.4.16.2 System Description

9.4.16.2.1 General Description

The Fire Protection Building Ventilation System ventilates the two diesel engine driven pump rooms and the electric motor driven pump room, using outside air as the cooling medium. Wall mounted outside air intake louvers with motor operated dampers, electric unit heaters and exhaust fans service the Fire Protection Building. Each pump room has a separate and independent heating and ventilation system.

The heating and ventilation systems for each of the diesel engine driven pump rooms are identical. Each diesel pump room is supplied with wall mounted outside air intake louvers, with motor operated dampers, electric unit heaters, exhaust fans, engine combustion air inlet ductwork with air intake filter, and combustion gas exhaust ductwork for proper pump performance.

The electric motor driven pump room is supplied with wall mounted outside air intake louvers with motor operated dampers, electric unit heaters and an exhaust fan.

The Fire Protection Building Ventilation System includes the Standby Diesel Generator (SDG) to supply AC power to the components of the ventilation system, heating system, and normal and emergency lighting systems, for the two diesel engine driven pump rooms following a SSE and loss of offsite power (LOOP) or Station Blackout (SBO).

Ventilation of the Diesel Engine Driven Pump Rooms

During normal operating conditions the diesel engine driven pump rooms' ventilation system will use two 50% wall mounted intake air louvers for room ventilation air and ventilation air shall be exhausted by one 100% exhaust fan. The intake air louvers and exhaust fan are supplied with motor operated dampers. Both intake louvers and the exhaust fan are interlocked to modulate air flow based on the required minimum and maximum design temperatures.

During winter conditions, when the diesel engine driven pumps are not in operation, the air in the diesel engine driven pump room is heated by two electric unit heaters. These heaters are controlled by local thermostats to maintain the required minimum temperature.

Combustion air for the diesel engine driven pumps is supplied through duct located in each diesel engine driven pump room. Each combustion air inlet is supplied with an air intake filter, and each diesel pump supplied with a combustion gas exhaust duct for proper pump performance.

The combustion air for the SDG is supplied through duct located in the diesel engine driven pump room. The SDG combustion air inlet is supplied with an air intake filter and the SDG is supplied with a combustion gas exhaust duct for proper performance.

Ventilation of the Electric Motor Driven Pump Room

During normal operating conditions the electric motor driven pump room ventilation system uses two 50% wall mounted intake air louvers for room ventilation air. Ventilation air is exhausted by one 100% exhaust fan. The intake air louvers and exhaust fan are supplied with motor operated dampers. Both intake louvers and the exhaust fan are interlocked to modulate air flow based on the required minimum and maximum design temperatures.

During winter conditions the air in the electric motor driven pump room is heated by two electric unit heaters. These heaters are controlled by local thermostats to maintain the required minimum temperature.

9.4.16.2.2 Component Description

The major components for the Fire Protection Building Ventilation System are listed in the following paragraphs, along with the applicable codes and standards. Refer to Section 3.2 for more discussion of seismic and system quality group classifications.

Ductwork and Accessories

The supply air and exhaust gas ducts are constructed of galvanized sheet steel and are structurally designed for fan shutoff pressure. The ductwork meets the design, construction and testing requirements of ASME AG-1a- 2004 (ASME, 2004).

Fans

The exhaust fans are centrifugal or propeller type with an electrical motor driver. Fan performance is rated in accordance with ANSI/AMCA 210-99 (ANSI, 1999), ANSI/AMCA-211-05 (ANSI, 2005a), and ANSI/AMCA-300-05 (ANSI, 2005b).

Electric Heater

Each electric heater is factory assembled with a fan, electric heating coil, adjustable air defectors and hanger support bracket. The unit heaters are provided with a local thermostat and control switch accessible from the floor area to maintain minimum room temperature.

Louver

Louver performance data shall be rated under the AMCA Certified Rating Program and shall bear the AMCA certified rating seal. The certified performance data shall include air flow pressure loss and water penetration (ANSI, 1995).

Motor Operated Dampers

The motor-operated dampers fail to the "open" position in the case of power loss. The performance and testing requirements of the dampers are in accordance with ASME AG-1a-2004 (ASME, 2004).

9.4.16.2.3 System Operation

Normal Plant Operation

During normal plant operation, the fire protection system pumps are not in operation, except for the jockey pump and periodic performance surveillance tests. The Fire Protection Building Ventilation System functions to maintain acceptable room temperatures for starting and operating the fire pumps. The room temperature is monitored by temperature sensors located in each pump room.

Emergency Power System

A self-contained Standby Diesel Generator (SDG) AC power source is provided to supply AC power to the Fire Protection Building (FPB) ventilation system, heating system, building normal and emergency lighting system components of the diesel driven pump rooms, in the event of loss of offsite power (LOOP) or Station Blackout (SBO). The SDG provides power to the FPB Ventilation System to maintain the required ambient conditions in the two diesel engine driven pump rooms. The SDG will be functional and provide power to the FPB ventilation system, heating system, building normal and emergency lighting system after a Safe Shutdown Earthquake (SSE) and loss of AC power or SBO. The SDG will provide AC power for twenty four hours, and thereafter it can provide AC power continuously by refueling the diesel engine, if the power is not restored within 24 hours.

Abnormal Operating Conditions

Failure of Diesel Engine Driven Pump Room Air Supply

If one or more components for the ventilation system of a diesel engine driven pump room fails, the ventilation system for that room is unable to maintain the required ambient conditions. Since there are two redundant diesel engine driven pump rooms, with a separate ventilation system and air supply, the failure of the air supply in one diesel engine driven pump room does not affect the other diesel engine driven pump room.

Failure of Pump Room Electric Heating Coils

Each fire protection pump room has two electric unit heaters. In the case of failure of one electric heater, the other electric heater is able to maintain the required temperature in the pump room.

Failure of Electric Motor Driven Pump Room Air Supply

In the case of failure of a component on the ventilation system for the electric motor driven pump room, the required ambient conditions may not be maintained in the electric motor driven pump room. However, the diesel engine driven pumps are available to provide necessary fire protection if an event should occur.

Failure of Exhaust Components

In the case of failure of any of the Fire Protection Building Ventilation System exhaust components, proper ambient conditions may not be maintained. However, components in the other unaffected pump rooms are available to provide necessary ventilation for the unaffected pump rooms during an event.

Loss of Offsite Power

In the event of Loss of Offsite Power, the emergency power system is supplied to the Fire Protection Building Ventilation System diesel engine driven pump room components. Emergency power supply to the system enables it to maintain normal room design temperature conditions.

Station Blackout

In the event of Station Blackout, the emergency power system is supplied to the Fire Protection Building Ventilation System components. Emergency power supply to the system enables it to maintain normal room design temperature conditions.

9.4.16.3 Safety Evaluation

The Fire Protection Building Ventilation System is designed to maintain ambient conditions inside the Fire Protection Building to allow safe and reliable operation of the fire pumps. The maximum temperature of 120°F in the pump rooms is the design temperature based on an outside ambient temperature of 100°F and room equipment heat loads. The equipment inside the pump rooms is designed to withstand a temperature of 120°F. A minimum temperature of 40°F will be maintained in the building based on a minimum ambient temperature of -10°F.

The Fire Protection Building Ventilation System is located inside each pump room of the Fire Protection Building, which is designed to withstand the effects of a safe shutdown earthquake (SSE). Chapter 3 provides the bases for adequacy of the structural design of the Fire Protection Building.

The diesel engine pump rooms' ventilation systems remain functional after an SSE event. Chapter 3.2 provides additional discussion of the seismic requirements for the Fire Protection System.

The two identical diesel engine driven pumps and diesel pump room ventilation systems provides redundancy to the ventilation system. Therefore, no single failure of the ventilation system compromises the safety function of the system. Vital power is supplied from onsite or offsite power systems.

In the event of loss of offsite power (LOOP) or Station Blackout (SBO) the Fire Protection Building Ventilation System, Heating System, and Normal and Emergency Lighting Systems are provided with a Self-Contained Standby Diesel Generator.

9.4.16.4 Inspection and Testing Requirements

Acceptance testing of the Fire Protection Building Ventilation System components is performed in accordance with ASME AG-1a-2004 (ASME, 2004) and ASME N510-1989 (ASME, 1995).

Testing of the Standby Diesel Generator (SDG) is conducted in accordance with IEEE Standard 387, 1995 (IEEE, 1995).

9.4.16.5 Instrumentation Requirements

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the Main Control Room (MCR). Fans, motor-operated dampers, and electric unit heaters can be operated from the MCR. The fire detection and sensor information is delivered to the fire detection system.

9.4.16.6 References

ASME, 2004. Code on Nuclear Air and Gas Treatment, ASME AG-1a-2004, American Society of Mechanical Engineers, 2004.

ASME, 1995. Testing of Nuclear Air-Treatment Systems, ASME N510-1989, American Society of Mechanical Engineers, 1995.

ANSI, 1999. Laboratory Methods of Testing Fans for Aerodynamic Performance Rating, ANSI/AMCA-210-99, American National Standards Institute/Air Movement and Control Association International, December 1999.

ANSI, 2005a. Certified Ratings Program-Air Performance, ANSI/AMCA-211-05, American National Standards Institute/Air Movement and Control Association International, 2005.

ANSI, 2005b. Reverberant Room Method of Testing Fans for Rating Purposes, ANSI/AMCA-300-05, American National Standards Institute/Air Movement and Control Association International, Inc., 2005.

ANSI, 1995. Laboratory Methods of Testing Fans for Rating Purposes, ANSI/AMCA 500-L, American National Standards Institute/Air Movement and Control Association International, Inc., 1995.

IEEE, 1995. IEEE Standard Criteria for Diesel-Generator Units Applied as Standard Power Supplies for Nuclear Power Generating Stations, IEEE Std. 387-1995, Institute of Electrical and Electronics, 1995}.

Figure 9.4-1 — Turbine Building Ventilation System

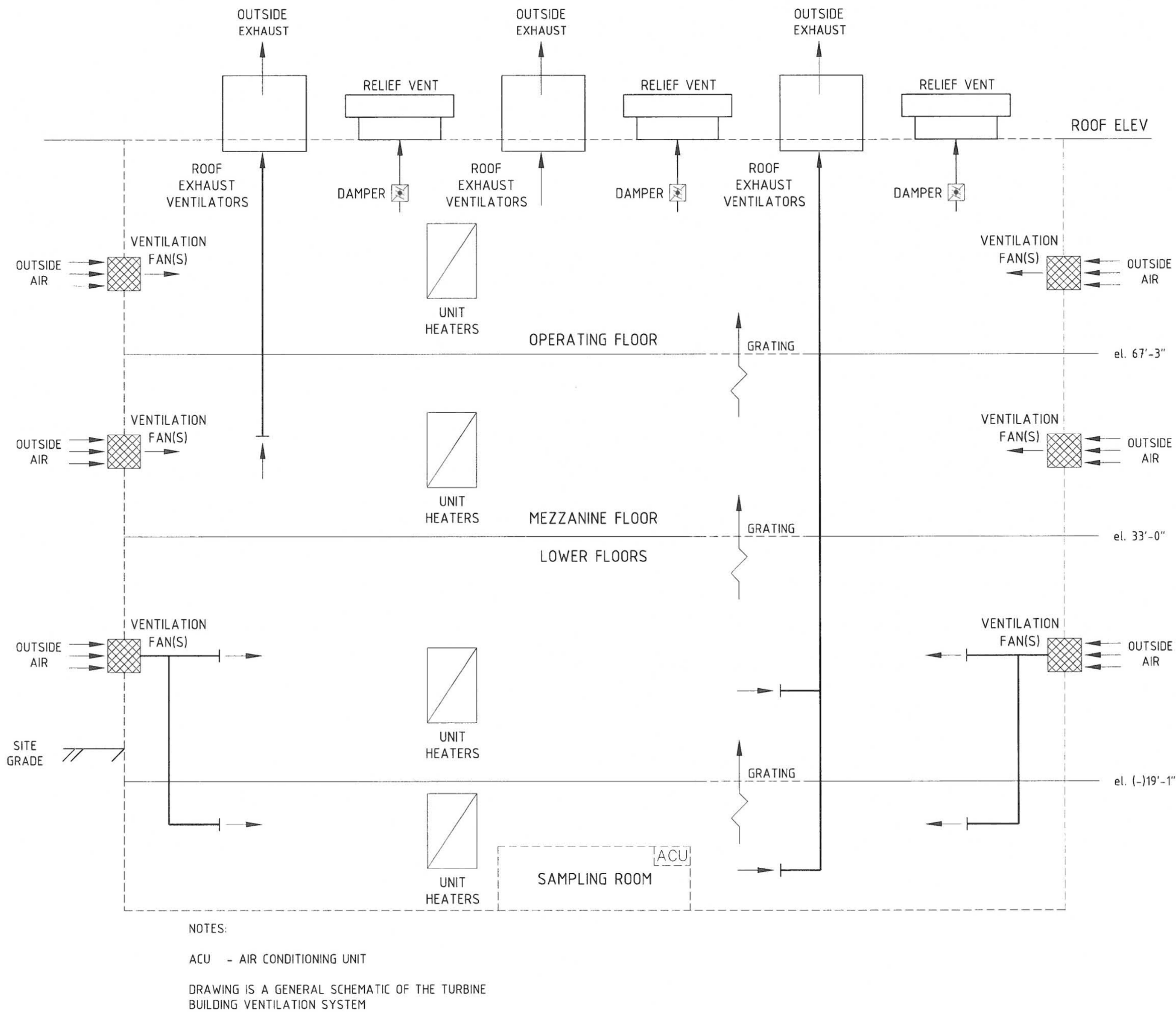
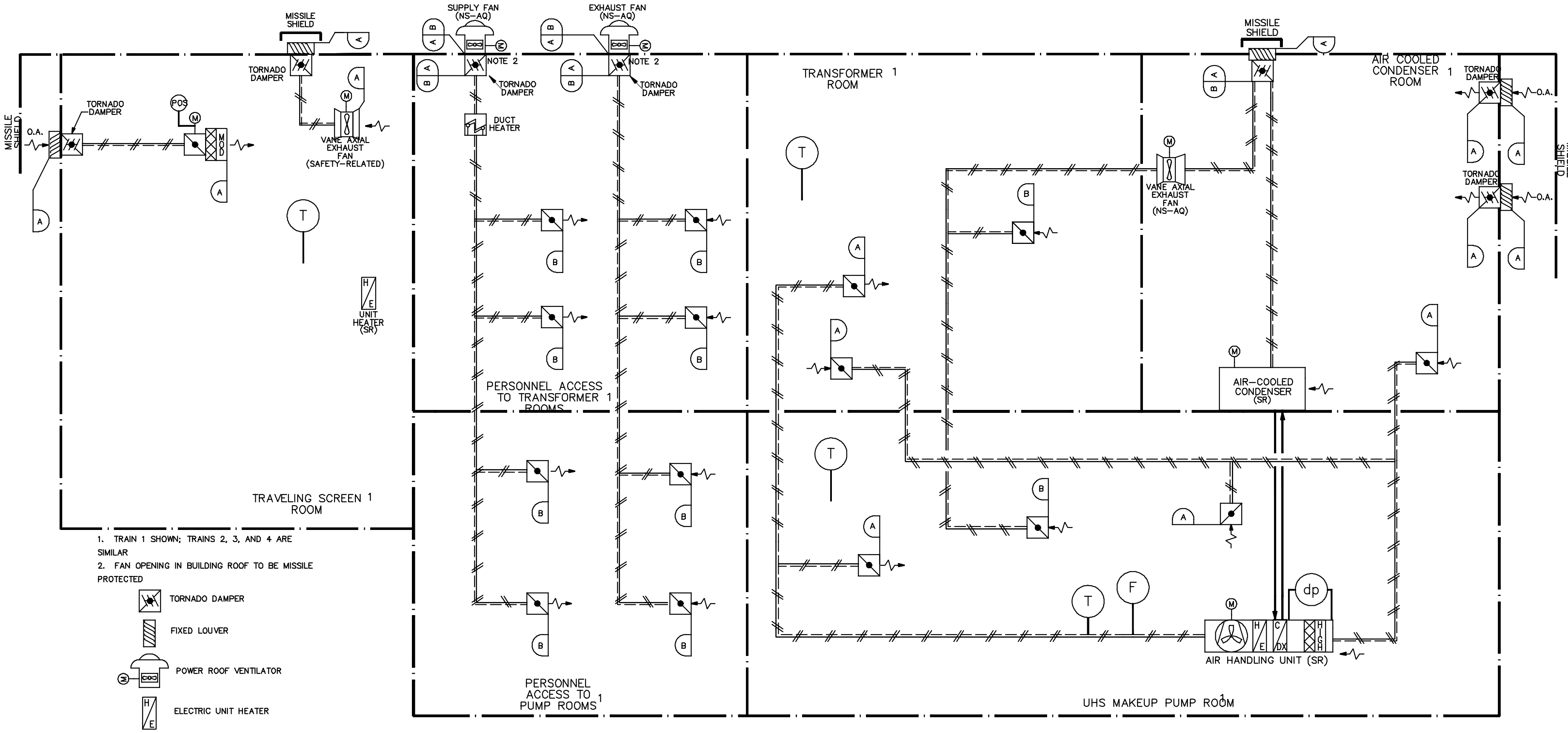


Figure 9.4-2 — {UHS Makeup Water Intake Structure Ventilation System}



B	D	II
A	C	I
DESIGN AREA	SSC QUALITY GROUP	SSC SEISMIC CLASS

9.5 OTHER AUXILIARY SYSTEMS

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

9.5.1 Fire Protection

No departures or supplements.

9.5.1.1 Design Basis

Appendix 9B of this COL FSAR supplements Appendix 9A of the U.S. EPR FSAR.

9.5.1.2 Program Description

9.5.1.2.1 General Description

For all aspects of the site specific Fire Protection Program (FPP), the same codes and standards and applicable edition years apply for fire protection as listed in Section 9.5.1.7 of the U.S. EPR FSAR.

Table 9.5-1 provides supplemental information for select items/statements in U.S. EPR FSAR EPR 9.5.1-1 identified as requiring COL Applicant input. The supplemental information is in a column headed {"CCNPP Unit 3 Supplement"} and addresses {CCNPP Unit 3} conformance to the identified requirement of Regulatory Guide 1.189 (NRC, 2007).

The U.S. EPR includes the following COL item in Section 9.5.1.2.1:

> A COL applicant that references the U.S. EPR design certification will provide a description and simplified Fire Protection System piping and instrumentation diagrams for site-specific systems.

This COL item is addressed as follows:

{Figure 9.5-1, Figure 9.5-2 and Figure 9.5-3 each provide a schematic piping and instrumentation diagram of the fire water distribution system specific to CCNPP Unit 3. These figures supplement the generic piping and instrumentation diagram provided in Figure 9.5.1-1 of the U.S. EPR FSAR.

Figure 9.5-1 illustrates the site-specific fire main yard loop supplying the Cooling Tower area. This non-seismic loop supplies the sprinkler system protecting the Water Treatment Building as well as the yard fire hydrants.

Figure 9.5-2 illustrates the site-specific fire main yard loop supplying the Intake Structure area. The loop designated as Conventional Seismic-I supplies fire water to the above ground manual and automatic suppression systems identified in Figure 9.5-3. This figure illustrates the standpipe and hose stations, designated as Conventional Seismic-I, specified for the UHS Makeup Water Intake Structure.}

Plant Fire Prevention and Control Features

Plant Arrangement

{The site building layout is shown in Figure 2.1-1. An enlargement of the power block area is provided in Figure 2.1-5.} Details of the arrangement of the Turbine Building, Switchgear Building, Auxiliary Power Transformer Area, Generator Transformer Area (the remaining power block structures) and non-power block structures are provided in Appendix 9B of this COL application.

Architectural and Structural Features

The U.S. EPR includes the following COL item in Section 9.5.1.2.1:

> A COL applicant that references the U.S. EPR design certification will submit site-specific information to address the Regulatory Guide 1.189, Regulatory Position C.6.2.6, Cooling Towers.

This COL item is addressed as follows:

{The CWCT is remotely located such that a fire will not adversely affect any systems or equipment important to safety (refer to Figure 1.1-3).

> Fire protection features provided to protect the CWCT include a dedicated, underground, fire protection yard loop which surrounds the CWCT, and supplies yard hydrants located in accordance with NFPA 24. The CWCT yard loop is supplied from two independent supply lines from the main fire water distribution system underground yard loop. Other fire protection features provided include automatic fire detection, manual fire alarms and portable fire extinguishers.}

Details of the architectural/structural design features for the remainder of the power block and balance of plant structures/areas are provided in Appendix 9B of this COL application.

Electrical System Design and Electrical Separation

Details of the electrical system design/separation for the remainder of the power block and balance of plant structures/areas are provided in Appendix 9B of this COL application.

Fire Safe Shutdown Capability

No departures or supplements.

Communications

No departures or supplements.

Emergency Lighting

No departures or supplements.

Ventilation System Design Considerations

Details of the ventilation system for the remainder of the power block and balance of plant structures are provided in Appendix 9B of this COL application.

Control of Smoke, Hot gases, and Fire Suppressant

Smoke confinement/smoke control is not provided in other structures/areas of the plant.

Fire Detection and Alarm System

Details of the fire detection and alarm system for the remainder of the power block and balance of plant structures are provided in Appendix 9B of this COL application.

Fire Water Supply System

The U.S. EPR includes the following COL item in Section 9.5.1.2.1:

> A COL applicant that references the U.S. EPR design certification will describe the program used to monitor and maintain an acceptable level of quality in the fire protection system freshwater storage tanks.

This COL item is addressed as follows:

The fire protection water supply quality program will ensure the criteria in Regulatory Guide 1.189, Section 3.2.1, are met as follows:

{Suction storage tank makeup is supplied from the desalinization plant which ultimately draws suction from the Chesapeake Bay. The fire protection water supply is treated to potable quality to help prevent occurrence of biological fouling or corrosion by means of desalination and chemical treatment.}The rate of makeup flow to the fire water storage tanks is sufficient to refill the minimum fire protection volume in one tank within eight hours. In addition to water treatment, the fire water storage tanks are inspected periodically for biological growth and subsequent corrosion; fire service mains, fire hydrants and fire suppression systems are also flow tested and/or drained periodically to verify treatment success and to confirm system functionality. The rate of makeup flow to the fire water storage tanks is sufficient to refill the minimum fire protection volume in one tank within eight hours.

In addition, the highest sprinkler system demand is for the Turbine Building and is {2400 gpm at 161 psig}. The highest standpipe system demand is for the Containment Building and is {1250 gpm at 176 psig}.

Automatic Fire Suppression Systems

Details of the automatic fire suppression systems for the remainder of the power block and balance of plant structures are provided in Appendix 9B of this COL application.

In addition, automatic sprinkler systems, designed and installed in accordance with National Fire Protection Association (NFPA) 13 (NFPA, 2007b), are provided for the following buildings:

- {Turbine Building under operating deck and skirt areas
- SBO Diesel Tank Rooms

- SBO Auxiliary Equipment Rooms
- Switchgear Building Diesel Engine Rooms
- Auxiliary Boiler Equipment Room
- Warehouse Building
- Central Gas Supply Building
- Fire Protection Building
- Desalinization / Water Treatment Building}

Automatic single or double interlock preaction sprinkler systems designed and installed in accordance with NFPA 13 (NFPA, 2007b) are provided in the following areas:

- Turbine Generator and Exciter bearings
- Switchgear Building Cable Spreading Rooms
- Switchgear Building Low- and Medium-Voltage Distribution Board Rooms
- Switchgear Building Cable Distribution Division Rooms
- Switchgear Building Battery Rooms
- Switchgear Building Battery Charger Rooms
- Switchgear Building I&C Control / Protection Panel Rooms

Fixed deluge water spray systems designed and installed in accordance with NFPA 15 are provided for the following hazards.

- Hydrogen seal oil unit
- Turbine Building Lube oil drain trenches
- Auxiliary Power Transformers
- Generator Transformers

Manual Fire Suppression Systems

Details of the manual fire suppression systems for the remainder of the power block and balance of plant structures are provided in Appendix 9B of this COL application.

9.5.1.3 Safety Evaluation – Fire Protection Analysis

The U.S. EPR includes the following COL item in Section 9.5.1.3:

> A COL applicant that references the U.S. EPR design certification will perform a supplemental Fire Protection Analysis for site-specific areas of the plant not analyzed by the FSAR.

This COL item is addressed as follows:

Appendix 9B addresses the fire protection analysis for the remaining power block and balance of plant structures.

In addition, the plant will maintain an integrated fire hazards analysis (FHA) and supporting evaluations that demonstrate that the plant can:

- achieve and maintain post-fire safe shutdown conditions for a fire in any fire area of the plant, including alternative shutdown fire areas,
- maintain safe plant conditions and minimize potential release of radioactive material in the event of a fire during any plant operating mode,
- detail the plant fire prevention, detection, suppression, and containment features, for each fire area containing structures, systems and components (SSCs) important to safety, and
- achieve and maintain these safe conditions with due consideration of plant fire risk as characterized in the plant-specific fire probabilistic risk assessment (Fire PRA).

9.5.1.4 Inspection and Testing Requirements

The FPP includes procedures for testing fire protection features and systems and includes criteria to ensure design and system readiness. This includes installation and acceptance testing, periodic testing, quality assurance oversight of testing, and proper test documentation.

All fire protection features and systems will be surveilled, inspected, tested, and maintained in accordance with applicable codes and standards of the NFPA including start-up and acceptance tests. The frequency of follow-up inspections and tests will also follow NFPA requirements and ALARA guidelines.

All surveillance, inspection, testing and maintenance is conducted and documented in accordance with approved plant procedures and is performed by qualified personnel.

9.5.1.5 Fire Probabilistic Risk Assessment

No departures or supplements.

9.5.1.6 Fire Protection Program

No departures or supplements.

9.5.1.6.1 Fire Prevention

Governance and control of FPP attributes is provided through policies, procedures, and the Quality Assurance Program Description. Procedures are in place for FPP impacting activities including:

- ♦ In-situ and transient combustibles.
- ♦ Ignition sources.
- ♦ Hot Work.
- ♦ Annunciator response and pre-fire plans.
- ♦ Surveillance, inspection, testing, and maintenance (as applicable) of:
    - ♦ Passive fire barriers including opening protectives (i.e., fire doors, fire dampers, and through penetration seal systems).
    - ♦ Fire protection water supply system.
    - ♦ Automatic and manual fire suppression systems and equipment.
    - ♦ Automatic and manual fire detection/fire alarm system equipment.
    - ♦ Fire brigade and fire response equipment.

9.5.1.6.2 Fire Protection Program

{U.S. EPR FSAR Section 9.5.1.6.2 states that the COL applicant is responsible for determining the individual position responsibilities for the organizational functions described herein. CCNPP Unit 3 will utilize the following site-specific titles for the positions identified in U.S. EPR FSAR Section 9.5.1.6.2:

U.S. EPR FSAR Organizational positions	CCNPP Unit 3 Site specific titles
Upper level manager	Site Vice President (Section 13.1.2.2.1)
Additional managers	General Supervisor – Operations Support (Section 13.1.2.2.1.1.1.2) General Supervisor – Engineering Support (Section 13.1.2.2.1.2.2)
Onsite manager	Plant General Manager (Section 13.1.2.2.1.1)
Fire protection engineer	Fire Protection Engineer
Nuclear training manager	Manager of Training and Performance Improvement (Section 13.1.2.2.1.3)
Onsite individual responsible for fire protection QA	Site Director – Quality and Performance Improvement (Section 13.1.2.2.1.4)

The Fire Marshall has responsibility to implement the day-to-day requirements of the Fire Protection Program. This position reports to the Plant General Manager and assists the Fire Protection Engineer, General Supervisor – Engineering Support, and the General Supervisor – Operations Support in administrating and implementing the Fire Protection Program through procedures, training, inspections, testing and evaluations.

The UniStar Nuclear Operating Services, LLC site organizational structure is represented in Figure 13.1-5. The site specific management positions for the FPP identified above are included in Figure 13.1-5.}

9.5.1.6.3 Fire Protection Training and Personnel Qualifications

Fire Protection Engineer

No departures or supplements.

Fire Brigade Members

No departures or supplements.

Fire Protection System Operation, Testing, and Maintenance

Personnel who perform operation of or surveillance, inspection, test, and/or maintenance activities on fire-protection related structures, systems, or components are trained in the specific activities they are required to perform. Training is conducted through one or more of the following: factory or shop training on individual equipment, recognized apprentice and/or journeyman training courses, training coursework on equipment of similar type or experience-based training and qualification on fire systems in general. All personnel who perform fire protection related maintenance will be trained in conformance to plant procedures and in fire protection feature/system impairment procedures.

Training of the Fire Brigade

No departures or supplements.

General Employee Training

This training is required for all personnel who are granted unescorted plant access. General employee training curriculum provides an overview of the requirements of the FPP including: general fire hazards within the plant, the defense-in-depth objectives of the FPP, and an introduction to the FPP procedures that govern employee actions including appropriate steps to be taken upon discovering a significant fire hazard, actions to be taken upon discovering a fire or hearing/seeing a fire alarm, and combustible material and ignition source controls.

Fire Watch Training

Fire Watch – Hot Work

This training is required for all plant and/or contract personnel assigned duties as a fire watch for hot work. Hot work fire watch training provides instruction on fire watch duties and responsibilities, including the identification of conditions or activities that present potential fire hazards, as well as the use of fire extinguishers, including hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch, and the proper fire notification procedures, and required actions for both one-hour roving and continuous fire watches. It also includes instruction on responsibilities, actions, and recordkeeping requirements, the identification of conditions or activities that present potential fire hazards, as well as the use of fire extinguishers, including hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch, and the proper fire notification procedures when serving as a compensatory measure for a degraded fire protection feature. All hot work fire watches are trained in the selection, limitations, and use/application of hand portable fire extinguishers.

Fire Watch – Compensatory Measures

This training is required for all plant and/or contract personnel assigned duties as either a one-hour roving or continuous fire watch compensating for the inoperability or impairment of a given fire protection system or feature. Compensatory measure fire watch training includes instruction on responsibilities, actions, and recordkeeping requirements, the identification of conditions or activities that present potential fire hazards, as well as the use of fire extinguishers, including hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch, and the proper fire notification procedures, when serving as a compensatory measure for a degraded fire protection feature. All compensatory measure fire watches are trained in the selection, limitations, and use/application of hand portable fire extinguishers.

9.5.1.6.4 Fire Brigade Organization, Training, and Records

Fire Brigade equipment including personal protective equipment for structural firefighting is provided for the plant fire brigade. Each fire brigade member is equipped with a helmet (with face shield), turnout coat, turnout pants, footwear, gloves, protective hood, personal alert safety system (PASS) device, and self-contained breathing apparatus (SCBA). All equipment will conform to appropriate NFPA standards. The plant maintains an adequate inventory of firefighting equipment to ensure outfitting of a full complement of brigade members with consideration of the possibility of sustained fire response operations (multiple crews).

SCBAs are required to be worn for interior fire response activities and at similar times when fire/response activities may involve a risk of chemical, particulate, and/or radiological material inhalation exposure.

Other types of fire response equipment are distributed and/or cached at various locations throughout the plant to support response by the plant fire brigade and/or off-site response agencies. The types of equipment provided include fire hose (2-1/2 and 1-1/2 inch diameter), combination and specialty hose nozzles, portable smoke removal equipment, spill control and absorbent materials, supplemental hand portable fire extinguishers, aqueous film-forming foam (AFFF) supply and foam eductors, and other specialty tools.

The plant has procedural controls in place to govern the response to fires. This includes fire annunciator response procedures and pre-fire plans which provide direction for the Control Room to determine: the need to initiate plant safe shutdown, the actions to take to effect shutdown, the mobilization and response of Control Room operators, and the mobilization and response of the plant Fire Brigade to effect fire-fighting activities. These procedures are utilized, in conjunction with the Emergency Plan, to determine when conditions necessitate:

- Requesting support of off-site emergency response resources.
- The declaration and escalation of the fire occurrence as a plant emergency.
- The notification of local, state, and federal governmental agencies.

9.5.1.6.5 Quality Assurance

This section of the U.S. EPR FSAR is incorporated by reference with the following supplemental information.

Section 9.5.1.6.5 of the U.S. EPR FSAR refers to U.S. EPR FSAR, Section 17.2 and its requirement that the COL applicant provide the Quality Assurance Programs associated with the construction and operations phase, which should include a description of the fire protection system quality assurance program to be applied during fabrication, erection, installation and operations.

The Quality Assurance Program Description has appropriate provisions to govern the quality attributes of the FPP. The FPP conforms to the applicable provisions of 10 CFR 50, Appendix B (CFR, 2008) and with the quality assurance guidance in Regulatory Guide 1.189 (NRC, 2007).

Audits of the FPP will be performed at the recommended frequencies by an audit team staffed and led by qualified QA and technical auditors.

Additional details of the quality assurance program are provided in Section 17.5.

9.5.1.7 References

{**CFR, 2008.** 10 CFR Appendix B.

NFPA, 2007a. Standard for Water Spray Fixed Systems for Fire Protection, NFPA 15, National Fire Protection Association,2007.

NFPA, 2007b. Standard for the Installation of Sprinkler Systems, NFPA 13, National Fire Protection Association, 2007.

NRC, 2007. Fire Protection for Nuclear Power Plants, Revision 1, Regulatory Guide 1.189, Revision 1, U. S. Nuclear Regulatory Commission, March 2007.}

9.5.2 Communication System

No departures or supplements.

9.5.2.1 Design Basis

This section of the U.S. EPR FSAR is incorporated by reference with supplements as identified in the following section.

9.5.2.1.1 10 CFR 50 Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities

The U. S. EPR FSAR includes the following COL Item in Section 9.5.2.1.1:

> A COL applicant that references the U.S. EPR design certification will provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface.

This COL item is addressed as follows:

{The emergency off-site communication system provides interface between the on-site and off-site communication systems to allow dedicated communication access to EOF, NRC, and federal and state/local agencies. This system is designed to be compatible with on-site communication systems. The emergency off-site communication system is powered from a Class 1E UPS system. Any interfaces to the plant security system are addressed in the Physical Security Plan. The design ensures frequency compatibility between the COL applicant systems and non COL applicant controlled communication networks. The Emergency Notification System (ENS) is powered locally from either a safety-related or non safety-related power source with a UPS, having either battery or generator backup. The ENS is routed through the site PBX to provide access to multiple outbound call paths. The long distance portion of the system is provided by the NRC using direct access lines (DALs) to the federal long distance service directed through a toll-free (800/888) exchange.}

9.5.2.1.2 10 CFR 50.34 (f)(2)(xxv), Emergency Response Facilities

No departures or supplements.

9.5.2.1.3 10 CFR 50.47(b)(8), Equipment and Facilities to Support Emergency

No departures or supplements.

9.5.2.1.4 10 CFR 50.55 (a), Codes and Standards

No departures or supplements.

9.5.2.1.5 10 CFR 50 Appendix A - General Design Criteria

No departures or supplements.

9.5.2.1.6 10 CFR 73.45(e)(2)(iii), Performance Capabilities for Fixed Site Physical Protection Systems - Communications Subsystems, and 10 CFR 73.45(g)(4)(i), Provide Communications Networks

No departures or supplements.

9.5.2.1.7 10 CFR 73.55(e), Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage Detection Aids, 10 CFR 73.55(f), Communications Subsystems, and 10 CFR 73.46(f), Fixed site Physical Protection Systems, Subsystems, Components and Procedures - Communications Subsystems

No departures or supplements.

9.5.2.2 System Description

No departures or supplements.

9.5.2.3 System Operation Communications Stations

The U. S. EPR FSAR includes the following COL Item in Section 9.5.2.3:

> The COL applicant referencing the U.S. EPR certified design will identify additional site-specific communication locations necessary to support effective communication between plant personnel in all vital areas of the plant during normal operation, as well as during accident conditions.

This COL Item is addressed as follows:

{The UHS Makeup Water Intake Structure contains safety-related equipment and is a site-specific vital area of the plant. Communication equipment will be provided in this area to support effective communication between plant personnel during normal operation, as well as during accident conditions. This location will contain equipment to allow use of the plant digital telephone system, PA and alarm system, and sound powered system. A portable wireless communication system will also be provided for use by fire brigade and other operations personnel required to achieve safe plant shutdown.

All the communication subsystems are available for use during normal operation of the plant. Except for the sound-powered system, the communication subsystems are powered from the Class 1E Emergency Uninterruptible Power Supply System (EUPS) or the Class 1E Emergency Power Supply System (EPSS), which are supported by the emergency and station blackout diesel generators to provide backup power. Hence all the communication subsystems are expected to be available for use during all accident conditions. However, all communications equipment is categorized as non-safety related, and is not relied upon to mitigate an accident. The sound-powered system does not require an external power source.}

9.5.2.4 Inspection and Testing Requirements

No departures or supplements.

9.5.2.5 References

No departures or supplements.

9.5.3 Lighting System

No departures or supplements.

9.5.4 Diesel Generator Fuel Oil Storage and Transfer System

9.5.4.1 Design Basis

No departures or supplements.

9.5.4.2 System Description

No departures or supplements.

9.5.4.3 System Operation

No departures or supplements.

9.5.4.4 Safety Evaluation

The U.S. EPR includes the following COL item in Section 9.5.4.4:

> A COL applicant that references the U.S. EPR design certification will describe the site-specific sources of acceptable fuel oil available for refilling the EDG fuel oil storage tanks within seven days, including the means of transporting and refilling the fuel storage tanks, following a design basis event to enable each diesel generator system to supply uninterrupted emergency power.

This COL item is addressed as follows:

{Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC have multiple sources of fuel oil that may be brought in by truck, barge, or air. Relationships or points of contact with the entities which are the sources of the fuel oil and the means for its transportation are well established. Multiple sources and means of transportation allow for the flexibility necessary in order to best respond to an event, and provides assurance of the ability to deliver fuel oil to the site.}

9.5.4.5 Inspection and Testing Requirements

No departures or supplements.

9.5.4.6 Instrumentation Requirements

No departures or supplements.

9.5.4.7 References

No departures or supplements.

9.5.5 Diesel Generator Cooling Water System

No departures or supplements.

9.5.6 Diesel Generator Starting Air System

No departures or supplements.

9.5.7 Diesel Generator Lubricating System

No departures or supplements.

9.5.8 Diesel Generator Air Intake and Exhaust System

No departures or supplements.

The interference effect of the UHS cooling tower plumes on the DG air intake is discussed in Section 9.2.5.3.3.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 1 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.1	Fire Protection Program	Compliance		The Fire Protection Program (FPP) is consistent with the requirements of Regulatory Guide 1.189 and SRP 9.5-1. Details of the FPP are provided in this COL application.
C.1.1	Organization, Staffing, and Responsibilities	Compliance		The Unistar Nuclear Operating SErvices, LLC site organizational structure is represented in Figure 13.1-5. The key site specific positions for the FPP are identified in Section 9.5.1.6.2
C.1.2	Fire Hazards Analysis	Compliance	See Fire Protection Analysis Appendix 9A	Appendix 9A of the U.S. EPR FSAR provides the technical analysis for the nuclear island and demonstrates that the EPR has the ability to achieve and maintain safe-shutdown and to minimize the release of radioactive materials to the environment. Appendix 9B is an analysis detailing fire hazards and fire protection attributes for the remainder of the plant. Other structures not listed will be confirmed as not posing fire/explosion risk to the plant using NFPA 80A criteria.
C1.3	Safe Shutdown Analysis	Compliance		The plant will develop and maintain an integrated, detailed site-specific FHA and will have detailed procedures and training to ensure fire-safe shutdown and other fire safe conditions required to minimize radioactive material release are achieved and maintained.
C.1.4	Fire Test Reports and Fire Data	Compliance		If untested barrier configurations are determined necessary during detailed design, they will be evaluated consistent with RG 1.189 requirements.
C.1.5	Compensatory Measures	Compliance		The FPP will apply compensatory measures consistent with RG 1.189 recommendations and standard industry practice whenever fire protection features are degraded and/or inoperable. Compensatory measures will be applied when necessary to accomplish repair or modification or as a result of findings during inspection or surveillance. Fire watches, temporary fire barriers, or backup suppression capability will be implemented, as applicable. Where an uncommon type of compensatory measure is warranted, an evaluation of the alternative will be conducted prior to implementation. Such evaluation will incorporate fire risk insights as applicable.
C.1.6	Fire Protection Training and Qualifications	Compliance		The FPP organization is shown in Section 9.5.1.6.2. The training and qualifications are detailed in Section 9.5.1.6.3.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 2 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.1.6.1	Fire Protection Staff Training and Qualifications	Compliance		The responsibilities, lines of authority, training and qualifications by title/position are detailed in administrative procedures and the UniStar Nuclear Quality Assurance Program Description.
C.1.6.2	General Employee Training	Compliance		General employee training includes instruction on actions to take upon discovery of a fire, hearing a fire alarm, and proper fire preventative and protective administrative controls and actions.
C.1.6.3	Fire Watch Training	Compliance		Fire watch training includes instruction on responsibilities, actions, and records for oversight of hot work and when serving as compensatory measure for degraded fire protection feature.
C.1.6.4	Fire Brigade Training and Qualifications	Compliance		The fire brigade will have at least five members available on each shift above the minimum shift complement for safe operation/shutdown. The brigade is trained and equipped to respond to fire-related emergencies.
C.1.6.4.1	Qualifications	Compliance		The fire brigade will be under the direction of the Shift Manager. A Fire Brigade Leader is assigned and qualified to command response to fire emergencies. A minimum of three operations staff members including one licensed operator will be assigned to the shift fire brigade. Fire brigade members are required to be physically fit and undergo an annual physical examination for initial and continuing brigade membership.
C.1.6.4.2	Instruction	Compliance		Fire brigade members are trained in nuclear facility fire response strategy and tactics by qualified trainers using both classroom and hands-on instruction. The training curriculum is detailed in an administrative procedure. Refresher training is structured to ensure that the entire curriculum is repeated every two years.
C.1.6.4.3	Fire Brigade Practice	Compliance		Brigade practice sessions are scheduled to ensure that each member attends at least one session per year.
C.1.6.4.4	Fire Brigade Training Records	Compliance		Brigade training records will be retained for a minimum of three years.
C.1.7	Quality Assurance	Compliance		The UniStar Nuclear Energy Quality Assurance Program Description has appropriate provisions to govern the quality attributes of the fire protection program. The FPP conforms to the applicable provisions of 10 CFR 50, Appendix B and with the quality assurance guidance in RG 1.189.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 3 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.1.7.1	Design and Procurement Document Control	COL Applicant	Note 3	Design and Procurement Document Control shall be in accordance with the Quality Assurance Program Description. Fire protection quality requirements are included in plant configuration control processes.
C.1.7.2	Instructions, Procedures, and Drawings	COL Applicant	Note 3	The FPP provides instruction and procedures to control fire prevention and firefighting; design, installation, inspection, test, maintenance and modification of fire protection features/systems; and appropriate administrative controls in accordance with the Quality Assurance Program Description.
C.1.7.3	Control of Purchased Material, Equipment, and Services	COL Applicant	Note 3	The FPP provides procedures to control procurement of fire protection related items to ensure proper evidence of quality in accordance with of the Quality Assurance Program Description.
C.1.7.4	Inspection	Compliance		The FPP includes procedures for independent inspection of fire protection-related activities including installation and/or maintenance of features including FP systems, emergency lighting and communication, cable routing, and fire barriers and opening protectives in accordance with the Quality Assurance Program Description.
C.1.7.5	Test and Test Control	Compliance		The FPP includes procedures for testing fire protection features and systems and includes criteria to ensure design and system readiness.This includes installation and acceptance testing, periodic testing, quality assurance oversight of testing, and proper test documentation in accordance with of the Quality Assurance Program Description.
C.1.7.6	Inspection, Test, and Operating Status	Compliance		Fire protection features and systems are provided with suitable marking and labeling to indicate acceptance and readiness for operation in accordance with the Quality Assurance Program Description.
C.1.7.7	Non-conforming Items	Compliance		The FPP includes procedures for identification and control of items that do not conform to specified requirements, are inoperable or otherwise unsuitable. This includes tagging or labeling, notification and dispositioning of the nonconforming item in accordance with of the Quality Assurance Program Description.
C.1.7.8	Corrective Action	Compliance		The plant has an administrative procedure to ensure that proper corrective actions are taken for conditions adverse to fire protection including root cause analysis when appropriate in accordance with the Quality Assurance Program Description.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 4 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.1.7.9	Records	Compliance		The FPP includes provisions for preparing and maintaining retrievable records that demonstrate conformance to fire protection requirements in accordance with the Quality Assurance Program Description.
C.1.7.10	Audits	Compliance		The FPP requires that audits be performed at the appropriate periodicity by qualified fire protection and QA personnel to verify that the program is being properly implemented and that compliance to fire protection requirements is being met in accordance with the Quality Assurance Program Description.
C.1.7.10.1	Annual Fire Protection Audit	Compliance		An annual audit will be performed consistent with R.G. 1.189.
C.1.7.10.2	24-Month Fire Protection Audit	Compliance		A biennial audit will be performed consistent with R.G. 1.189 and the Quality Assurance Program Description.
C.1.7.10.3	Triennial Fire Protection Audit	Compliance		A triennial audit will be performed consistent with R.G. 1.189 and the Quality Assurance Program Description. Independent auditors will be used to perform triennial audits.
C.1.8	Fire Protection Program Changes/ Code Deviations	COL Applicant	Note 3	FPP changes or deviations will be assessed in accordance with existing regulatory guidance (i.e., NUREG-0800, SRP 9.5.1 and R.G. 1.189). In the future if the NRC endorses a risk-informed, performance-based (RI/PB) plant change evaluation process for new reactors, similar to that under development by the NFPA Technical Committee on Fire Protection for Nuclear Facilities, UniStar Nuclear Energy may opt to adopt such a process to augment the existing regulatory guidance for assessing program changes or deviations. If a RI/PB change evaluation process were to be adopted in the future, it would be implemented and maintained as part of an administratively controlled plant change control process and designed in accordance with NRC endorsed methodology. Any adoption of RI/PB evaluation methodology to plant change control processes would be submitted to NRC for approval prior to use by UniStar Nuclear Energy.
C.1.8.1	Change Evaluations	COL Applicant	Note 3	Compliance - FPP program changes will be evaluated consistent with 10 CFR 50.59 and the applicable change processes in 10 CFR 52.
C.1.8.5	10 CFR 50.72 Notification and 10 CFR 50.73 Report	COL Applicant	Note 3	Compliance - the plant will report fire events and any fire protection program deficiencies consistent with 10 CFR 50.72 and 10 CFR 50.73.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 5 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.1.8.7	Fire Modeling	COL Applicant	Note 3	Compliance - If fire models are used to evaluate changes, the plant will apply models consistent with R.G. 1.189 including limitations on their use and adequate verification and validation (as required).
C.2	Fire Prevention	Compliance		The FPP includes procedures to ensure minimization of fire hazards in areas important to safety for anticipated operating conditions and to ensure fire safety as part of facility modifications.
C.2.1	Control of Combustibles	Compliance		The FPP includes procedures to control transient combustibles consistent with the Fire Hazards Analysis and good fire prevention practices.
C.2.1.1	Transient Fire Hazards	Compliance		The FPP includes procedures to control transient combustibles consistent with the Fire Hazards Analysis and good fire prevention practices.
C.2.1.2	Modifications	Compliance		The FPP includes procedures to ensure that fire prevention and fire safety practices are maintained and that the facility fire safety design basis is not negatively impacted.
C.2.1.3	Flammable and Combustible Liquids and Gases	Compliance		The FPP includes procedures to ensure flammable and combustible liquids and gases are handled properly and consistent with the facility design basis.
C.2.1.4	External/Exposure Fire Hazards	Compliance		The FPP includes procedures to ensure that any adjacent or external facilities to areas important to safety are evaluated consistent with NFPA 80A and for impact on the facility Fire Hazards Analysis.
C.2.2	Control of Ignition Sources	Compliance		The FPP includes procedures for control of ignition sources. The facility design follows recognized codes, standards, and practices to minimize ignition hazards.
C.2.2.1	Open Flame, Welding, Cutting, and Grinding (Hot Work)	Compliance		The FPP includes procedures for issuance of hot work permits and to control the designation of fixed weld shop areas or similar.
C.2.2.2	Temporary Electrical Installations	Compliance		The FPP includes procedures to monitor and control the use of temporary electrical installations for routine and outage related maintenance consistent with recognized standards and practices.
C.2.2.3	Other Sources	Compliance		The FPP includes procedures to monitor and control other non-routine ignition hazards such as temporary heating, leak testing, tar kettles, heat guns, and similar devices/operations.
C.2.3	Housekeeping	Compliance		The FPP includes procedures for routine housekeeping and monitoring areas important to safety for prompt removal of combustibles.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 6 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.2.4	Fire Protection System Maintenance and Impairments	Compliance		The FPP includes procedures to ensure fire protection features and systems are maintained in accordance with applicable reference standards and other regulatory guidance. Fire system and feature impairments are controlled by a permit system authorized by a qualified individual.
C.3.5	Manual Firefighting Capabilities	Compliance		See below
C.3.5.1	Fire Brigade	Compliance		The Fire Brigade consists of at least five members available on each shift above the minimum shift complement for safe operation/ shutdown. The brigade is trained and equipped to respond to fire-related emergencies.
C.3.5.1.1	Fire Brigade Staffing	Compliance		The Fire Brigade consists of at least five members available on each shift above the minimum shift complement for safe operation/shutdown. The on-duty Shift Manager is not a member of the fire brigade.
C.3.5.1.2	Equipment	Compliance		The Fire Brigade is suitably outfitted and equipped for interior structural firefighting activities. PPE and related fire brigade equipment conforms with and is maintained per recognized standards. This includes turnout gear and self-contained breathing apparatus and equipment including hoses, nozzles, smoke ejectors, and other specialized equipment. Equipment maintenance and inspection is performed per plant procedure.
C.3.5.1.3	Procedures and Prefire Plans	Compliance		The Fire Brigade and fire response activities are conducted in accordance with annunciator response procedures, pre-fire plans, and related fire response procedures which address strategies and tactics typical to nuclear power plant fire response.
C.3.5.2	Offsite Manual Firefighting Resources	Compliance		Offsite fire department response is governed through a mutual aid agreement with offsite fire departments. The offsite fire departments are included in pertinent training on the hazards of the facility and participate in a minimum of one drill per year on-site.
C.3.5.2.1	Capabilities	Compliance		The offsite fire department equipment is compatible with the plant equipment and/or adapters are provided and available when required.
C.3.5.2.2	Training	Compliance		The offsite fire departments are included in pertinent training on the hazards of and response within the facility including radiological and operational hazards; site access/security; and roles, responsibilities and authorities including command and response structure.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 7 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.3.5.2.3	Agreement/Plant Exercise	Compliance		The plant will establish written mutual aid agreements with off-site fire departments to provide response support to the fire brigade.Said agreements will address authorities and command responsibilities and will provide for periodic participation/joint training including annual drills and participation in radiological emergency response plan exercises.
C.4.1.7	Communications	Compliance		The Fire Brigade will utilize portable radios for communications during fire response. This system is arranged to not conflict with other site radio communications and to provide reliable, comprehensive coverage for the site. The radio system is the primary means of communication for fire brigade operations. Secondary communications are available to the fire brigade via the plant primary and wireless telephone systems and by the plant public address system.
C.5.5	Post-Fire Safe-Shutdown Procedures	COL Applicant	Note 3	Compliance - The plant will have detailed procedures and training to ensure fire-safe shutdown and other fire-safe conditions required to minimize radioactive material release are achieved and maintained.
C.5.5.1	Safe-Shutdown Procedures	COL Applicant	Note 3	Compliance -See C.5.5
C.5.5.2	Alternative/Dedicated Shutdown Procedures	COL Applicant	Note 3	Compliance -See C.5.5
C.5.5.3	Repair Procedures	COL Applicant	Note 3	Compliance - Consistent with the U.S. EPR FSAR, the plant does not permit repairs to achieve hot or cold shutdown conditions; procedures are not required.
C.6.1.6	Alternative/Dedicated Shutdown Panels	Compliance		The FPP includes procedures to control transient combustibles consistent with the Fire Hazards Analysis and good fire prevention practices.
C.6.2.4	Independent Spent Fuel Storage Areas	COL Applicant	Note 3	Compliance - No Independent Spent Fuel Storage Areas are planned for the plant at this time and are not included in this COL application.
C.6.2.6	Cooling Towers	COL Applicant for the Circulating Water System Cooling Tower Structure	Note 3 for the Circulating Water System Cooling Tower Structure	Compliance - Circulating Water System. The Cooling Tower Structure is addressed in Appendix 9B.

Table 9.5-1 — {Fire Protection Program Compliance with Regulatory Guide 1.189}
(Page 8 of 8)

R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment	CCNPP Unit 3 Supplement
C.7.6	Nearby Facilities	COL Applicant	Note 3	Compliance - Appendix 9A of the U.S. EPR FSAR provides the technical analysis for the nuclear island and related power block structures and demonstrates that the EPR has the ability to achieve and maintain safe-shutdown and to minimize the release of radioactive materials to the environment. FSAR Appendix 9B of this COL application provides an analysis of fire hazards and details fire protection attributes for the remainder of the plant.
C.8.4	Applicable Industry Codes and Standards	Compliance		The FPP will conform to the codes and standards and applicable edition years listed in Section 9.5.1.7 of the U.S. EPR FSAR.
C.8.6	Fire Protection Program Implementation Schedule	Compliance		The required elements of the FPP are fully operational prior to receipt of new fuel for buildings storing new fuel and adjacent areas that could affect the fuel storage area at the plant. Other required elements of the FPP described in FSAR Section 9.5.1 are fully operational prior to initial fuel loading at.

Notes:

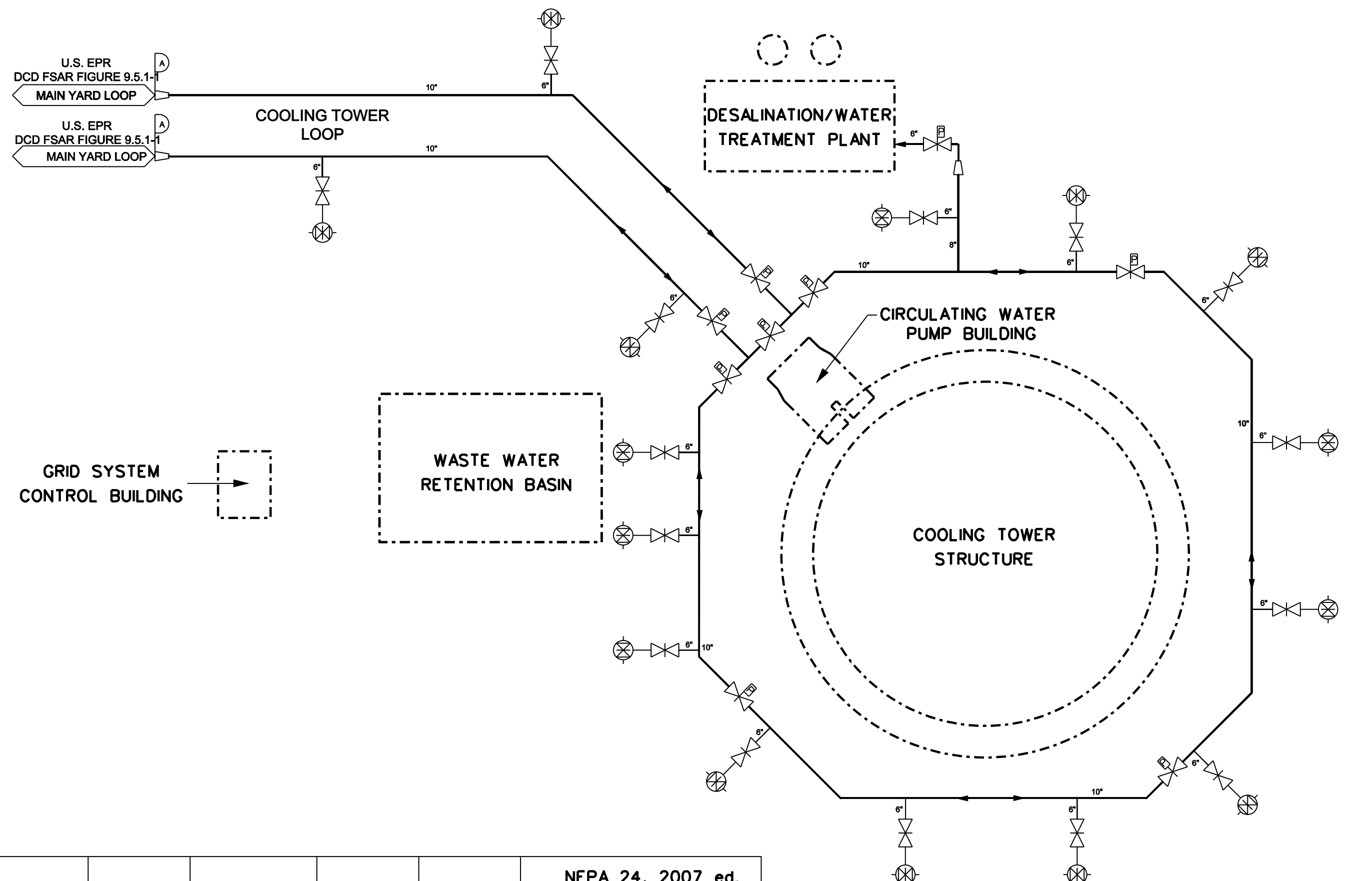
1. The scope of the Regulatory Position presented in this compliance comparison table is abbreviated, due to the depth of detail contained within the Regulatory Position Appendix C itself. The user should refer to Regulatory Guide 1.189 directly for the text portion of each section addressed by the table.

2. The U.S. EPR compliance to the regulatory positions delineated in Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants," is as indicated by the following definitions:

    - COL Applicant – The COL Applicant will address the subject regulatory position.
    - Compliance – The U.S. EPR design supports compliance with the subject regulatory position.

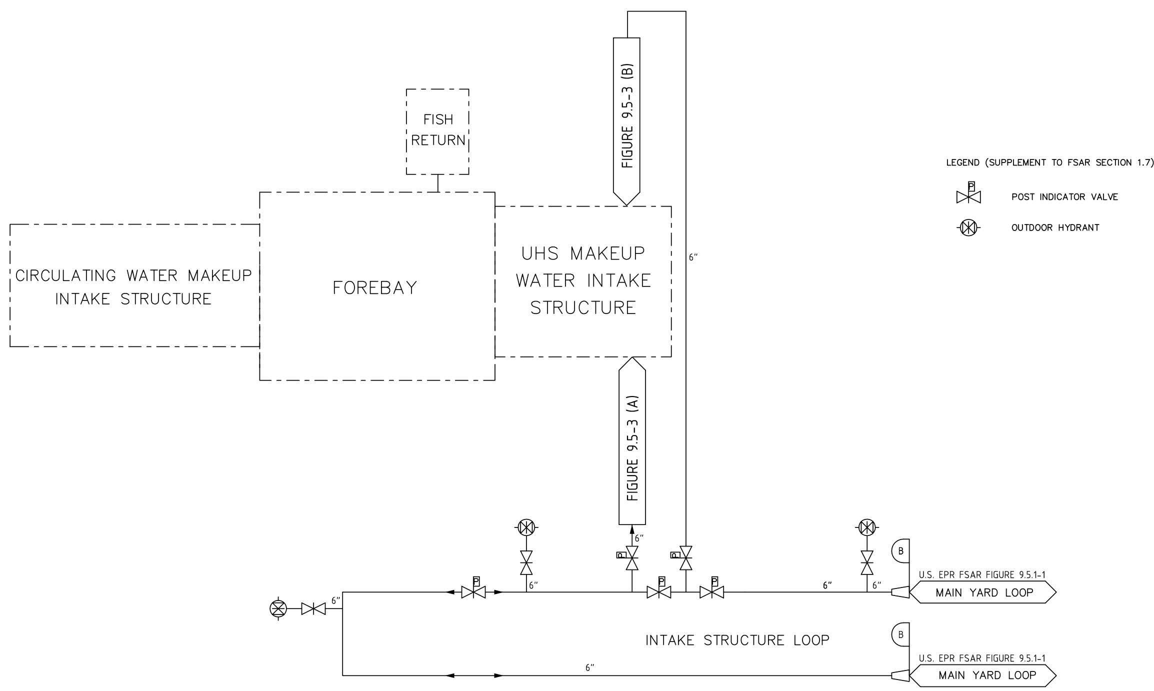
3. A COL Applicant that references the U.S. EPR design certification will submit site specific information to address the Regulatory Position.

Figure 9.5-1 — {CCNPP Unit 3 Fire Water Distribution System – Cooling Tower Loop}



A	NS-AQ	D	250	100	NSC	No	NFPA 24, 2007 ed. NFPA 25, 2002 ed. NFPA 804, 2006 ed.
DESIGN AREA	SSC SAFETY CLASS	SSC QUALITY GROUP	DESIGN PRESSURE PSIG	DESIGN TEMPERATURE °F	SSC SEISMIC CLASS	10 CFR APPENDIX B PROGRAM	COMMERCIAL CODE

Figure 9.5-2 — {CCNPP Unit 3 Fire Water Distribution System – Intake Structure Loop}

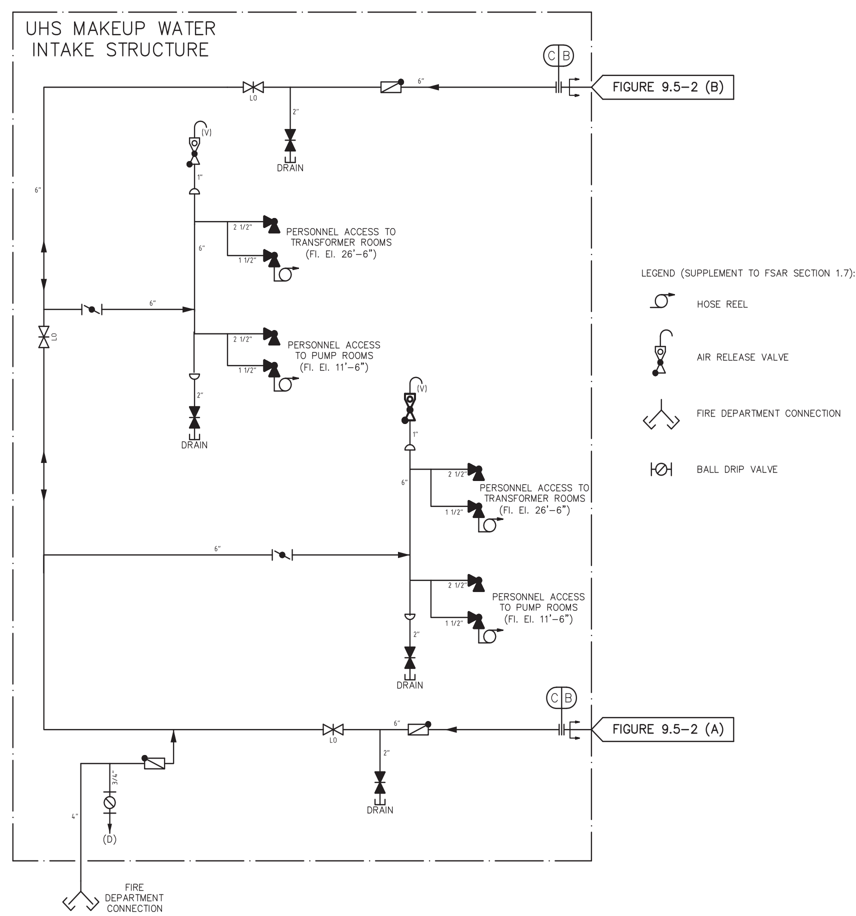


B	NS–AQ	D	250	100	CS–I	Yes	NFPA 24, 2007 ed. NFPA 25. 2002 ed. NFPA 804, 2006 ed. ANSI/ASME B31.1, 2004 ed. ASME III, 2004 ed. (NOTE 2)
DESIGN AREA	SSC SAFETY CLASS	SSC QUALITY GROUP	DESIGN PRESSURE PSIG	DESIGN TEMPERATURE °F	SSC SEISMIC CLASS	10 CFR APPENDIX B PROGRAM (NOTE 1)	COMMERCIAL CODE

NOTE 1: THOSE SSCs CLASSIFIED AS NS–AQ (FOR SAFETY CLASS) AND CLASSIFIED AS "YES" FOR 10 CFR 50 APPENDIX B WILL BE SUBJECT ONLY TO THOSE QUALITY ASSURANCE REQUIREMENTS OF APPENDIX B THAT ARE PERTINENT TO THAT SSC BASED ON POTENTIAL AFFECT OF THE SSC ON SAFETY-RELATED FUNCTIONS.

NOTE 2: ASME III, 2004 EDITION IS UTILIZED FOR SEISMIC ANALYSIS METHODOLOGY ONLY

Figure 9.5-3 — {CCNPP Unit 3 UHS Makeup Water Intake Structure}



DESIGN AREA	SSC SAFETY CLASS	SSC QUALITY GROUP	DESIGN PRESSURE PSIG	DESIGN TEMPERATURE °F	SSC SEISMIC CLASS	10 CFR APPENDIX B PROGRAM (NOTE 1)	COMMERCIAL CODE
C	NS-AQ	D	250	120	CS - I	YES	NFPA 13, 2007 ed. NFPA 14, 2007 ed. NFPA 25, 2002 ed. NFPA 804, 2006 ed. ANSI/ASME B31.1, 2004 ed. ASME III, 2004 ed. (NOTE 2)
B	NS-AQ	D	250	100	CS - I	YES	NFPA 24, 2007 ed. NFPA 25, 2002 ed. NFPA 804, 2006 ed. ANSI/ASME B31.1, 2004 ed. ASME III, 2004 ed. (NOTE 2)

NOTE 1: THOSE SSCs CLASSIFIED AS NS-AQ (FOR SAFETY CLASS) AND CLASSIFIED AS "YES" FOR 10 CFR 50 APPENDIX B WILL BE SUBJECT ONLY TO THOSE QUALITY ASSURANCE REQUIREMENTS OF APPENDIX B THAT ARE PERTINENT TO THAT SSC BASED ON POTENTIAL AFFECT OF THE SSC ON SAFETY-RELATED FUNCTIONS.

NOTE 2: ASME III, 2004 EDITION IS UTILIZED FOR SEISMIC ANALYSIS METHODOLOGY ONLY.

9A FIRE PROTECTION ANALYSIS

Appendix 9A of the U.S. EPR FSAR is incorporated by reference with the following supplement.

The information in U.S. EPR FSAR Appendix 9A – the fire protection analysis of the nuclear island – is supported by additional information provided in Appendix 9B. Appendix 9B provides the fire protection analysis of the remaining power block and balance of plant structures.

Figures 9A-98 through 106 in the U.S. EPR FSAR are identified as conceptual information for the Access Building. These figures and the corresponding fire area parameters in Table 9A-2 of the U.S. EPR FSAR for the Access Building are applicable to the plant.

9B FIRE PROTECTION ANALYSIS - PLANT SPECIFIC SUPPLEMENT

FSAR Appendix 9B is completely Site Specific.

9B.1 Introduction

{The Fire Protection Analysis (FPA) evaluates the potential for occurrence of fires within the plant, documents the capabilities of the fire protection system, and provides reasonable assurance of the capability to safely shut down the plant. The FPA is an integral part of the process of selecting fire prevention, detection, and suppression methods, and provides a design basis for the fire protection system. The design of the fire protection system is described in Section 9.5.1 and U.S. EPR FSAR Section 9.5.1.

This FPA is performed for the remaining power block and balance of plant structures that were not addressed in Appendix 9A. The FPA is performed for each fire area using the methodology addressed in Section 9B.2. The methodology follows the guidance of Regulatory Guide 1.189 (NRC, 2007a). The results of the analysis are provided in Section 9B.3.

Fires are expected to occur over the life of a nuclear power plant and should be treated as anticipated operational occurrences as defined in Appendix A to 10 CFR Part 50. Requirements for protection against radiation during normal operations appear in 10 CFR Part 20. Anticipated operational occurrences of fires should not result in unacceptable radiological consequences applying the exposure criteria of 10 CFR Part 20. Prevention of a radiological release that could result in a radiological hazard to the public, environment, or plant personnel becomes the primary objective during plant shutdown and decommissioning.

9B.1.1 Regulatory Bases

The regulatory bases and requirements applicable to the U.S. EPR design certification and CCNPP Unit 3 have been previously established, and are only restated in this FPA for completeness. 10 CFR 52.48 (CFR, 2008a) specifies, in part, that applications filed under this subpart will be reviewed for compliance with the standards set out in 10 CFR Part 50 and its appendices.

GDC 3 of Appendix A to 10 CFR Part 50 states:

"Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety. Firefighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components."

Additionally, 10 CFR 50.34(h) (CFR, 2008b) requires new reactor license applications to include an evaluation of the facility against the current Standard Review Plan (SRP) guidance. The applicable SRP guidance is specified in Section 9.5.1 of NUREG-0800 (NRC, 2007b). NUREG-0800 describes the areas of review, acceptance criteria and review procedure for NRC review of nuclear power plant fire protection programs. NUREG-0800 in turn invokes Regulatory Guide 1.189, for methods acceptable to the NRC to demonstrate compliance with the SRP review criteria. In addition to the guidance specified in Regulatory Guide 1.189, Section 9.5.1 of

NUREG-0800 also invokes SECY-90-016 (NRC, 1990) for additional NRC fire protection requirements applicable to evolutionary reactor designs.

9B.1.2 Defense-in-Depth

The objective of the overall Fire Protection Program is to implement a defense-in-depth strategy to achieve and maintain a high degree of plant safety. This strategy is accomplished by achieving and maintaining a balance between the following:

- Prevent fires from occurring.
- The capability to rapidly detect, control, and promptly extinguish those fires that do occur.
- Adequate protection for structures, systems, and components (SSC) important to safety so that a fire that is not promptly extinguished by fire suppression activities will not prevent safe shutdown of the plant or result in release of radioactive materials to the environment.

The programmatic elements used by the FPA to implement the defense-in-depth strategy are:

- Document and assess the impact of in situ and transient fire hazards on a fire area basis throughout the facility, including potential effects on safe shutdown capability, effects of fire suppression activities, and applicable risk insights from the fire probabilistic fire risk assessment.
- Specify measures for fire prevention, fire detection, fire suppression, and fire confinement.
- Minimize the potential for a fire or fire-related event to place the plant in an unrecoverable condition, cause a release of radioactive materials, or result in radiological exposure to onsite and offsite personnel.
- Specify measures that will provide reasonable assurance that one success path of safe shutdown capability will be available under credible post fire conditions.

9B.1.3 Scope

The scope of the FPA consists of the comprehensive assessment of the fire or explosion hazards for the plant structures in the following list, including a description of the fire protection defense-in-depth features provided to minimize the consequences of such an event.

- Turbine Building (UMA)
- Switchgear Building (UBA)
- Auxiliary Power Transformer Area (UBE)
- Generator Transformer Area (UBF)
- Warehouse Building (UST)
- Security Access Building (UYF)

- Central Gas Supply Building (UTG)
- Grid Systems Control Building (UAC)
- Fire Protection Building (USG)
- Circulating Water System Cooling Tower Structure (URA)
- Circulating Water System Pump Building (UQA)
- Ultimate Heat Sink Makeup Water Intake Structure (UPF)
- Circulating Water System Makeup Intake Structure (UPE)
- Desalinization/Water Treatment Building (UPQ)

9B.2 Fire Protection Analysis Methodology

9B.2.1 General Design Criteria

As described in Section 9B.1, the fire protection performance objectives are:

- Provide reasonable assurance that one success path of SSC will remain free of fire damage so that hot standby and cold shutdown conditions can be achieved without crediting plant or system repair activities.
- Minimize and control the release of radioactivity to the environment.

To meet these performance objectives, SECY-90-016 (NRC, 1990) specifies the following design criteria:

"Therefore, the evolutionary ALWR designers must ensure the safe shutdown can be achieved, assuming all equipment in any one fire area is rendered inoperable by fire and that re-entry into the fire area for repairs and operator actions is not possible. Because of its physical configuration, the control room is excluded from this approach, provided an independent alternative shutdown capability that is physically and electrically independent of the control room is included in the design. Evolutionary ALWR designers must 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, the evolutionary ALWR designers must 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 manual actions."

Based on the previously mentioned criteria, for the U.S. EPR, redundant divisions of safe shutdown systems, components, and cables, including associated circuits (e.g., safety-related, non-safety-related, Class 1E and non-Class 1E), whose failure could affect or prevent post fire safe shutdown capability, should not be located within the same fire area. The exceptions are the control room, because of provision of physically and electrically independent alternative shutdown capability, and the Reactor Building, because of provision of fire protection defense-in-depth features that provide reasonable assurance, to the extent practicable, that one success path of SSC necessary to achieve safe shutdown will remain free of fire damage.

9B.2.2 Specific Elements

To meet this design criterion, the following methodology is employed.

1. In accordance with GDC 3, structures, systems, and components important to safety must be designed and located to minimize the probability and effect of fires and explosions. The requirements of GDC 3 are met, in part, by compartmentation of the plant into separate fire areas. Specifically, based on the hazards present and the need for physical separation of SSC important to safety, the plant is segregated into separate fire areas by passive, fire-rated structural barriers (e.g., walls, floors, and ceilings). In some instances (e.g., Reactor Building), a fire area is sub-divided into fire zones based on physical separation, location of plant equipment, or for FPA purposes. These fire areas and 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 SSC important to safety. Outside of the main control room and the Reactor Building, each of the redundant divisions of emergency core cooling are separated by three hour rated structural fire barriers.

2. Materials used in plant construction are noncombustible or heat resistant to the extent practicable in accordance with GDC 3. Walls, floors, roofs, including structural materials, suspended ceilings, thermal insulation, radiation shielding materials, and soundproofing and interior finish are noncombustible or meet applicable qualification test acceptance criteria unless otherwise justified. Concealed spaces are devoid of combustibles unless otherwise justified.

3. The plant layout also provides reasonable assurance that adequate means of access to all plant areas is provided for manual fire suppression activities and allow safe access and egress for personnel. The layout and travel distances of access and egress routes meet the intent of NFPA 101 (NFPA, 2006) to the extent practicable, unless otherwise justified. Potential delays in plant access or egress due to security locking systems are considered.

4. The in situ plant equipment and components, including electrical cables, housed within each fire area are considered. Any SSC important to safety located within the fire area are considered.

5. In situ fire and explosion hazards associated with plant operations, maintenance, and refueling activities within the fire area are identified (e.g., cables, lube oil, diesel fuel oil, flammable gases, chemicals, building materials, and interior finish). In developing postulated fire scenarios for each fire area, the FPA considers the continuity of combustible materials, susceptibility of the materials to ignition, heat of combustion, heat release rates (HRR), and potential for fire spread.

   In the event that a fire area could be subject to potentially explosive environments from flammable gases or other potentially energetic sources (e.g., chemical treatment systems, ion exchange columns), explosion-prevention features and measures are provided.

   External exposure hazards are identified (e.g., flammable and combustible liquid or gas storage, auxiliary boiler units, natural vegetation) that could potentially expose SSC important to safety to fire effects (i.e., heat, flame, smoke). Wildfire hazards are addressed if the potential for damage to SSC important to safety exists.

6. The credible in situ ignition sources within the fire area are identified. The FPA classifies ignition sources as common or atypical and assign potential fire severity levels on a generic basis using predefined guidance. Most in situ ignition sources are of the common type, which include electrical switchgear cabinets, general electrical and control cabinets, electric motors, pumps (i.e., reactor coolant pumps, feedwater pumps, and other pumps), diesel generators, air compressors, battery banks, boiler heating units, electric dryers, heating, ventilation, air conditioning (HVAC) subsystem components, and others.

   Atypical sources of ignition include arcing electrical faults, hydrogen storage tanks, hydrogen piping, turbine generator exciter hydrogen, outdoor oil-filled transformers, and liquid fuels (i.e., spills). Because of their nature, fires associated with atypical ignition sources are not assigned a generic intensity level.

   Most anticipated fires will involve the common in situ ignition sources as represented by the equipment and components typically found in nuclear power plants. Such fires can be assessed using a fixed fire intensity (i.e., HRR) level for the given fire ignition source. However, consideration of a fixed fire intensity level for a given ignition source may not adequately consider the potential for low-likelihood, high intensity fires. NUREG/CR-6850 (NRC, 2005) addressed this concern by assigning a ranking of two HRR values. The first value assigned is the 75th percentile fire intensity. This means that 75 percent of the fires involving a given ignition source would reach an intensity no greater than the cited fire intensity (absent the fire propagating to any secondary combustibles). The second HRR value is the 98th percentile value, which is intended to represent a high-confidence fire intensity value, which based on the industry guidance cited, is expected to bound the vast majority of fires involving a given ignition source. Table 9B-1- Predefined Severities for Common Plant Ignition Source Fires provides the predefined HRR values associated with common plant ignition sources.

   Based on the in situ fire or explosion hazards and sources of ignition present within the fire area under consideration, postulated fire scenarios are developed and assessed. The FPA then assigns a hazard classification to each fire area. This classification is used as a broad characterization of the overall hazard assessment of each fire area. The classification system uses the same category and naming hierarchy as the NFPA 13 (NFPA, 2007) for classification of building occupancies. However, as used herein, these classifications are only intended to be a simplified reflection of the positive correlation between fire severity and the quantity of fuel available to support combustion and the thermal properties (e.g., HRR) of the fuel. The HRR values shown for each fire area hazard classification are only intended to represent the level of intensity that would generally be expected for a fire of this type. These HRR values are not used as a basis for determining worst-case fire scenarios. The classifications used are defined as follows:

   - Light Hazard - areas where, in combination or separately, the quantity or combustibility of materials are generally low, and fires with relatively low rates of heat release (e.g., 70 kW) are expected.

   - Ordinary Hazard (OH) (Group 1) - areas where the combustibility of materials is generally low, the quantity of materials is moderate (without large concentrations), and fires with moderate rates of heat release (e.g., 200 kW) are expected.

   - Ordinary Hazard (OH) (Group 2) - areas where the quantity and combustibility of materials are moderate to high (segregated large concentrations may exist), and fires with moderate to high rates of heat release (e.g., 650 kW) are expected.

- Extra Hazard (EH) (Group 1) - areas where the quantity and combustibility of materials are very high, with materials present that have the potential to result in rapidly developing fires with high rates of heat release (e.g., 2 MW), but with little or no combustible or flammable liquids present.

- Extra Hazard (EH) (Group 2) - areas with moderate to substantial amounts of combustible or flammable liquids present, which would result in fires having very high rates of heat release (e.g., 10 MW).

The predefined higher and lower HRR values associated with common ignition source fires and the corresponding FPA hazard classifications are provided in Table 9B-1.

7. Based on the type and nature of the plant equipment located in the area, the plant activities normally performed in the area, and the frequency of those activities, the FPA provides a transient hazard level (THL) assessment of transient fire hazards into the fire area analysis. A THL-1 determination generally reflects no need for detailed assessment of transient fire hazards. Depending on the type and quantity of in situ hazards within the area and its FPA hazard classification, a THL-2 determination may or may not reflect the need for detailed assessment of transient fire hazards. A THL-3 determination generally reflects the need for detailed assessment of transient fire hazards within the area analysis. In such cases, the material type, quantity, and associated thermal properties comprising the transient hazard package is evaluated. More than one type of transient hazard source may apply to a given fire area. Section 9B.2.3.3 provides additional information regarding the transient fire hazard determination process.

8. Based on compartmentation of the plant by three hour rated structural fire barriers, additional fire protection features (e.g., fire detection system capability, fixed fire suppression system capability, electrical raceway fire barrier systems) are generally not required in order to provide adequate separation of redundant trains of safe shutdown systems, components, and cables. However, for provision of fire protection features, regulatory requirements and regulatory guidance take precedence.

   Risk-informed, performance-based methods, or other quantitative /computational methods or tools are not utilized to determine where fire detection and suppression systems will or will not be installed. However, where fire detection and suppression systems are provided in accordance with regulatory guidance, recognized fire protection engineering practices, methods, and analytical tools, such as those promulgated by NUREG-1805 (NRC, 2004) and NUREG-1824 (NRC, 2007c) may be used to assess the performance capability of such systems.

9. Based on the previously mentioned considerations, suitable fire protection defense-in-depth features are specified for all plant fire areas.

   The fire protection features provided (e.g., fire barriers and closure devices, fire detection systems, fire suppression systems and equipment) are designed and installed in accordance with applicable regulatory guidance, codes and NFPA standards. Deviations from the above requirements are justified. See U.S. EPR FSAR Section 9.5.1 for further information regarding fire protection features.

10. Appropriate manual fire suppression capability (i.e., hydrants, standpipe and hose systems, and portable fire extinguishers) are specified and described for each plant fire area.

11. Pursuant to GDC 3, the potentially disabling effects of fire suppression systems, due to normal or inadvertent operation, on SSC important to safety are described for each fire area.

12. The FPA describes the means provided to ventilate, exhaust, or isolate each fire area. Additionally, in accordance with SECY-90-016 (NRC, 1990), the ventilation system design provides reasonable assurance that smoke, hot gases, and fire suppressants do not migrate into other fire areas to the extent that they could adversely affect safe shutdown capabilities, including operator manual actions. See U.S. EPR FSAR Section 9.5.1 for further information regarding the ventilation system design.

13. For each fire area, the capability to protect SSC important to safety from flooding associated with automatic and manual fire suppression activities, including inadvertent operation or fire suppression system failure, is considered. The effects of floor drains on the ability of total flooding gaseous fire suppression systems to achieve and maintain agent concentration upon discharge is considered for applicable fire areas.

    In fire areas containing flammable or combustible liquids, the measures are provided to minimize the potential for fire propagation via the drainage system.

14. Emergency lighting required to support fire suppression activities and post fire safe shutdown operations, including access and egress routes to such locations, is described.

15. Plant communication systems, including hardwired and radio systems to provide effective communications between plant personnel performing safe shutdown operations, fire brigade personnel, and the main control room (MCR) or alternative shutdown location, are described.

9B.2.3 Assumptions

9B.2.3.1 General

1. The loss of function of systems used to mitigate the consequences of design basis accidents under post fire conditions does not necessarily impact public safety. The need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

2. The systems used for alternative shutdown do not need to be designed to Seismic Category I criteria, single failure criteria, or other design basis accident criteria, except the portions of these systems that interface with or impact safety systems.

3. Fire damage to safe shutdown equipment or fires with the potential to result in release of radioactive materials to the environment is assessed on the basis of a single fire, 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 SSC important to safety or radioactive materials located in or adjacent to that same area. The effects of such fire (e.g., smoke, heat, and ignition) can adversely affect those SSC important to safety. Thus, if safe shutdown equipment associated with multiple success paths were located in the same fire area, a fire involving one success path of safe shutdown equipment could constitute an exposure fire to the remaining success paths. A fire involving

combustibles other than a redundant success path may constitute an exposure fire to redundant success paths located in the same area.

4. Redundant systems required for design basis accident consequence mitigation, but not required for fire safe shutdown may be damaged by a single exposure fire. The most stringent limitation for fire damage applies toward those systems that are required for both safe shutdown and design basis accident mitigation.

5. The fire event considered for alternative shutdown is a postulated fire in a specific fire area containing redundant safe shutdown cables or equipment where it has been determined that fire protection systems and features can not be provided to provide reasonable assurance that safe shutdown capability will be preserved. For the U.S. EPR, areas requiring alternative shutdown are limited to the control room.

6. It is assumed that a fire may occur at any time, but is not postulated to occur simultaneously with plant accidents or with severe natural phenomena (e.g., floods or high winds). However, severe natural phenomena (e.g., earthquakes) may initiate a fire event and are considered in evaluating the design capability of fire protection systems and features.

7. In evaluating the capability to accomplish post fire safe shutdown, offsite power may or may not be available and consideration is given to both cases. However, loss of offsite power need not be considered for a fire in non-alternative shutdown areas (i.e., outside of the control room) if it can be shown that offsite power can not be lost because of a fire in that area.

8. Alternative shutdown capability accommodates post fire conditions where offsite power is available and where offsite power is not available for 72 hours. In evaluating safe shutdown circuits, including associated circuits, the availability of uninterrupted power (i.e., offsite power available) may impact the ability to control the safe shutdown of the plant by increasing the potential for associated circuit interactions resulting from fire damage to energized power and control circuits.

9. Intentional station blackout (SBO) is not relied upon to mitigate potential fire damage to safe shutdown systems or associated circuits.

9B.2.3.2 Ignition Sources

1. Self-ignition of electrical cables that are qualified in accordance with a nationally recognized standard fire test methodology, such as IEEE Standard 1202 (IEEE, 2006) is not considered credible due to the protective devices (e.g., fuses, circuit breakers) provided and analyzed to be properly sized. On this basis, qualified electrical cables are considered as potential damage targets, but not ignition sources. Accordingly, any type of electrical cabling routed within metal conduit are considered as potential damage targets, but do not contribute to fire growth and spread. Therefore, they are not considered as ignition sources.

2. Hot work is only considered as a transient ignition source where performance of hot work is consistent with the plant equipment and normal activities to be performed within the fire area.

9B.2.3.3 Transient Fire Hazards

1. THL-1 applies to fire areas that are normally closed to any type of traffic, are not visited often (e.g., not more than once per week), are not occupied during normal plant operations, and where maintenance activities would generally be disallowed during at-power modes of plant operation. Such fire areas should also be subject to administrative controls that disallow leaving or storing unattended transient combustible materials. Examples of THL-1 areas include:

    - Areas where the exposed combustibles are limited to qualified cables, access is strictly controlled, and administrative controls prevent unattended transient combustibles.

    - Cable vaults and other areas having controlled access.

    - MCR (Exception: continuous occupancy of the MCR is not taken as indicative of a higher transient fire likelihood because extraordinary vigilance is expected for this area).

    - Reactor Building.

2. THL-2 applies to fire areas that either have occasional to frequent foot traffic (e.g., not more than once per shift and the area is not a regular access transit pathway) or are occasionally, but not continuously occupied during normal plant operations. Modest storage of transient combustible materials may be allowed. THL-2 would also apply to a fire area where maintenance activities are allowed at-power modes of plant operation, but such maintenance activities are subject to administrative controls (e.g., activity-specific permit process or other combustible controls program measures) and are a relatively rare occurrence (e.g., once per operating year). Examples of THL-2 areas or processes include:

    - Areas not normally locked but are not used as a passage to other areas of the plant (e.g., a DC power distribution panel room at the end of a corridor).

    - Normally unlocked areas that only a few plant personnel may enter once or twice per shift.

    - Areas that normal plant operations may infrequently involve personnel occupation for up to several hours.

    - Areas where the predominate exposed combustibles are qualified cables, but may contain other plant components.

    - Areas where materials may be stored on a temporary basis (e.g., to perform a maintenance or repair activity on nearby equipment). However, such storage should be infrequent rather than routine.

    - Areas where routine maintenance or repair activities (e.g., pump lube oil change-out or motor bearing maintenance) may result in the introduction of transient combustibles or ignition sources on a relatively common basis (e.g., two or more times per year) while the plant is at-power.

    - Most pump rooms and areas within the Nuclear Auxiliary Building.

- Most switchgear areas and battery rooms, depending on the frequency of maintenance activities.

3. THL-3 generally applies to fire areas that have heavy foot traffic, are frequently or continuously occupied, where transient combustibles are typically stored, where plant refuse is routinely gathered in substantive quantities for collection, where ignition sources are frequently brought into the area, and where maintenance activities are common during normal plant operation. Examples of THL-3 areas include:

   - Plant areas where personnel are present for a large fraction of the time. Paper-based items (e.g., letters, reports, computer printouts) are brought in and maintained in the area. Small electrical tools or appliances (e.g., hot plates, portable heaters, microwave ovens, and coffee pots) may frequently be used in the area. Also included are health physics access control areas, break room areas, any area used for food preparation, and security stations. While not applicable to the MCR, portions of the control room complex, such as kitchen or security areas may be THL-3.

   - Areas where smoking is not prohibited, or where there is evidence of smoking.

   - Areas with open trash cans that routinely contain substantive quantities of general trash.

   - Areas where radiation protection gear (e.g., jump suits, gloves, boots) are stored or collected including turn-out and change-out areas.

   - Areas used for storage (permanent or temporary) of flammable or combustible liquids or gases.

   - Staging areas where items are repaired or constructed before they are taken to other parts of the plant for use or installation.

   - Areas where materials are prestaged in anticipation of a planned outage.

   - Truck loading and unloading bays.

   - Areas where hot work is relatively common during at-power plant operations.

   - Areas within the diesel generator areas, intake structures, and the Radiation Waste Building.

9B.3 Fire Area-by-Fire Area Evaluation

The FPA is performed on a fire area by fire area basis for the following plant structures:

- Turbine Building (UMA)
- Switchgear Building (UBA)
- Auxiliary Power Transformer Area (UBE)
- Generator Transformer Area (UBF)
- Warehouse Building (UST)

- Security Access Building (UYF)
- Central Gas Supply Building (UTG)
- Grid Systems Control Building (UAC)
- Fire Protection Building (USG)
- Cooling Tower Structure (URA)
- Circulating Water Pump Building (UQA)
- Ultimate Heat Sink Makeup Water Intake Structure (UPF)
- Circulating Water System Makeup Intake Structure (UPE)
- Desalinization/Water Treatment Building (UPQ)

9B.3.1 Turbine Building

9B.3.1.1 Fire Area FA-UMA-01 (Table 9B-2, Column 1)

Fire area FA-UMA-01 is the Turbine Building. It consists of all floor elevations from (-) 19′-1″ to +67′-3″. Due to its vast size, fire area FA-UMA-01 is divided into the following fire zones:

Zone Number	Zone Name
FZ-UMA-01	Turbine Building, Floor Elev. (-) 19′-1″, Plant West
FZ-UMA-02	Turbine Building, Floor Elev. (-) 19′-1″, Plant East
FZ-UMA-03	Turbine Building, Floor Elev. ±0'0", Plant West
FZ-UMA-04	Turbine Building, Floor Elev. ±0'0", Plant East
FZ-UMA-05	Turbine Building, Floor Elev. +33′-0″, Plant West
FZ-UMA-06	Turbine Building, Floor Elev. +33′-0″, Plant East
FZ-UMA-07	Turbine Building, Floor Elev. +67′-3″, Turbine-Generator/Exciter Bearings, Lube Oil Lines, and Lube Oil Drainage Trenches

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-01 from affecting adjacent fire areas.

This fire area is frequently occupied during normal plant operations. The egress route from this area in the event of a fire is via grade level exits provided from each room.

9B.3.1.2 Fire Area FA-UMA-02 (Table 9B-2, Column 2)

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-02 from affecting adjacent fire areas.

This fire area is one of four egress routes/exits from the Turbine Building. If this exit becomes obstructed due to fire conditions, three other exit stairwells are available.

9B.3.1.3 Fire Area FA-UMA-03 (Table 9B-2, Column 3)

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-03 from affecting adjacent fire areas.

This fire area is one of four egress routes/exits from the Turbine Building. If this exit becomes obstructed due to fire conditions, three other exit stairwells are available.

9B.3.1.4 Fire Area FA-UMA-04 (Table 9B-2, Column 4)

Fire area FA-UMA-04 is the Stairwell located in the plant northeast corner of the Turbine Building that serves those elevations from (-) 19′-1″ to +98′-7″.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-04 from affecting adjacent fire areas.

This fire area is one of four egress routes/exits from the Turbine Building. If this exit becomes obstructed due to fire conditions, three other exit stairwells are available.

9B.3.1.5 Fire Area FA-UMA-05 (Table 9B-2, Column 5)

Fire area FA-UMA-05 is the Stairwell located in the plant northwest corner of the Turbine Building that serves those elevations from (-) 19′-1″ to +67′-3″.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-05 from affecting adjacent fire areas.

This fire area is one of four egress routes/exits from the Turbine Building. If this exit becomes obstructed due to fire conditions, three other exit stairwells are available.

9B.3.1.6 Fire Area FA-UMA-06 (Table 9B-2, Column 6)

Fire area FA-UMA-06 is the Elevator shaft located in the plant southeast corner of the Turbine Building from elevation (-) 19′-1″ to +67′-3″.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-06 from affecting adjacent fire areas.

This fire area is not used as an egress component and occupants are protected from the effects of fire by rated construction and by elevator control and recall features.

9B.3.1.7 Fire Area FA-UMA-07 (Table 9B-2, Column 7)

Fire area FA-UMA-07 is the Feedwater Chemical Addition Room located at elevation (-) 19′-1″ within FZ-UMA-01.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-07 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is through the one door provided from the room with continuing egress to the exterior of the structure.

9B.3.1.8 Fire Area FA-UMA-08 (Table 9B-2, Column 8)

Fire area FA-UMA-08 is the Seal Oil Equipment Room located at grade elevation 0'0" within FZ-UMA-03.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-08 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is through the one door provided from the room with continuing egress to the exterior of the structure.

9B.3.1.9 Fire Area FA-UMA-09 (Table 9B-2, Column 9)

Fire area FA-UMA-09 is the Excitation Transformer Room located on the Mezzanine at level +33'-0" above grade elevation within FZ-UMA-05.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-09 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is through one of multiple doors provided from the room with continuing egress to the exterior of the structure.

9B.3.1.10 Fire Area FA-UMA-10 (Table 9B-2, Column 10)

Fire area FA-UMA-10 is the Lube Oil Equipment Room located on a platform +49'-11" above grade elevation. It includes the Main Lube Oil Tank, Filter and Cooler and is located within FZ-UMA-06.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UMA-10 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is through the one door provided from the room with continuing egress to the exterior of the structure.

9B.3.2 Switchgear Building

9B.3.2.1 Fire Area FA-UBA-01 (Table 9B-2, Column 11)

Fire area FA-UBA-01 is the Switchgear Building floor located 19'-1" below grade elevation. Fire area FA-UBA-01 is comprised of the following rooms:

Room Number	Room Name
UBA01-001	Access Corridor
UBA01-002	Train 2 Spreading Room
UBA01-003	Train 1 Spreading Room
UBA01-004	Train 2 SBO Spreading Room
UBA01-005	Train 2 SBO Equipment Room
UBA01-006	Train 2 SBO Diesel Tank Room
UBA01-007	Auxiliary Boiler Equipment Room
UBA01-008	Train 1 SBO Spreading Room
UBA01-009	Train 1 SBO Equipment Room
UBA01-010	Train 1 SBO Diesel Tank Room

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.2.2 Fire Area FA-UBA-02 (Table 9B-2, Column 12)

Fire area FA-UBA-02 is the Switchgear Building floor located at +0'-0" (grade) elevation. Fire area FA-UBA-02 is comprised of the following rooms:

Room Number	Room Name
UBA02-001	Access Corridor
UBA02-002	Train 2 Equipment Room
UBA02-003	Train 2 Cable Tray Chase
UBA02-004	Train 1 Equipment Room
UBA02-005	Train 1 Cable Tray Chase
UBA02-006	Train 2 SBO Equipment Room
UBA02-007	Train 2 SBO Diesel Room
UBA02-008	Auxiliary Boiler Room
UBA02-009	Train 1 SBO Equipment Room
UBA02-010	Train 1 SBO Diesel Room

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.2.3 Fire Area FA-UBA-03 (Table 9B-2, Column 13)

Fire area FA-UBA-03 is the Switchgear Building floor located +33'-0" above grade elevation. Fire area FA-UBA-03 is comprised of the following rooms:

Room Number	Room Name
UBA03-001	Access Corridor
UBA03-002	Train 2 NUPS Battery Room
UBA03-003	Train 2 NUPS Equipment Room
UBA03-004	Train 2 HVAC Equipment Room
UBA03-005	Train 2 Cable Tray Chase
UBA03-006	Train 1 NUPS Battery Room
UBA03-007	Train 1 NUPS Equipment Room
UBA03-008	Train 1 HVAC Equipment Room
UBA03-009	Train 1 Cable Tray Chase
UBA01-010	Train 2 12UPS Equipment Room
UBA03-011	Train 2 12UPS Battery Room
UBA03-012	Train 2 SBO Diesel Air Inlet Room
UBA03-013	Auxiliary Boiler Equipment Room
UBA03-014	Train 1 12UPS Equipment Room
UBA03-015	Train 1 12UPS Battery Room
UBA03-016	Train 1 SBO Diesel Air Inlet Room

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-03 from affecting adjacent fire areas.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.2.4 Fire Area FA-UBA-04 (Table 9B-2, Column 14)

Fire area FA-UBA-04 is the Switchgear Building floor located +48'-0" above grade elevation. Fire area FA-UBA-04 is comprised of the following rooms:

Room Number	Room Name
UBA04-001	Access Corridor
UBA04-002	Train 2 Electrical Spreading Room
UBA04-003	Train 2 Cable Tray Chase
UBA04-004	Train 1 Electrical Spreading Room
UBA04-005	Train 1 Cable Tray Chase
UBA04-006	HVAC Equipment Room
UBA04-007	Train 2 SBO Diesel Radiator Room
UBA04-008	Auxiliary Boiler Electrical Room
UBA04-009	Train 1 SBO Diesel Radiator Room

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-04 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.2.5 Fire Area FA-UBA-05 (Table 9B-2, Column 15)

Fire area FA-UBA-05 is the Switchgear Building located +67'-3" above grade elevation. Fire area FA-UBA-05 is comprised of the following rooms:

Room Number	Room Name
UBA05-001	Entrance Vestibule
UBA05-002	Turbine Operator Work Station
UBA05-003	Restroom
UBA05-004	Train 2 Electrical Closet
UBA05-005	Train 2 DCS Equipment Room
UBA05-006	Common Equipment Room
UBA05-007	Train 2 Operator Work Station
UBA05-008	Work Station
UBA05-009	Work Station
UBA05-010	Train 1 Operator Work Station
UBA05-011	Train 1 DCS Equipment Room
UBA05-012	Common NUPS Equipment Room
UBA05-013	Train 1 Electrical Closet

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-05 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.2.6 Fire Area FA-UBA-06 (Table 9B-2, Column 16)

Fire area FA-UBA-06 is the Switchgear Building Roof at +79'-4" above grade elevation.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBA-06 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations.

[Security-Related Information - Withheld Under 10 CFR 2.390 - See Part 9 of the COL Application]

9B.3.3 Auxiliary Power Transformer Area

9B.3.3.1 Fire Area FA-UBE-01(Table 9B-2, Column 17)

Fire area FA-UBE-01 is the area that houses the Emergency Auxiliary Power Transformer number 1 (EAT 1) and associated equipment in cubicle 1UBE. Fire area FA-UBE-01 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBE-01	Cubicle housing the EAT 1 Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBE-01 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.3.2 Fire Area FA-UBE-02 (Table 9B-2, Column 18)

Fire area FA-UBE-02 is the area that houses the Normal Auxiliary Power Transformer number 1 (NAT 1) and associated equipment in cubicle 2UBE. Fire area FA-UBE-02 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBE-02	Cubicle housing the NAT 1 Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBE-02 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.3.3 Fire Area FA-UBE-03 (Table 9B-2, Column 19)

Fire area FA-UBE-03 is the area that houses the Normal Auxiliary Power Transformer number 2 (NAT 2) and associated equipment in cubicle 3UBE. Fire area FA-UBE-03 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBE-03	Cubicle housing the NAT 2 Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBE-03 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.3.4 Fire Area FA-UBE-04 (Table 9B-2, Column 20)

Fire area FA-UBE-04 is the area that houses the Emergency Auxiliary Power Transformer number 2 (EAT 2) and associated equipment in cubicle 4UBE. Fire area FA-UBE-04 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBE-04	Cubicle housing the EAT 2 Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBE-04 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.4 Generator Transformer Area

9B.3.4.1 Fire Area FA-UBF-01(Table 9B-2, Column 21)

Fire area FA-UBF-01 is the area that houses the Main Step-Up (MSU) Transformer and associated equipment in cubicle 1UBF. Fire area FA-UBF-01 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBF-01	Cubicle housing the MSU Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBF-01 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.4.2 Fire Area FA-UBF-02 (Table 9B-2, Column 22)

Fire area FA-UBF-02 is the area that houses the Main Step-Up (MSU) Transformer and associated equipment in cubicle 2UBF. Fire area FA-UBF-02 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBF-02	Cubicle housing the MSU Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBF-02 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.4.3 Fire Area FA-UBF-03 (Table 9B-2, Column 23)

Fire area FA-UBF-03 is the area that houses the Main Step-Up (MSU) Transformer and associated equipment in cubicle 3UBF. Fire area FA-UBF-03 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBF-03	Cubicle housing the MSU Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBF-03 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.4.4 Fire Area FA-UBF-04 (Table 9B-2, Column 24)

Fire area FA-UBF-04 is the area that houses the spare Main Step-Up (MSU) Transformer and associated equipment in structure 4UBF. Fire area FA-UBF-04 is comprised of the following zones:

Zone Number	Fire Zone Description
FZ-UBF-04	Cubicle housing the spare MSU Transformer

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UBF-04 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. This exterior area is not enclosed by significant egress impediments/obstructions.

9B.3.5 Warehouse Building

9B.3.5.1 Fire Area FA-UST-01 (Table 9B-2, Column 25)

Fire area FA-UST-01 is the Warehouse Building. It consists of the following rooms:

Room Number	Room Name
UST-01-001	Office
UST-01-002	Storage Area

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UST-01 from affecting adjacent fire areas.

This fire area is frequently occupied during normal plant operations. The egress route from this area in the event of a fire is via the stair enclosures located at each corner of the Warehouse Building.

9B.3.6 Security Access Facility

9B.3.6.1 Fire Area FA-UYF-01 (Table 9B-2, Column 26)

Fire area FA-UYF-01 is the Security Access Facility.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UYF-01 from affecting adjacent fire areas.

This fire area is frequently occupied during normal plant operations. The egress route from this area in the event of a fire is via grade level exits.

9B.3.7 Central Gas Supply Building

9B.3.7.1 Fire Area FA-UTG-01 (Table 9B-2, Column 27)

Fire area FA-UTG-01 is the oxygen cylinder storage room.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UTG-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits to the exterior located at grade elevation.

9B.3.7.2 Fire Area FA-UTG-02 (Table 9B-2, Column 28)

Fire area FA-UTG-02 is the miscellaneous gas cylinder storage room. Gases stored in this area include argon, nitrogen, and argon-methane (flammable – 90% argon, 10% methane).

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UTG-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits to the exterior located at grade elevation.

9B.3.7.3 Fire Area FA-UTG-03 (Table 9B-2, Column 29)

Fire area FA-UTG-03 is the hydrogen cylinder storage room. Only hydrogen gas is stored in this area.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UTG-03 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits to the exterior located at grade elevation.

9B.3.8 Grid Systems Control Building

9B.3.8.1 Fire Area FA-UAC-01 (Table 9B-2, Column 30)

Fire area FA-UAC-01 is one of two switchyard control rooms and is designated as Switchyard Control Room 1.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UAC-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits to the exterior located at grade elevation.

9B.3.8.2 Fire Area FA-UAC-02 (Table 9B-2, Column 31)

Fire area FA-UAC-02 is one of two switchyard control rooms and is designated as Switchyard Control Room 2.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UAC-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits to the exterior located at grade elevation.

9B.3.9 Fire Protection Building

9B.3.9.1 Fire Area FA-USG-01 (Table 9B-2, Column 32)

Fire area FA-USG-01 is one of two diesel fire pump rooms and is designated as Diesel Fire Pump Room 1.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-USG-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single exit to the exterior.

9B.3.9.2 Fire Area FA-USG-02 (Table 9B-2, Column 33)

Fire area FA-USG-02 is one of two diesel fire pump rooms and is designated as Diesel Fire Pump Room 2.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-USG-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single exit to the exterior.

9B.3.9.3 Fire Area FA-USG-03 (Table 9B-2, Column 34)

Fire area FA-USG-03 is the electric and jockey fire pump room.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-USG-03 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single exit to the exterior.

9B.3.10 Circulating Water System Cooling Tower Structure

9B.3.10.1 Fire Area FA-URA-01 (Table 9B-2, Column 35)

Fire area FA-URA-01 is the Circulating Water System Cooling Tower Structure.

The adequacy of the fire protection features provided are sufficient to prevent a fire originating within fire area FA-URA-01 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations.

9B.3.11 Circulating Water System Pump Building

9B.3.11.1 Fire Area FA-UQA-01 (Table 9B-2, Column 36)

Fire area FA-UQA-01 is the electrical room housing the electrical equipment providing power and control for the circulating water system pumps.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UQA-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single exit to the exterior.

9B.3.11.2 Fire Area FA-UQA-02 (Table 9B-2, Column 37)

Fire area FA-UQA-02 is grade and below grade portion of the circulating water system pump building which houses the four circulating water system pumps.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UQA-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via the two grade level exits to the exterior.

9B.3.12 Ultimate Heat Sink Makeup Water Intake Structure

9B.3.12.1 Fire Area FA-UPF-01(Table 9B-2, Column 38)

Fire area FA-UPF-01 is one of the four UHS makeup water pump, electrical, traveling screen and forebay divisions. Fire area FA-UPF-01 consists of the following rooms:

Room Number	Room Name
UPF03-001	UHS Makeup Water Air Cooled Condenser Room 1
UPF03-002	UHS Makeup Water Transformer Room 1
UPF03-011	UHS Makeup Water Traveling Screen Room 1
UPF02-001	UHS Makeup Water Pump Room 1
UPF01-001	UHS Makeup Water Intake Forebay Area 1

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UPF-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from the Air Cooled Condenser Room, Transformer Room, Traveling Screen Room and UHS Makeup Water Pump Room in the event of a fire is via the building corridors two exits: a single escape ladder to the roof, or a single grade level exit to the exterior. The egress route from the Traveling Screen Room to the building corridor in the event of fire is via an egress ladder and platform to the corridor. The use of ladders as means of emergency egress, as allowed by NFPA 101, restricts the occupant load for the building to three, and requires these personnel be capable of using the ladder in an emergency.

9B.3.12.2 Fire Area FA-UPF-02 (Table 9B-2, Column 39)

Fire area FA-UPF-02 is the corridor/stairwell enclosure serving the UHS Makeup Water Intake Structure. Fire area FA-UPF-02 consists of the following rooms:

Room Number	**Room Name**
UPF03-003	Personnel Access to Electrical Rooms
UPF02-002	Personnel Access to Pump Rooms
UPF02-010	Vestibule

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UPF-02 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single grade level exit to the exterior or a single escape ladder to the roof. The use of ladders as means of emergency egress, as allowed by NFPA 101, restricts the occupant load for the building to three and requires these personnel be capable of using the ladder in an emergency.

9B.3.12.3 Fire Area FA-UPF-03 (Table 9B-2, Column 40)

Fire area FA-UPF-03 is one of the four UHS makeup water pump, electrical, traveling screen and forebay divisions. Fire area FA-UPF-03 consists of the following rooms:

Room Number	**Room Name**
UPF03-004	UHS Makeup Water Air Cooled Condenser Room 2
UPF03-005	UHS Makeup Water Transformer Room 2
UPF03-012	UHS Makeup Water Traveling Screen Room 2
UPF02-004	UHS Makeup Water Pump Room 2
UPF01-002	UHS Makeup Water Intake Forebay Area 2

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UPF-03 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from the Air Cooled Condenser Room, Transformer Room, Traveling Screen Room and UHS Makeup Water Pump Room in the event of a fire is via the building corridors two exits: a single escape ladder to the roof, or a single grade level exit to the exterior. The egress route from the Traveling Screen Room to the building corridor in the event of fire is through two (non-lockable) exit doors to adjacent traveling screen rooms with access to the building corridor via an egress ladder and platform. The use of ladders as means of emergency egress, as allowed by NFPA 101, restricts the occupant load for the building to three, and requires these personnel be capable of using the ladder in an emergency.

9B.3.12.4 Fire Area FA-UPF-04 (Table 9B-2, Column 41)

Fire area FA-UPF-04 is one of the four UHS makeup water pump, electrical, traveling screen and forebay divisions. Fire area FA-UPF-04 consists of the following rooms:

Room Number	Room Name
UPF03-006	UHS Makeup Water Air Cooled Condenser Room 3
UPF03-007	UHS Makeup Water Transformer Room 3
UPF03-013	UHS Makeup Water Traveling Screen Room 3
UPF02-006	UHS Makeup Water Pump Room 3
UPF01-003	UHS Makeup Water Intake Forebay Area 3

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UPF-04 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from the Air Cooled Condenser Room, Transformer Room, Traveling Screen Room and UHS Makeup Water Pump Room in the event of a fire is via the building corridors two exits: a single escape ladder to the roof, or a single grade level exit to the exterior. The egress route from the Traveling Screen Room to the building corridor in the event of fire is through two (non-lockable) exit doors to adjacent traveling screen rooms with access to the building corridor via an egress ladder and platform. The use of ladders as means of emergency egress, as allowed by NFPA 101, restricts the occupant load for the building to three, and requires these personnel be capable of using the ladder in an emergency.

9B.3.12.5 Fire Area FA-UPF-05 (Table 9B-2, Column 42)

Fire area FA-UPF-05 is one of the four UHS makeup water pump, electrical, traveling screen and forebay divisions. Fire area FA-UPF-05 consists of the following rooms:

Room Number	Room Name
UPF03-008	UHS Makeup Water Air Cooled Condenser Room 4
UPF03-009	UHS Makeup Water Transformer Room 4
UPF03-014	UHS Makeup Water Traveling Screen Room 4
UPF02-008	UHS Makeup Water Pump Room 4
UPF01-004	UHS Makeup Water Intake Forebay Area 4

The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA-UPF-05 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from the Air Cooled Condenser Room, Transformer Room, Traveling Screen Room and UHS Makeup Water Pump Room in the event of a fire is via the building corridors two exits: a single escape ladder to the roof, or a single grade level exit to the exterior. The egress route from the Traveling Screen Room to the building corridor in the event of fire is via an egress ladder and platform to the corridor. The use of ladders as means of emergency egress, as allowed by NFPA 101, restricts the occupant load for the building to three, and requires these personnel be capable of using the ladder in an emergency.

9B.3.13 Circulating Water System Makeup Intake Structure

9B.3.13.1 Fire Area FA-UPE-01 (Table 9B-2, Column 43)

Fire area FA-UPE-01 is the electrical equipment room providing power and control for the circulating water system makeup pumps.

The adequacy of the fire protection features provided are sufficient to prevent a fire originating within fire area FA-UPE-01 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. The egress route from this area is via single exit to the exterior.

9B.3.13.2 Fire Area FA-UPE-02 (Table 9B-2, Column 44)

Fire area FA-UPE-02 is the grade and below grade portion of the circulating water system makeup intake structure which houses the three circulating water makeup pumps.

The adequacy of the fire protection features provided are sufficient to prevent a fire originating within fire area FA-UPE-02 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. The egress route from this area in the event of a fire is via a single grade level exit to the exterior and via multiple ladders from below grade.

9B.3.14 Desalinization/Water Treatment Building

9B.3.14.1 Fire Area FA-UPQ-01 (Table 9B-2, Column 45)

Fire area FA-UQP-01 is the Desalinization and Water Treatment Building.

The adequacy of the fire protection features provided are sufficient to prevent a fire originating within fire area FA-UPQ-01 from affecting adjacent fire areas.

This fire area is occasionally occupied during normal plant operations. The egress route from this area in the event of a fire is via multiple exits located at grade elevation.

9B.4 References

CFR, 2008a. Standards for Review of Applications, Title 10, Code of Federal Regulations, Part 52.48, 2008. U.S. Nuclear Regulatory Commission, 2008

CFR, 2008b. Contents of Construction Permit and Operating License Applications; Technical Information, Conformance with the Standard Review Plan, Title 10, Code of Federal Regulations, Part 50.34(h), U.S. Nuclear Regulatory Commission, 2008.

IEEE, 2006. IEEE Standard for Flame-Propagation Testing of Wire and Cable, EEE Standard 1202, Institute of Electrical and Electronics Engineers, 2006.

NFPA, 2002. Standard for the Installation Of Air-Conditioning & Ventilating Systems, NFPA 90A, National Fire Protection Association Standards, 2002.

NFPA, 2006. Life Safety Code, NFPA 101, National Fire Protection Association Standards, 2006.

NFPA, 2007. Standard for Installation of Sprinkler Systems, NFPA 13, National Fire Protection Association Standards, 2007.

NRC, 1990. Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements, SECY-90-016, U. S. Nuclear Regulatory Commission, January 12, 1990.

NRC, 2004. Fire Dynamics Tools (FDT^s) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program, NUREG-1805, U. S. Nuclear Regulatory Commission, December 2004.

NRC, 2005. EPRI/NRC - RES Fire PRA Methodology for Nuclear Power Facilities, NUREG/CR-6850, U.S. Nuclear Regulatory Commission, September 2005.

NRC, 2007a. Fire Protection for Nuclear Power Plants, Revision 1, Regulatory Guide 1.189, U.S. Nuclear Regulatory Commission, March 2007.

NRC, 2007b. Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, NUREG-0800, U.S. Nuclear Regulatory Commission, March 2007.

NRC, 2007c. Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications, NUREG-1824, U. S. Nuclear Regulatory Commission, May 2007.}

Table 9B-1 — Predefined Severities for Common Plant Ignition Source Fires

Fire Size (Hazard Classification)	Small Electrical Fire	Large Electrical Fire	Indoor Oil-Filled Transformers	Very Large Fire Sources	Engines and Heaters	Solid and Transient Combustibles
70 kW (Light)	75th Percentile Fire				75th Percentile Fire	75th Percentile Fire
200 kW (OH Group 1)	98th Percentile Fire	75th Percentile Fire			98th Percentile Fire	98th Percentile Fire
650 kW (OH Group 2)		98th Percentile Fire	75th Percentile Fire	75th Percentile Fire		
2 MW (EH Group 1)			98th Percentile Fire			
10 MW (EH Group 2)				98th Percentile Fire		

Table 9B-2 — Fire Area Parameters
(Page 1 of 18)

Column	1	2	3	4	5
Fire Area	FA-UMA-01	FA-UMA-02	FA-UMA-03	FA-UMA-04	FA-UMA-05
Building or Area	UMA	UMA	UMA	UMA	UMA
Figures	Figure 9B-1 through Figure 9B-7	Figure 9B-1 through Figure 9B-4	Figure 9B-1 through Figure 9B-5	Figure 9B-1 through Figure 9B-5	Figure 9B-1 through Figure 9B-4
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, b, c, d, f, g, j	None	None	None	None
Transient Fire Loading	THL-3	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	a, b, c, d, e, m	a	a	a	a
Atypical Ignition Sources (Note 2b)	cc, dd, ee	None	None	None	None
Hazard Classification (Note 13)	OH Group-2	Light Hazard	Light Hazard	Light Hazard	Light Hazard
Automatic Fire Detection	Yes (Hazard specific) Spot-type heat: T-G/Exciter Brgs Line-type heat: LO Drain Trenches	No	No	No	No
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	Yes (Hazard & Zone specific) Auto wet-pipe: FZ-UMA-01, FZ-UMA-02, FZ-UMA-03, FZ-UMA-04, FZ-UMA-05, FZ-UMA-06, FZ-UMA-07 Auto pre-action: T-G/ Exciter Bearings in FZ-UMA-07 Auto water spray: Lube Oil Drain Trenches in FZ-UMA-07	Yes Auto wet-pipe	Yes Auto wet-pipe	Yes Auto wet-pipe	Yes Auto wet-pipe
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	Yes	Yes	Yes	Yes	Yes

Table 9B-2 — Fire Area Parameters
(Page 2 of 18)

Column	1	2	3	4	5
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10 Smoke and heat vents	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 3 of 18)

Column	6	7	8	9	10
Fire Area	FA-UMA-06	FA-UMA-07	FA-UMA-08	FA-UMA-09	FA-UMA-10
Building or Area	UMA	UMA	UMA	UMA	UMA
Figures	Figure 9B-1 through Figure 9B-4	Figure 9B-1, Figure 9B-6	Figure 9B-2	Figure 9B-3, Figure 9B-6	Figure 9B-3, Figure 9B-6
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, c, d, e, g, j	a, c, e	a, c, d, e, f	a, e, g, k	a, c, d, e, g, j
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	a, b, m	a, b, d	a, b	a, b	a, b, c, d, m
Atypical Ignition Sources (Note 2b)	None	None	None	aa	ee
Hazard Classification (Note 13)	OH Group-1	OH Group-2	OH Group-2	OH Group-2	EH Group-2
Automatic Fire Detection	No	No	Yes Spot-type heat	Yes Spot-type heat	None
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	Yes Auto wet-pipe	Yes Auto wet-pipe	Yes Auto water spray/deluge	Yes Auto water spray/deluge	Yes Auto wet-pipe

Table 9B-2 — Fire Area Parameters
(Page 4 of 18)

Column	6	7	8	9	10
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	Yes	Yes	Yes	Yes	Yes
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	Yes (Note 6b)

Table 9B-2 — Fire Area Parameters
(Page 5 of 18)

Column	11	12	13	14	15
Fire Area	FA-UBA-01	FA-UBA-02	FA-UBA-03	FA-UBA-04	FA-UBA-05
Building or Area	UBA	UBA	UBA	UBA	UBA
Figures	Figure 9B-8, Figure 9B-14	Figure 9B-9, Figure 9B-14	Figure 9B-10, Figure 9B-14	Figure 9B-11, Figure 9B-14	Figure 9B-12, Figure 9B-14
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, b, c, d, e, g, j, n	a, b, c, d, e, g, j, k, n, s	a, b, c, e, f, g, m, t, v	a, b, c, g, j, t	a, b, c, e, g, r, s, v
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	a, b, c, d, m	a, b, c, d, g, i, k, m	a, b, g, j, m	a, b, m, n, o	a, b, g, n
Atypical Ignition Sources (Note 2b)	aa, ee	aa, ee	aa	aa	aa
Hazard Classification (Note 13)	EH Group-2 EH Group-1 OH Group-1 Light	EH Group-2 EH Group-1 OH Group-1 Light	EH Group-1 OH Group-2 OH Group-1 Light	EH Group-1 OH Group-1 Light	OH Group-2 OH Group-1 Light
Automatic Fire Detection	Yes Smoke: Train 1 Spreading Room Train 2 Spreading Room Train 1 SBO Spreading Room Train 2 SBO Spreading Room Train 1 SBO Equip Room Train 2 SBO Equip Room Train 1 SBO Diesel Tank Room Train 2 SBO Diesel Tank Room	Yes Smoke: Train 1 Equipment Train 2 Equipment Train 1 Cable Tray Chase Train 2 Cable Tray Chase Train 1 SBO Equip. Room Train 2 SBO Equip. Room Train 1 SBO Diesel Room Train 2 SBO Diesel Room	Yes Smoke: Train 1 NUPS Battery Room Train 2 NUPS Battery Room Train 1 NUPS Equipment Room Train 2 NUPS Equipment Room Train 1 Cable Tray Chase Train 2 Cable Tray Chase Train 1 12UPS Equipment Room Train 2 12UPS Equipment Room Train 1 12UPS Battery Room Train 2 12UPS Battery Room	Yes Smoke: Train 1 Electrical Spreading Room Train 2 Electrical Spreading Room Train 1 Cable Tray Chase Train 2 Cable Tray Chase	Yes, Smoke: Turbine Oper. Work Station Common NUPS Equip. Room Common Equip. Room Work Stations Train 1 Elect. Closet Train 2 Elect. Closet Train 1 DCS Equip. Room Train 2 DCS Equip. Room Train 1 Oper. Work Station Train 2 Oper. Work Station
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes

Table 9B-2 — Fire Area Parameters
(Page 6 of 18)

Column	11	12	13	14	15
Automatic Fixed Fire Suppression	Yes Auto wet-pipe: SBO Diesel Tank Rooms, SBO Equip. Rms, Aux. Boiler Equip. Room and Access Corridor Auto double interlock pre-action: Spreading Rooms and SBO Spreading Rooms	Yes Auto wet-pipe: SBO Diesel Rooms, Aux. Boiler Rm and Access Corridor Auto double interlock pre-action: Equipment Rooms, Cable Tray Chases, and SBO Equipment Rooms	Yes Auto wet-pipe: Access Corridor, HVAC Equipment Rms, SBO Diesel Air Inlet Rms and Auxiliary Boiler Equipment Rm Auto double interlock pre-action: NUPS Battery Rms, NUPS Equipment Rms, Cable Tray Chases, 12UPS Battery Rms, and 12UPS Equipment Rms	Yes Auto wet-pipe: Access Corridor, HVAC Equipment Rm, SBO Diesel Radiator Rms, and Auxiliary Boiler Equip. Rm Auto double interlock pre-action: Electrical Spreading Rms and Cable Tray Chases	Yes Auto wet-pipe: Entrance Vestibule and Restroom Auto double interlock pre-action: Work Stations, Electrical Closets, DCS Equipment Rms, and Common Equip. Rms
Manual Fixed Fire Suppression	No	No	No	No	No

Table 9B-2 — Fire Area Parameters
(Page 7 of 18)

Column	11	12	13	14	15
Standpipe and Hose System (Note 7)	Yes	Yes	Yes	Yes	Yes
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 8 of 18)

Column	16	17	18	19	20
Fire Area	FA-UBA-06	FA-UBE-01	FA-UBE-02	FA-UBE-03	FA-UBE-04
Building or Area	UBA	UBE	UBE	UBE	UBE
Figures	Figure 9B-13, Figure 9B-14	Figure 9B-15	Figure 9B-15	Figure 9B-15	Figure 9B-15
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figure	See Figure	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	None	a, e, g, l	a, e, g, l	a, e, g, l	a, e, g, l
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	i	a, b	a, b	a, b	a, b
Atypical Ignition Sources (Note 2b)	None	aa, ee, ff	aa, ee, ff	aa, ee, ff	aa, ee, ff
Hazard Classification (Note 13)	Light	EH Group-2	EH Group-2	EH Group-2	EH Group-2
Automatic Fire Detection	No	Yes, Line-type heat	Yes, Line-type heat	Yes, Line-type heat	Yes, Line-type heat
Manual Fire Alarms	No	No	No	No	No
Automatic Fixed Fire Suppression	No	Yes Auto water spray /deluge	Yes Auto water spray /deluge	Yes Auto water spray /deluge	Yes, Auto water spray/ deluge
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	No	No	No	No	No
Portable Fire Extinguishers (Note 8)	No	No	No	No	No
Suppression Affects	None	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	None	None	None	None	None
Emergency Lighting (Note 11)	None	None	None	None	None
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 9 of 18)

Column	21	22	23	24	25
Fire Area	FA-UBF-01	FA-UBF-02	FA-UBF-03	FA-UBF-04	FA-UST-01
Building or Area	UBF	UBF	UBF	UBF	UST
Figures	Figure 9B-15	Figure 9B-15	Figure 9B-15	Figure 9B-15	Figure 9B-16
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, e, g, l	a, e, g, l	a, e, g, l	a, e, g, l	a, b, c, d, r, s
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-3
Common Ignition Source (Note 2a)	a, b	a, b	a, b	a, b	a, c
Atypical Ignition Sources (Note 2b)	aa, ee, ff	aa, ee, ff	aa, ee, ff	aa, ee, ff	ee
Hazard Classification (Note 13)	EH Group-2	EH Group-2	EH Group-2	EH Group-2	OH Group-2
Automatic Fire Detection	Yes, Line-type heat	Yes, Line-type heat	Yes, Line-type heat	Yes, Line-type heat	No
Manual Fire Alarms	No	No	No	No	Yes
Automatic Fixed Fire Suppression	Yes, Auto water spray/ deluge	Yes, Auto water spray/ deluge	Yes, Auto water spray/ deluge	Yes, Auto water spray/ deluge	Yes
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	No	No	No	No	Yes (Note 7a)
Portable Fire Extinguishers (Note 8)	No	No	No	No	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	None	None	None	None	Note 10
Emergency Lighting (Note 11)	None	None	None	None	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 10 of 18)

Column	26	27	28	29	30
Fire Area	FA-UYF-01	FA-UTG-01	FA-UTG-02	FA-UTG-03	FA-UAC-01
Building or Area	UYF	UTG	UTG	UTG	UAC
Figures	Figure 9B-17	Figure 9B-18	Figure 9B-18	Figure 9B-18	Figure 9B-19
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, b, c, r, s	a, c, g, j	a, c, g, j, u	a, c, f, g, j	a, b, c, d, e, f, g, j, m, r, s, v
Transient Fire Loading	THL-3	THL-1	THL-1	THL-1	THL-2
Common Ignition Source (Note 2a)	a	a, m	a, m	a, m	a, b, j, m
Atypical Ignition Sources (Note 2b)	None	None	None	bb	None
Hazard Classification (Note 13)	Light Hazard	EH Group-2	OH Group-2	EH Group-2	OH Group-1
Automatic Fire Detection	Yes	No	No	No (H2 gas detection w/ exhaust auto-start)	Yes
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	No	Yes	Yes	Yes	No
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	No	No	No	No	No
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 11 of 18)

Column	31	32	33	34	35
Fire Area	FA-UAC-02	FA-USG-01	FA-USG-02	FA-USG-03	FA-URA-01
Building or Area	UAC	USG	USG	USG	URA
Figures	Figure 9B-19	Figure 9B-20	Figure 9B-20	Figure 9B-20	Figure 9B-21
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	None	None	None
SCC: post-fire safe shutdown	None	None	None	None	None
In situ Loading (Note 1)	a, b, c, d, e, f, g, j, m, r, s, v	a, c, d, e, g, j, n, m, v	a, c, d, g, j, m, n, v	a, c, d, g, j	a, b, d, e, g, w
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-1
Common Ignition Source (Note 2a)	a, b, j, m	a, b, d, m, i, j	a, b, d, j, m	a, b, c, d, m	a, c
Atypical Ignition Sources (Note 2b)	None	ee, aa	ee	None	ee
Hazard Classification (Note 13)	OH Group-1	EH Group-2	EH Group-2	OH Group-1	OH Group-2
Automatic Fire Detection	Yes	No	No	Yes	Yes
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	No	Yes	Yes	No	No
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	No	No	No	No	No
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	None
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	None	None	None

Table 9B-2 — Fire Area Parameters
(Page 12 of 18)

Column	36	37	38	39	40
Fire Area	FA-UQA-01	FA-UQA-02	FA-UPF-01	FA-UPF-02	FA-UPF-03
Building or Area	UQA	UQA	UPF	UPF	UPF
Figures	Figure 9B-22	Figure 9B-22	Figure 9B-23	Figure 9B-23	Figure 9B-23
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	None	None	Yes	None	Yes
SCC: post-fire safe shutdown	None	None	Yes	None	Yes
In situ Loading (Note 1)	a, b, c, e, g	a, b, c, d, g	a, b, c, d, e, g, j, k, t	a, b, c, j	a, b, c, d, e, g, j, k, t
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	a, b, m	a, b, c, d	a, b, c, d, m, o, p	a, m	a, b, c, d, m, o, p
Atypical Ignition Sources (Note 2b)	None	None	aa, ee	None	aa, ee
Hazard Classification (Note 13)	OH Group-1	OH Group-1	OH Group-2	OH Group-1	OH Group-2
Automatic Fire Detection	Yes	Yes	Yes Smoke: UPF03-001 UHS Makeup Water Air Cooled Condenser Room 1 UPF03-002 UHS Makeup Water Transformer Room 1 UPF02-001 UHS Makeup Water Pump Room 1 UPF03-011 UHS Makeup Water Traveling Screen Room 1	Yes Smoke: UPF03-003 Personnel Access to Electrical Rooms UPF02-002 Personnel Access to Pump Rooms	Yes Smoke: UPF03-004 UHS Makeup Water Air Cooled Condenser Room 2 UPF03-005 UHS Makeup Water Transformer Room 2 UPF02-004 UHS Makeup Water Pump Room 2 UPF03-012 UHS Makeup Water Traveling Screen Room 2
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	No	No	No	No	No
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	No	No	Yes	Yes	Yes
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14

Table 9B-2 — Fire Area Parameters
(Page 13 of 18)

Column	36	37	38	39	40
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	None	None	Yes (Notes 17 & 18)	Yes (Notes 17 & 18)	Yes (Notes 17 & 18)

Table 9B-2 — Fire Area Parameters
(Page 14 of 18)

Column	41	42	43	44	45
Fire Area	FA-UPF-04	FA-UPF-05	FA-UPE-01	FA-UPE-02	FA-UPQ-01
Building or Area	UPF	UPF	UPE	UPE	UPQ
Figures	Figure 9B-23	Figure 9B-23	Figure 9B-24	Figure 9B-24	Figure 9B-25
Fire Barriers (Notes 3,4,5,6)	See Figures	See Figures	See Figures	See Figures	See Figures
SSC: important to safety	Yes	Yes	None	None	None
SCC: post-fire safe shutdown	Yes	Yes	None	None	None
In situ Loading (Note 1)	a, b, c, d, e, g, j, k, t	a, b, c, d, e, g, j, k, t	a, c, e, g	a, c, d, g	a, c, d, e, g, k
Transient Fire Loading	THL-2	THL-2	THL-2	THL-2	THL-2
Common Ignition Source (Note 2a)	a, b, c, d, m, o, p	a, b, c, d, m, o, p	a, b, m	a, b, c, d	a, b, c, d
Atypical Ignition Sources (Note 2b)	aa, ee	aa, ee	None	ee	None
Hazard Classification (Note 13)	OH Group-2	OH Group-2	OH Group-1	OH Group-1	OH Group-1
Automatic Fire Detection	Yes Smoke: UPF03-006 UHS Makeup Water Air Cooled Condenser Room 3 UPF03-007 UHS Makeup Water Transformer Room 3 UPF02-006 UHS Makeup Water Pump Room 3 UPF03-013 UHS Makeup Water Traveling Screen Room 3	Yes Smoke: UPF03-008 UHS Makeup Water Air Cooled Condenser Room 4 UPF03-009 UHS Makeup Water Transformer Room 4 UPF02-008 UHS Makeup Water Pump Room 4 UPF03-014 UHS Makeup Water Traveling Screen Room 4	Yes	Yes	Yes (Note 15)
Manual Fire Alarms	Yes	Yes	Yes	Yes	Yes
Automatic Fixed Fire Suppression	No	No	No	No	Yes (Note 15)
Manual Fixed Fire Suppression	No	No	No	No	No
Standpipe and Hose System (Note 7)	Yes	Yes	No	No	No
Portable Fire Extinguishers (Note 8)	Yes	Yes	Yes	Yes	Yes
Suppression Affects	Note 14	Note 14	Note 14	Note 14	Note 14
Plant Drains	Note 9	Note 9	Note 9	Note 9	Note 9
Radiological Affects	None	None	None	None	None
HVAC	Note 10	Note 10	Note 10	Note 10	Note 10

Table 9B-2 — Fire Area Parameters
(Page 15 of 18)

Column	41	42	43	44	45
Emergency Lighting (Note 11)	aa	aa	aa	aa	aa
Communication (Note 12)	Yes	Yes	Yes	Yes	Yes
Engineering Evaluations	Yes (Notes 17 & 18)	Yes (Notes 17 & 18)	None	None	None

Notes
1. In-situ Loading:

a. Miscellaneous Cable Insulation
b. Miscellaneous Plastic and Rubber
c. Miscellaneous Wire and Plastic Components (Panels)
d. Lubricants and Hydraulic Fluids
e. Electrical Cabinets
f. Flammable Gases (Hydrogen)
g. Electrical Cable Insulation (Cable Trays)
h. Charcoal (Filters)
i. Air Compressors
j. HVAC Subsystem Components
k. Transformers (Dry)
l. Transformers (Oil-filled)
m. Battery Cases
n. Diesel Fuel Oil
o. Paints, Solvents and Cleaning Fluids
p. Clothing (Cotton and Synthetic Blends)
q. Clothing (Rubber and Plastic)
r. Paper Records, Procedures and Files
s. Furniture and/or Appliances
t. Air Handling Units
u. Flammable Gases (Methane)
v. Battery Chargers

Table 9B-2 — Fire Area Parameters
(Page 16 of 18)

2a. Common Ignition Sources:
- a. Low to Medium Voltage Electrical Circuits
- b. General Electrical and Control Cabinets
- c. Electric Motors
- d. Pumps
- e. Air Compressors
- f. Indoor Oil-filled Transformers
- g. Electrical Switchgear Cabinets
- h. Reactor Protection System MG sets
- i. Diesel Generators
- j. Battery Banks
- k. Boiler Heating Units
- l. Electric Dryers
- m. HVAC subsystem components
- n. Low Voltage Electrical Circuits
- o. Air Handling Units
- p. Transformers (Dry)

2b. Atypical Ignition Sources:
- aa. Arcing Electrical Faults
- bb. Hydrogen Storage Tanks
- cc. Hydrogen Piping
- dd. T/G Exciter / Hydrogen
- ee. Liquid Fuels (spills)
- ff. Outdoor Oil-filled Transformers

3. Barrier Ratings: See "Fire Barrier Location" located on the Fire Area Layout Drawings

4. Doors:
- ♦ For 1 hour fire rated barriers, minimum 1 hour fire rated door assemblies are provided.
- ♦ For 2 hour fire rated barriers, minimum 1.5 hour fire rated door assemblies are provided.
- ♦ For 3 hour fire rated barriers, minimum 3 hour fire rated door assemblies are provided.

5. Dampers:
- ♦ For 1 hour fire rated barriers, minimum 1 hour fire rated dampers are provided, except where through duct configuration is suitable to satisfy NFPA 90A (NFPA, 2002) requirements to allow for dampers to be omitted.
- ♦ For 2-hour fire rated barriers, minimum 1.5-hour fire rated dampers are provided.
- ♦ For 3-hour fire rated barriers, minimum 3-hour fire rated dampers are provided.

Table 9B-2 — Fire Area Parameters
(Page 17 of 18)

6. Penetrations:
Penetrations through fire rated walls, floors, and ceilings of each fire area are sealed or otherwise closed with rated penetration seal assemblies except where seal omission is permitted by NFPA code/standard. Any non-rated penetrations through rated barriers in this fire area will be justified by engineering evaluations.

6a. During detailed design, an engineering evaluation shall be performed to justify the lube oil equipment hatch penetration, at elevation 67’-3” above grade, through the 3 hour rated fire barrier separating fire areas FA-UMA-10 of FZ-UMA-06 and FZ-UMA-07.

7. Unless noted otherwise, a "Yes" indicates that Class III standpipes and hose stations are available for fire fighting use, but may not be located within the fire area.

7a. One and a half inch hose connections shall be provided in lieu of the Class III standpipes and hose connections.

8. Portable Fire Extinguishers:
Portable fire extinguishers may not necessarily be located in each individual fire area; however, they are available throughout each building to support manual fire fighting activities in accordance with NFPA requirements.

9. Plant Drains:
Drainage to be determined during detailed design. Drains will be provided except where storage of hazardous materials and/or radiological contamination imposes requirements for confinement and/or secondary containment.

10. HVAC:
Duct smoke detection and fan interlock will be provided when required by NFPA 90A.

11. Emergency Lighting:
aa. self-contained, battery backed fixtures installed throughout the fire area which provide minimum illumination for a 90 minute period to ensure a safe access/egress path in the event of a loss of the normal lighting system.

12. Communication:
One or more of the following methods of communication are available: plant-wide public address/paging system, in-plant telephone system, external communication links to the outside world, and/or portable radio communications.

13. Hazard Classification:
See Section 9B.2.2 for definition of hazard classifications.
- ♦ Light Hazard
- ♦ Ordinary Hazard (OH Group-1)
- ♦ Ordinary Hazard (OH Group-2)
- ♦ Extra Hazard (EH Group-1)
- ♦ Extra Hazard (EH Group-2)

14. Suppression Affects:
No adverse affects from automatic suppression systems are anticipated based on selected suppression agents and systems, on the absence of important to safety SSCs in the area or room of concern, and/or on the absence of important to safety SSCs susceptible to damage in the area or room of concern. This will require confirmation after final room/area, suppression system and important to safety SSC configuration/layout.

Table 9B-2 — Fire Area Parameters
(Page 18 of 18)

15. Water Reactive Chemicals
The Water Treatment Building will be provided with full area sprinkler protection, except for secondary containment areas associated with the tank storage of water reactive chemicals. These areas will be provided with automatic fire detection in accordance with the provisions of the IBC.

16. Manual pull stations may not necessarily be located in each individual fire area; however, they are located in accordance with NFPA requirements.

17. During detailed design, an engineering evaluation shall be performed to confirm the inability of smoke and hot gases to migrate into other fire areas containing safety-related equipment to the extent that they could adversely affect safe-shutdown capabilities, including operator actions.

18. Life safety egress provisions for egress from the UHS Makeup Water Intake Structure for occupant loading of greater than three (3) due to use of ladders as mean of emergency egress will be justified by engineering evaluations.

Figure 9B-1 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation (-)19'-1" from Grade

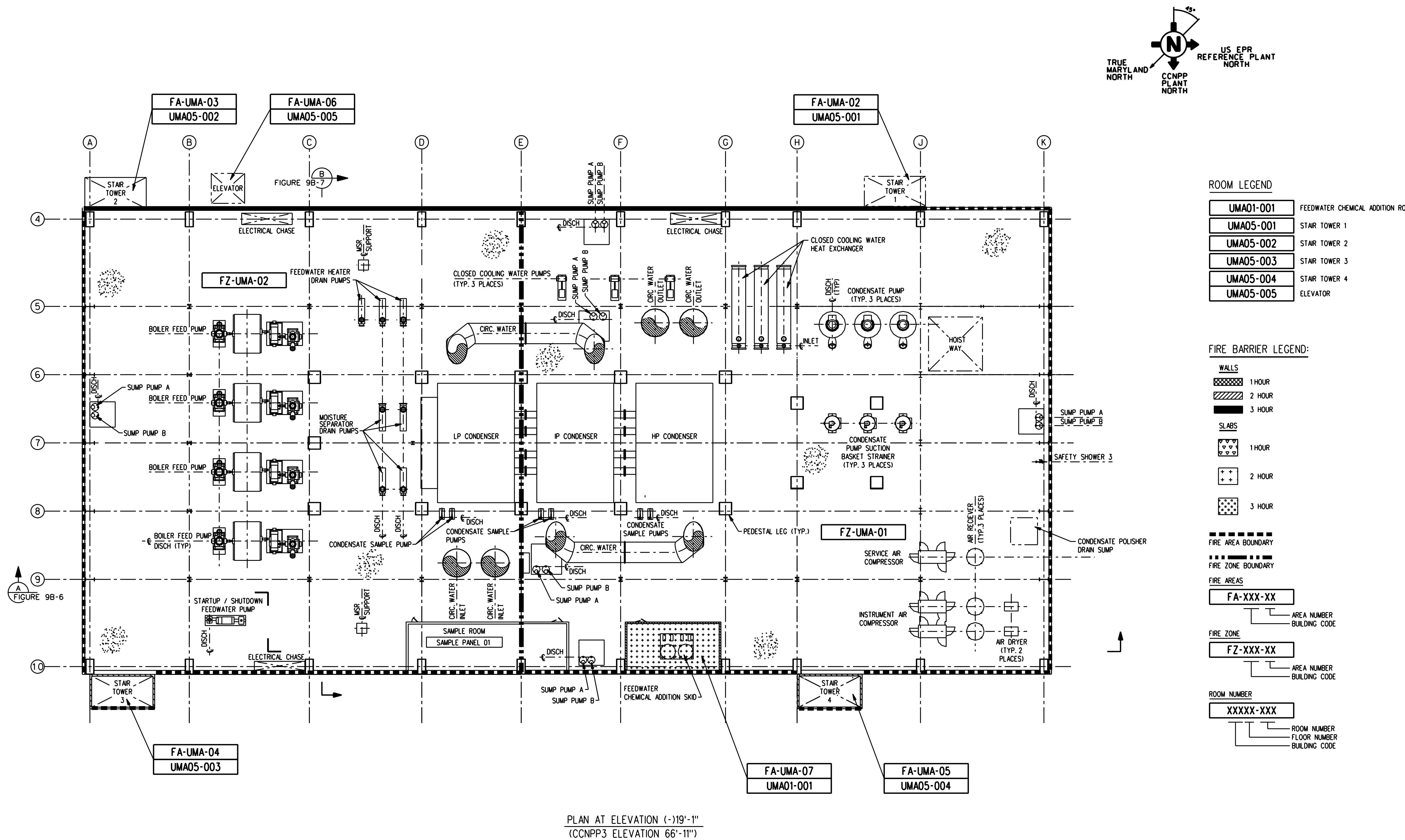


Figure 9B-2 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +0'-0" From Grade

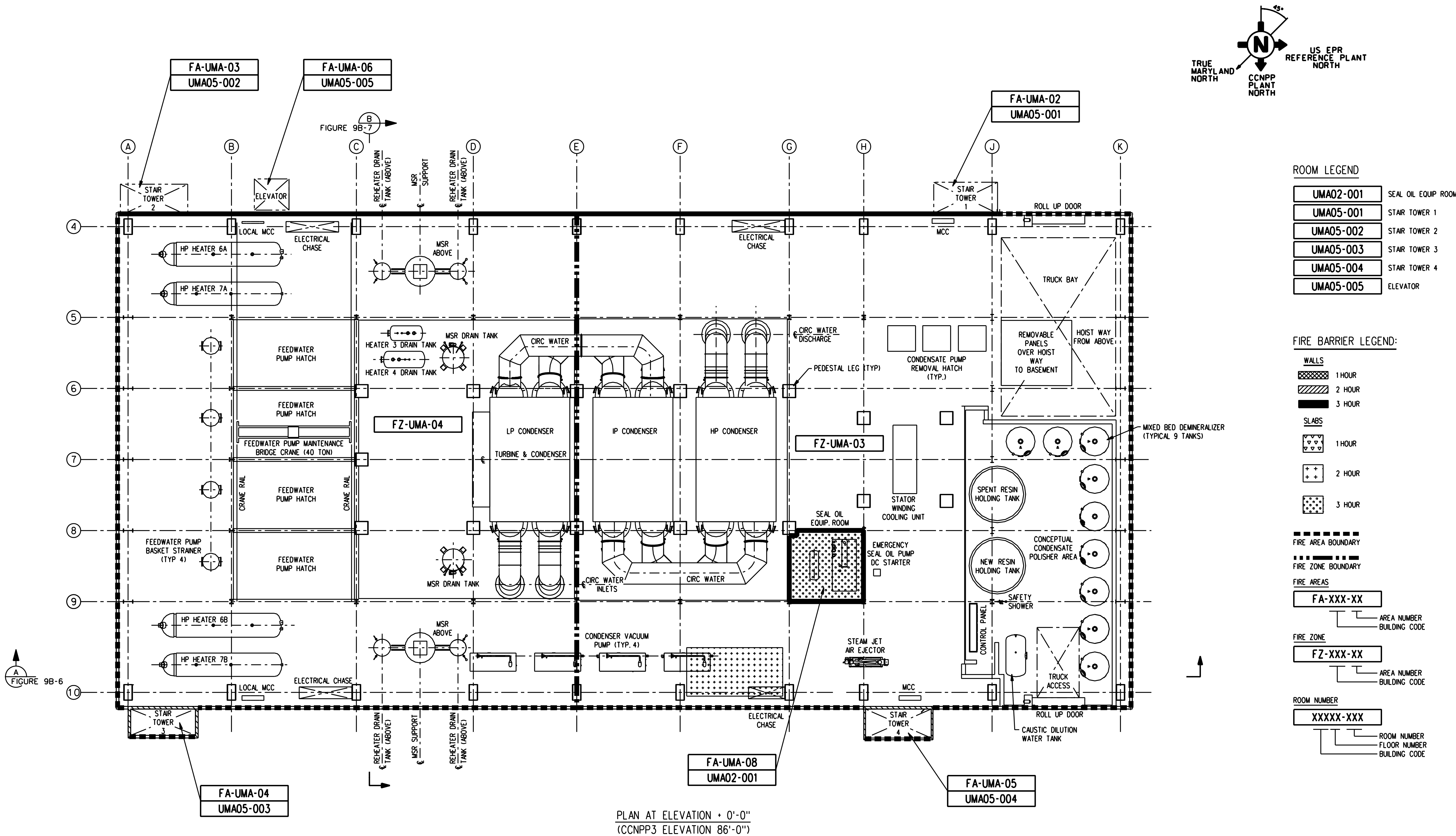
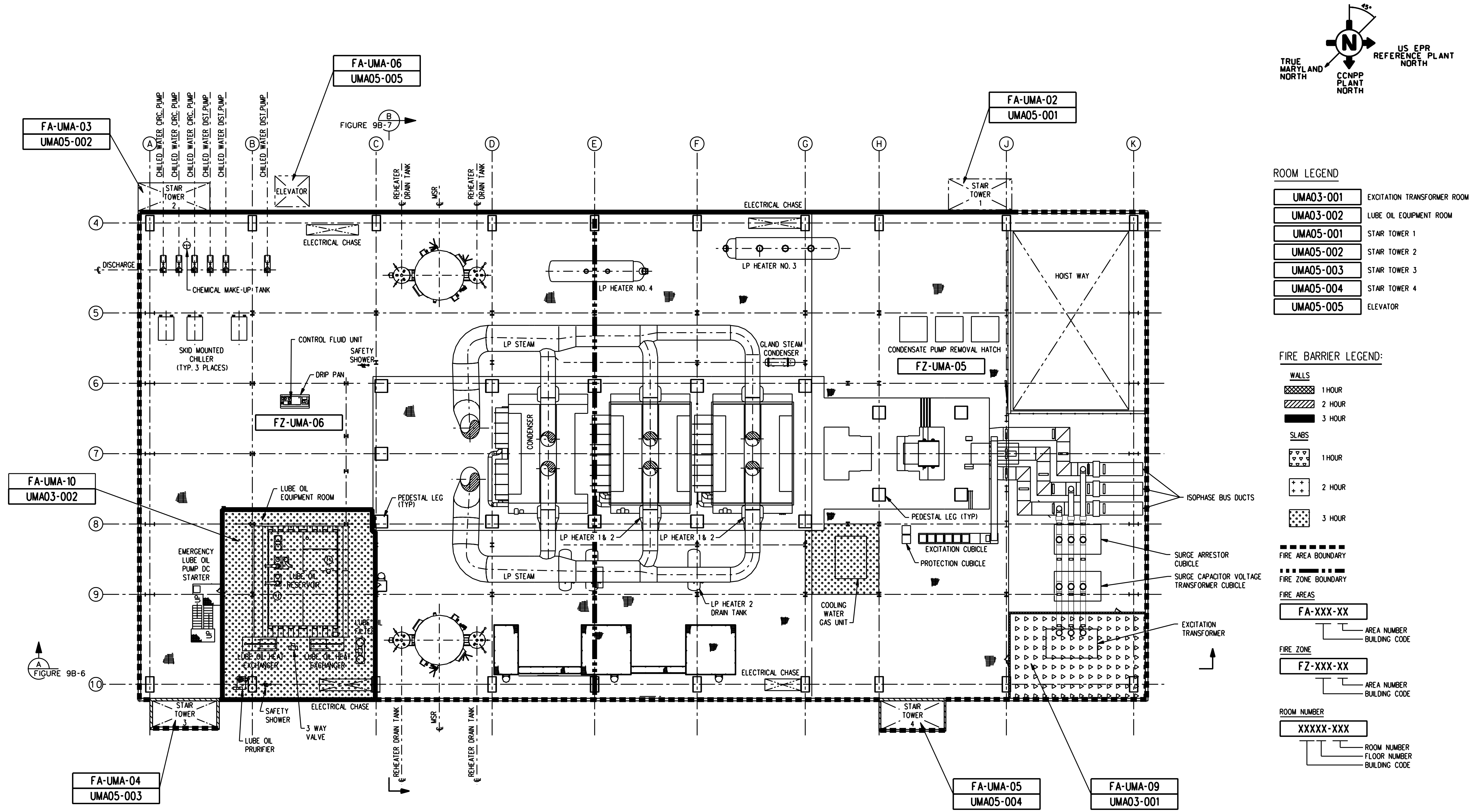


Figure 9B-3 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +33’-0”From Grade



PLAN AT ELEVATION + 33'-0"
(CCNPP3 ELEVATION 119'-0")

Figure 9B-4 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +67'-3" From Grade

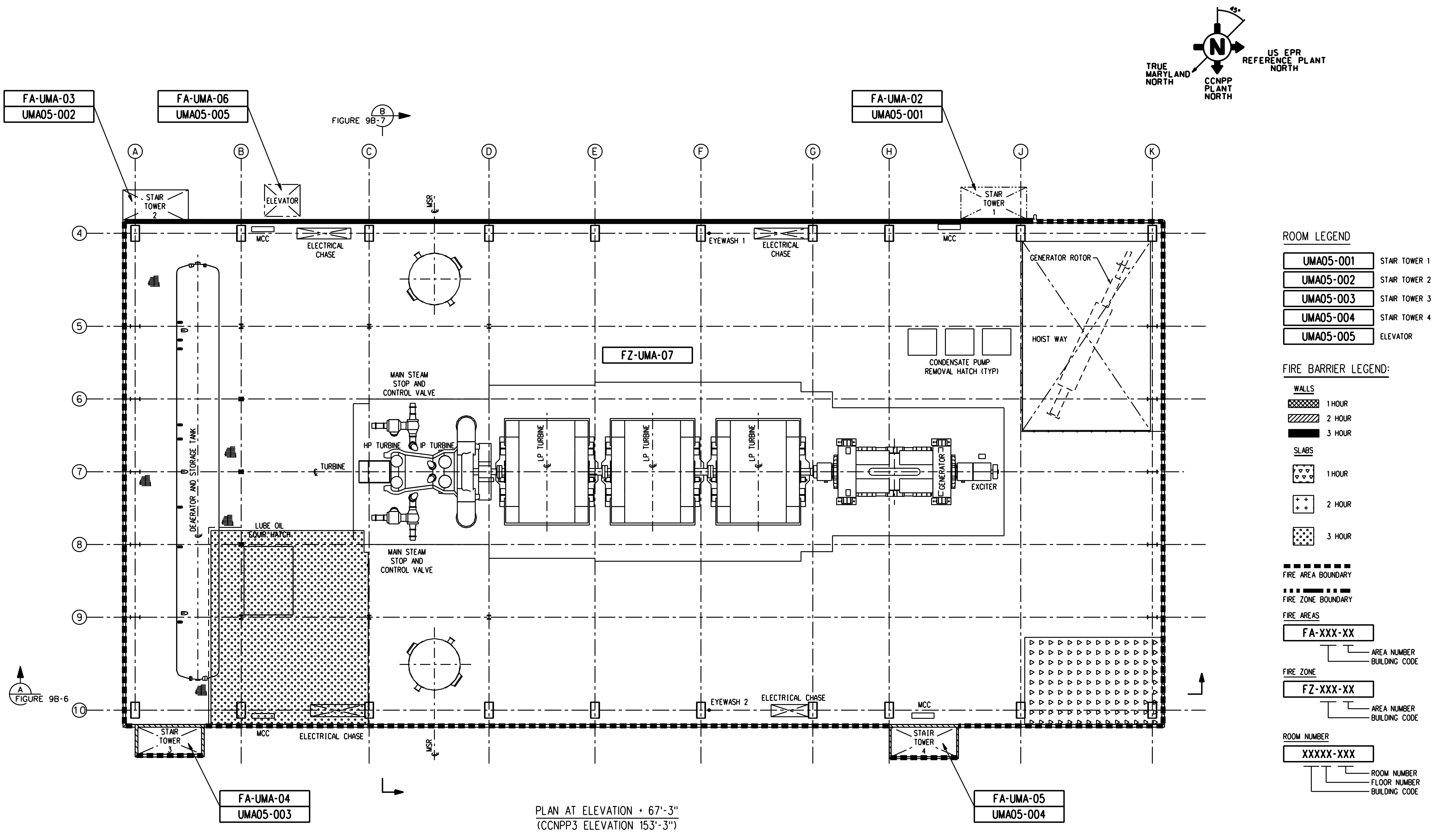


Figure 9B-5 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Platform Elevations +88′-7″, +97′-0″ & +98′-7″ From Grade

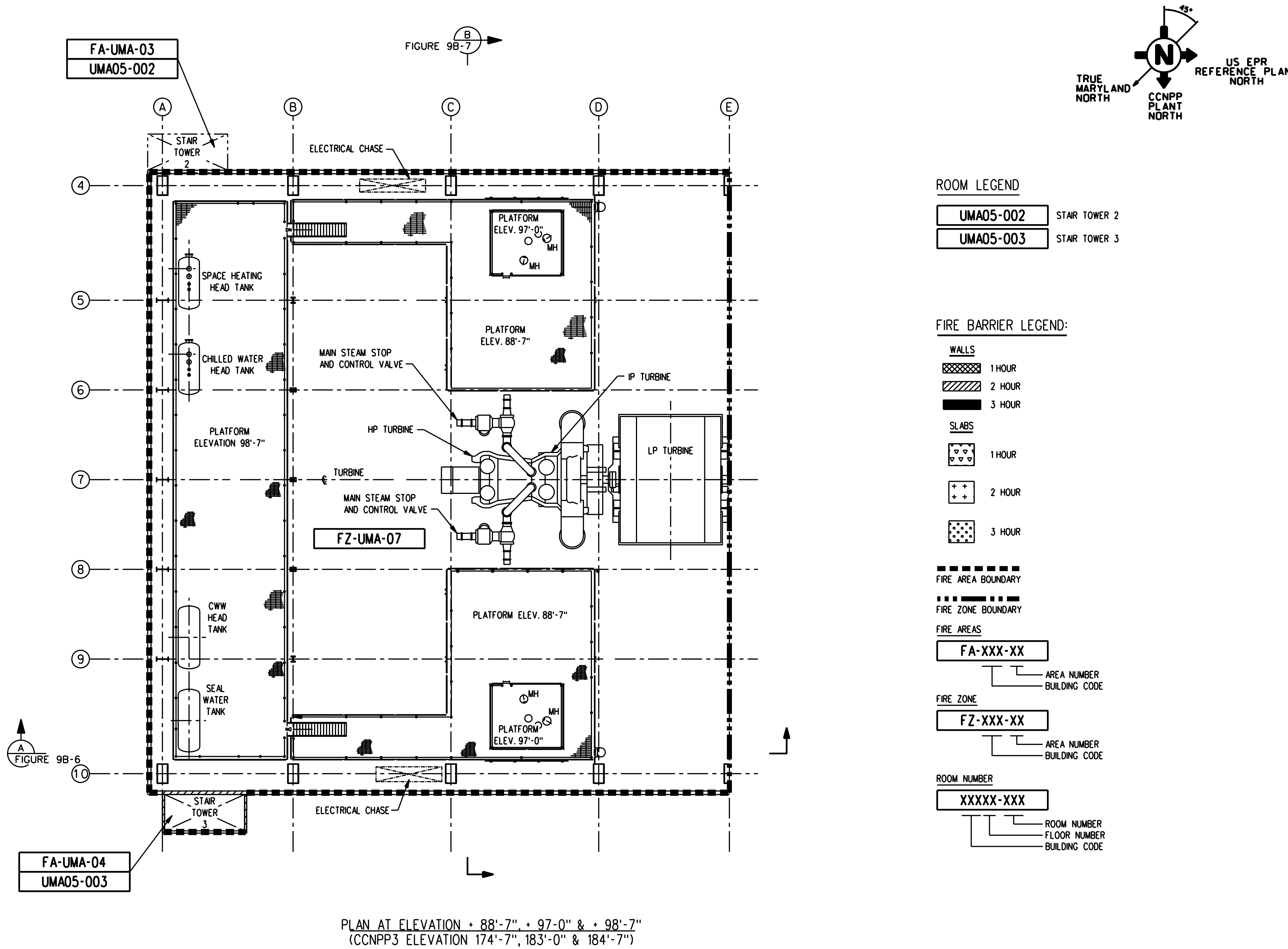


Figure 9B-6 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Section A-A

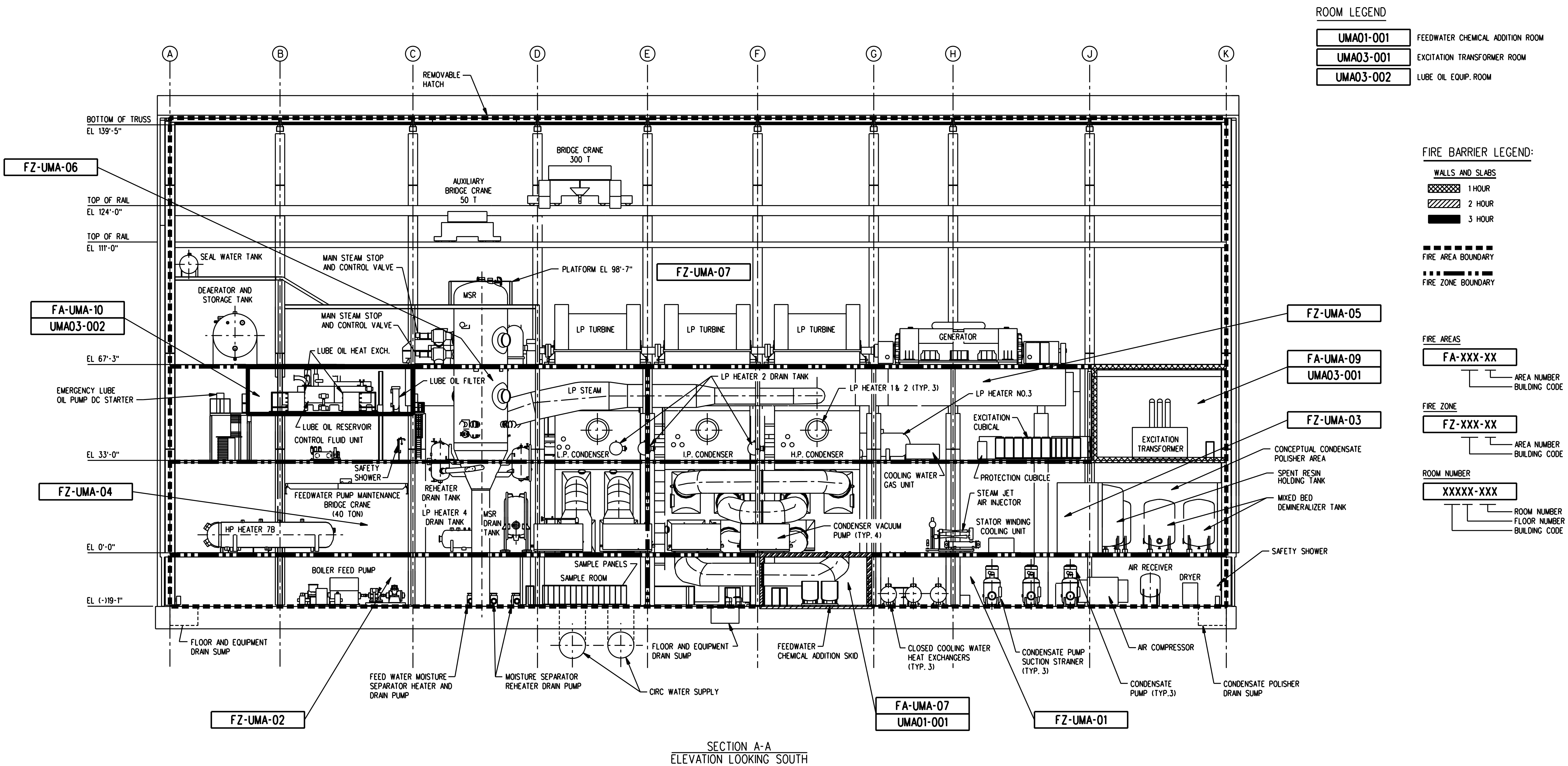


Figure 9B-7 — CCNPP Unit 3 Fire Barrier Location, Turbine Building Section B-B

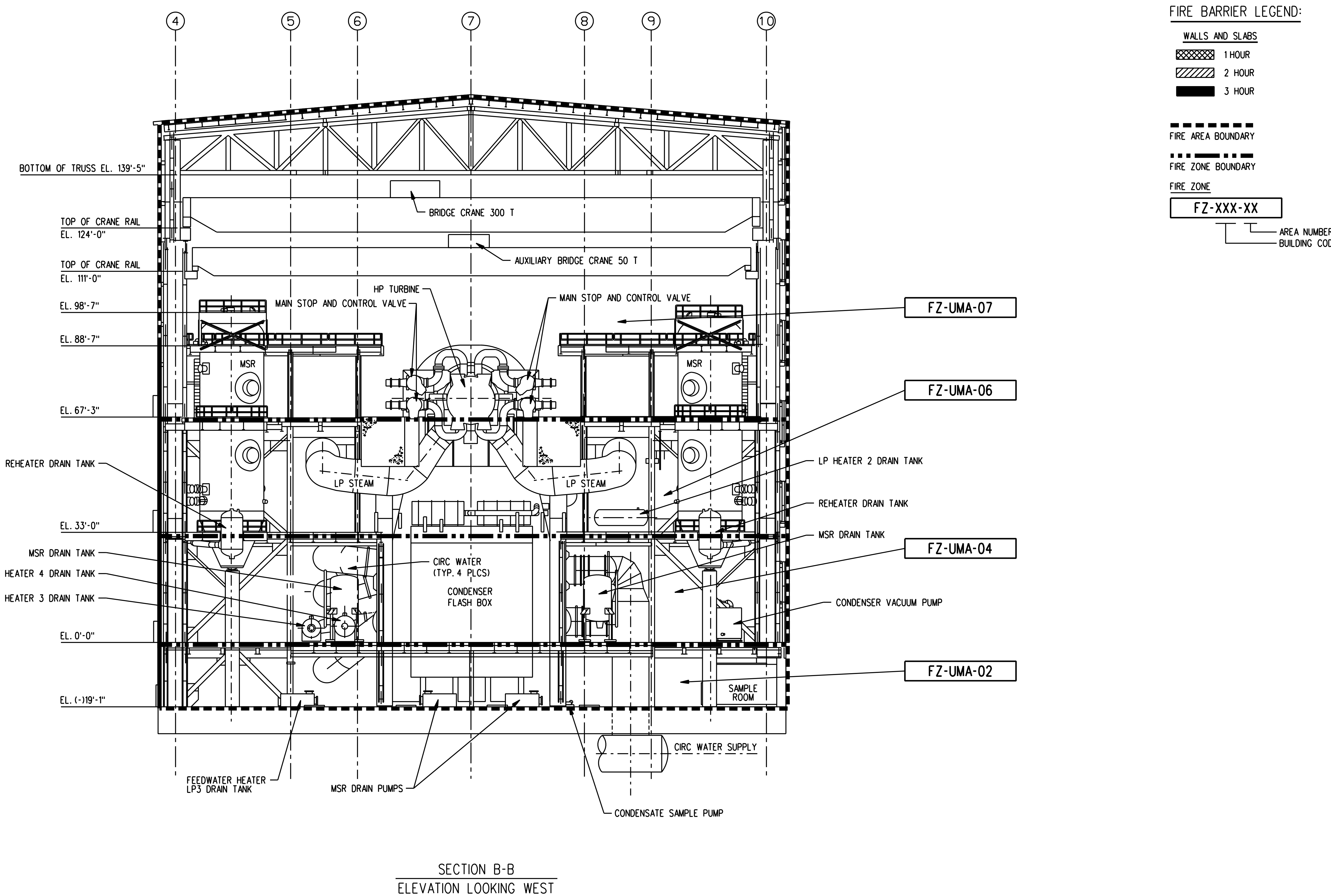


Figure 9B-8 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation (-)19’-1” From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-9 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation +0’-0” From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-10 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation +33'-0" From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-11 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation +48’0” From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-12 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation +67-3" From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-13 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Plan at Elevation +79'-4" & +94'-0 1/2" From Grade

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-14 — CCNPP Unit 3 Fire Barrier Location, Switchgear Building Section A-A & Section B-B

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-15 — CCNPP Unit 3 Fire Barrier Location, Transformer Area Plan View at Elevation 0'-0" From Grade

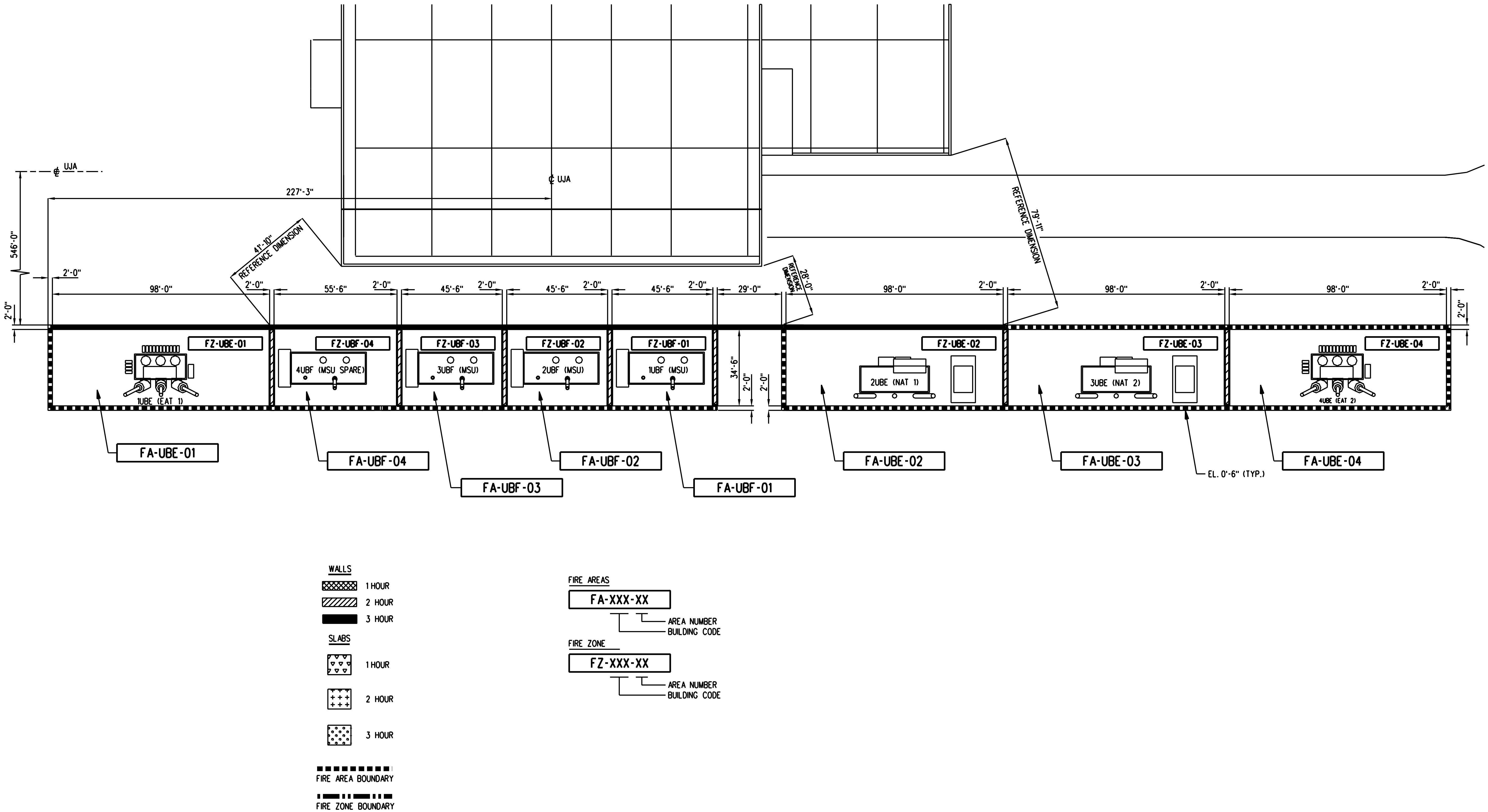


Figure 9B-16 — CCNPP Unit 3 Fire Barrier Location, Warehouse Building Plan View at Elevation 85'-0"

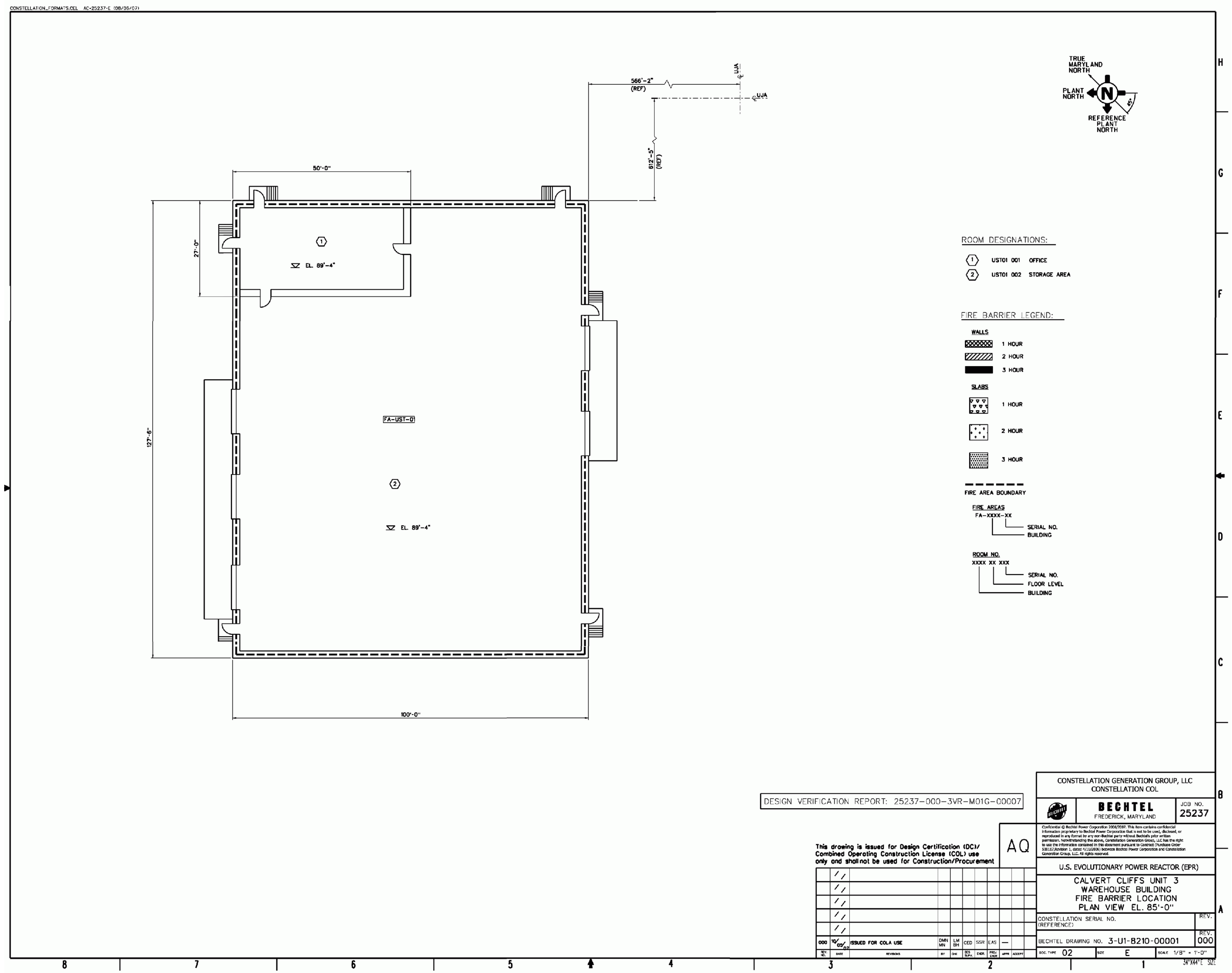


Figure 9B-17 — CCNPP Unit 3 Fire Barrier Location, Security Access Facility Plan View at Elevation 85'-0"

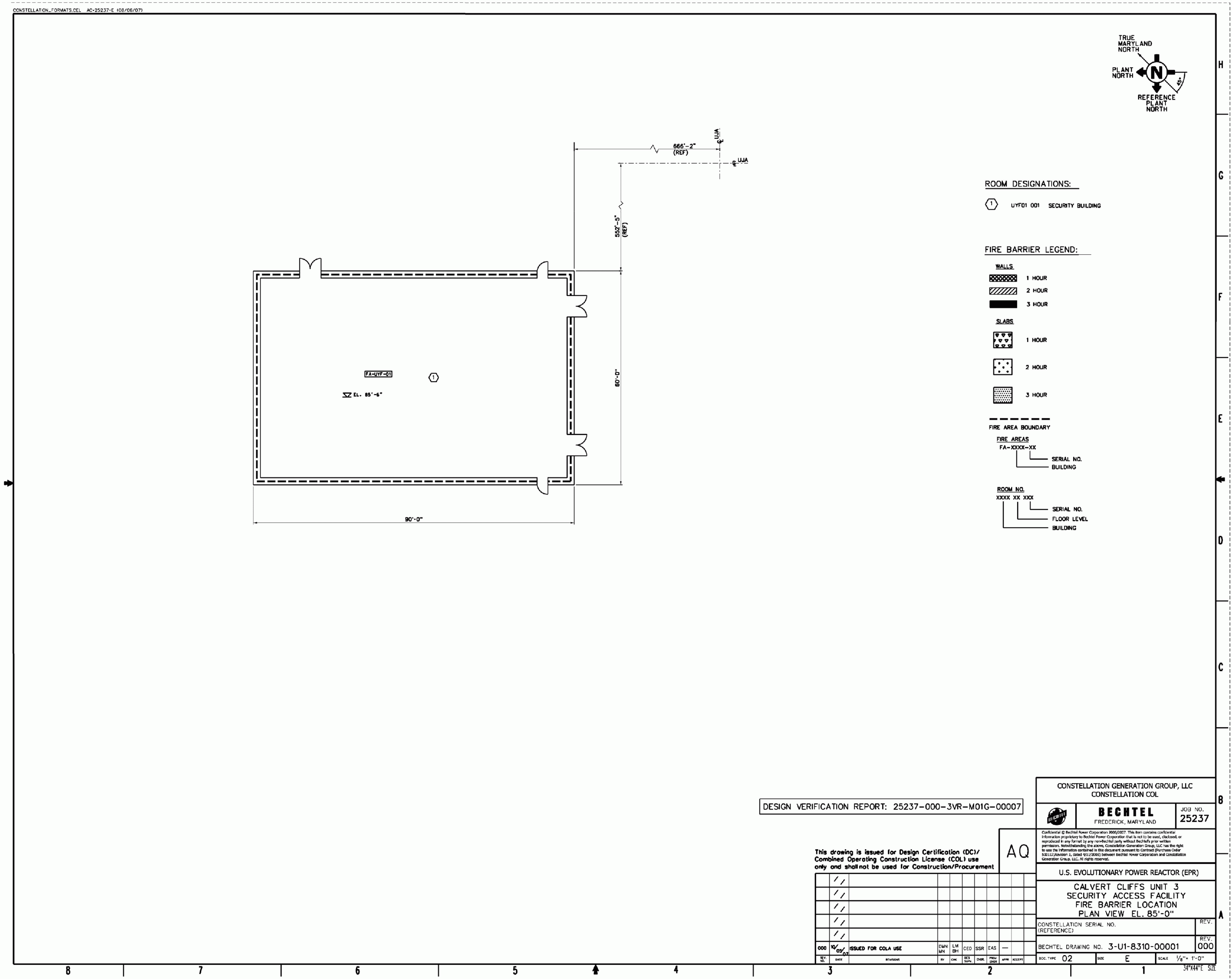


Figure 9B-18 — CCNPP Unit 3 Fire Barrier Location, Central Gas Supply Building Plan View at Elevation 85'0"

[Security related information - Withheld under 10 CFR 2.390 — See Part 9 of the COL Application.]

Figure 9B-19 — CCNPP Unit 3 Fire Barrier Location, Grid Systems Control Building Plan View at Elevation 85'0"

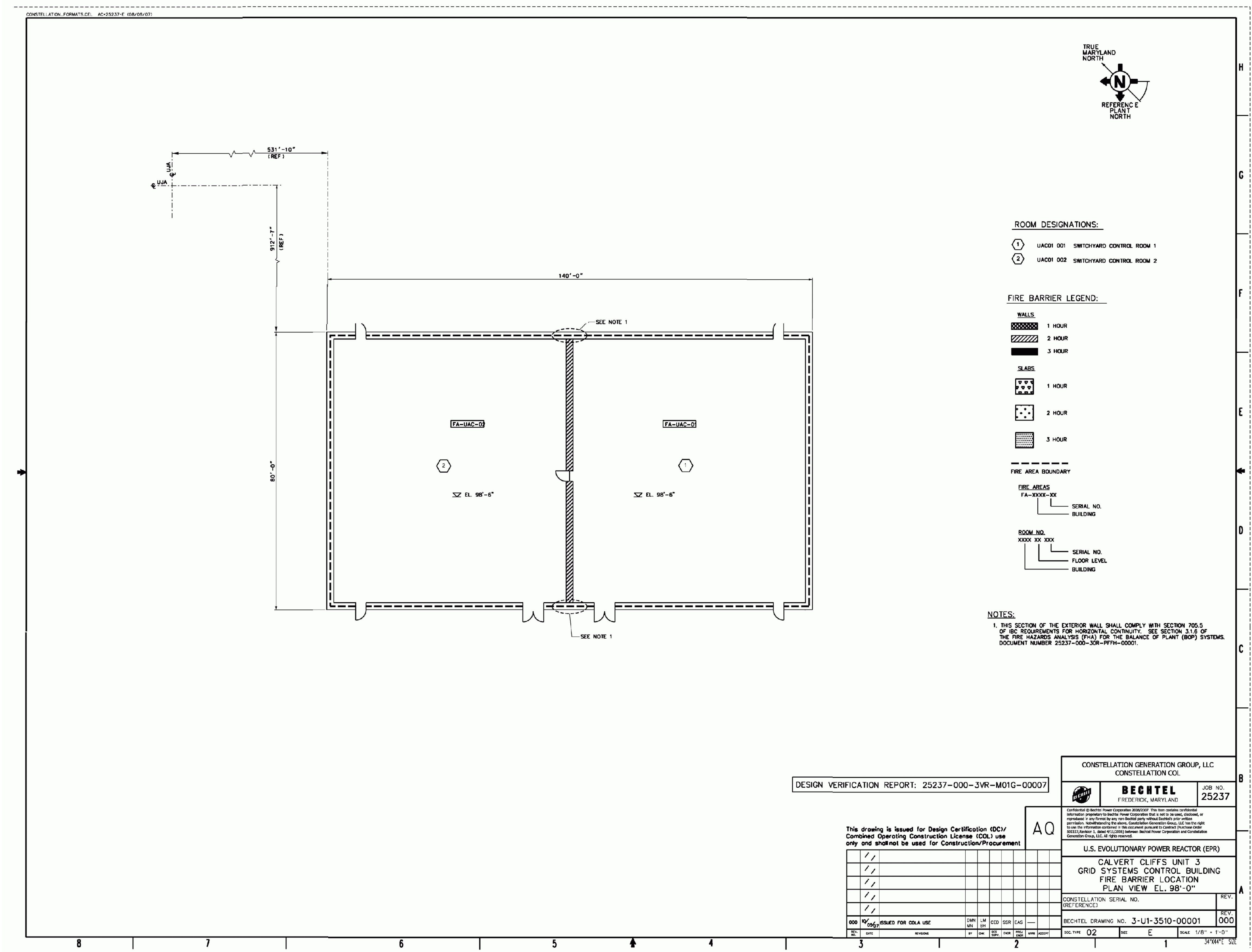


Figure 9B-20 — CCNPP Unit 3 Fire Barrier Location, Fire Protection Building Plan View at Elevation 85'0"

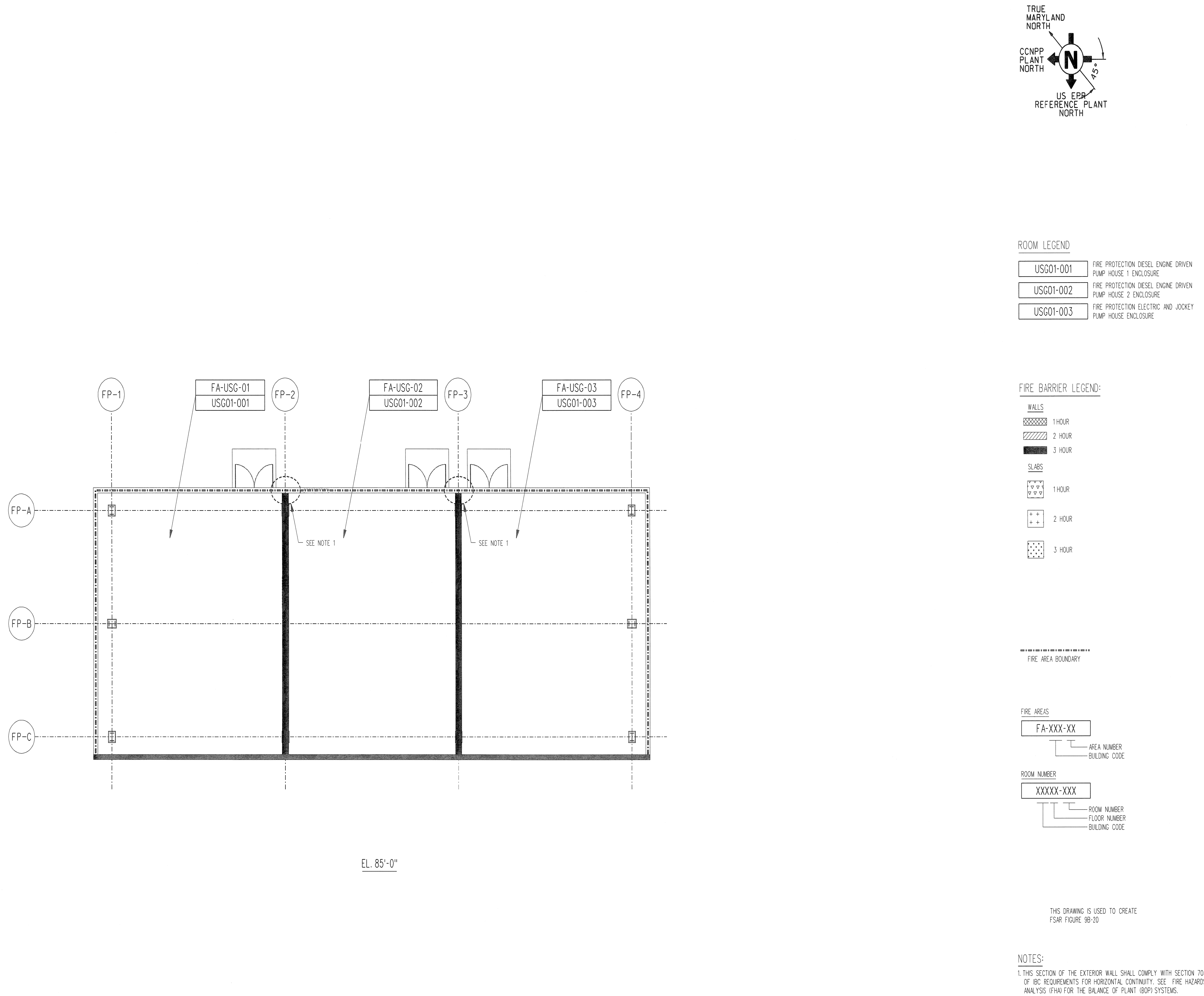


Figure 9B-21 — CCNPP Unit 3 Fire Barrier Location, Cooling Tower Structure, Plan View and Section A-A

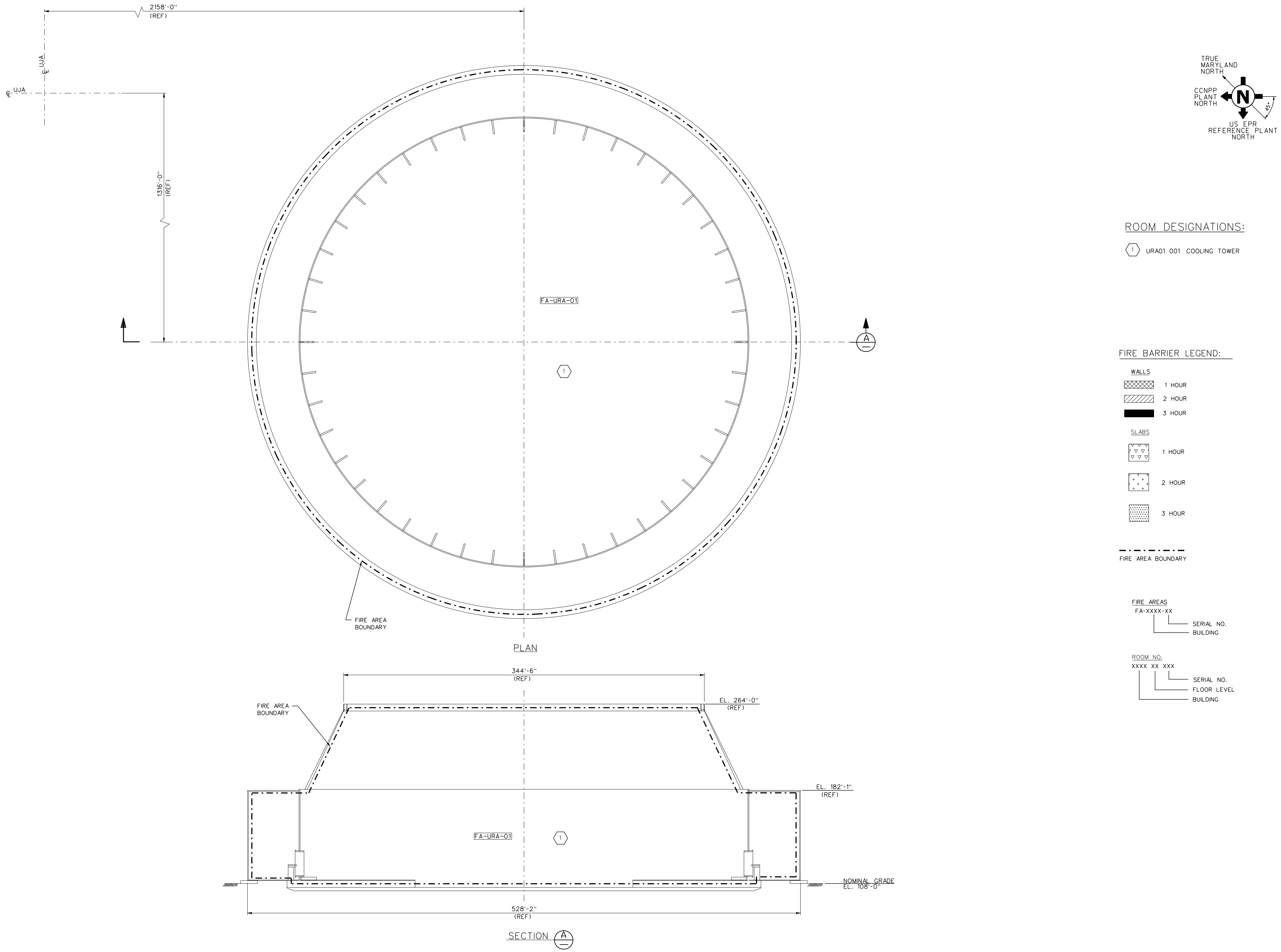


Figure 9B-22 — CCNPP Unit 3 Fire Barrier Location, Circulating Water Pump Building, Plan View and Section A-A

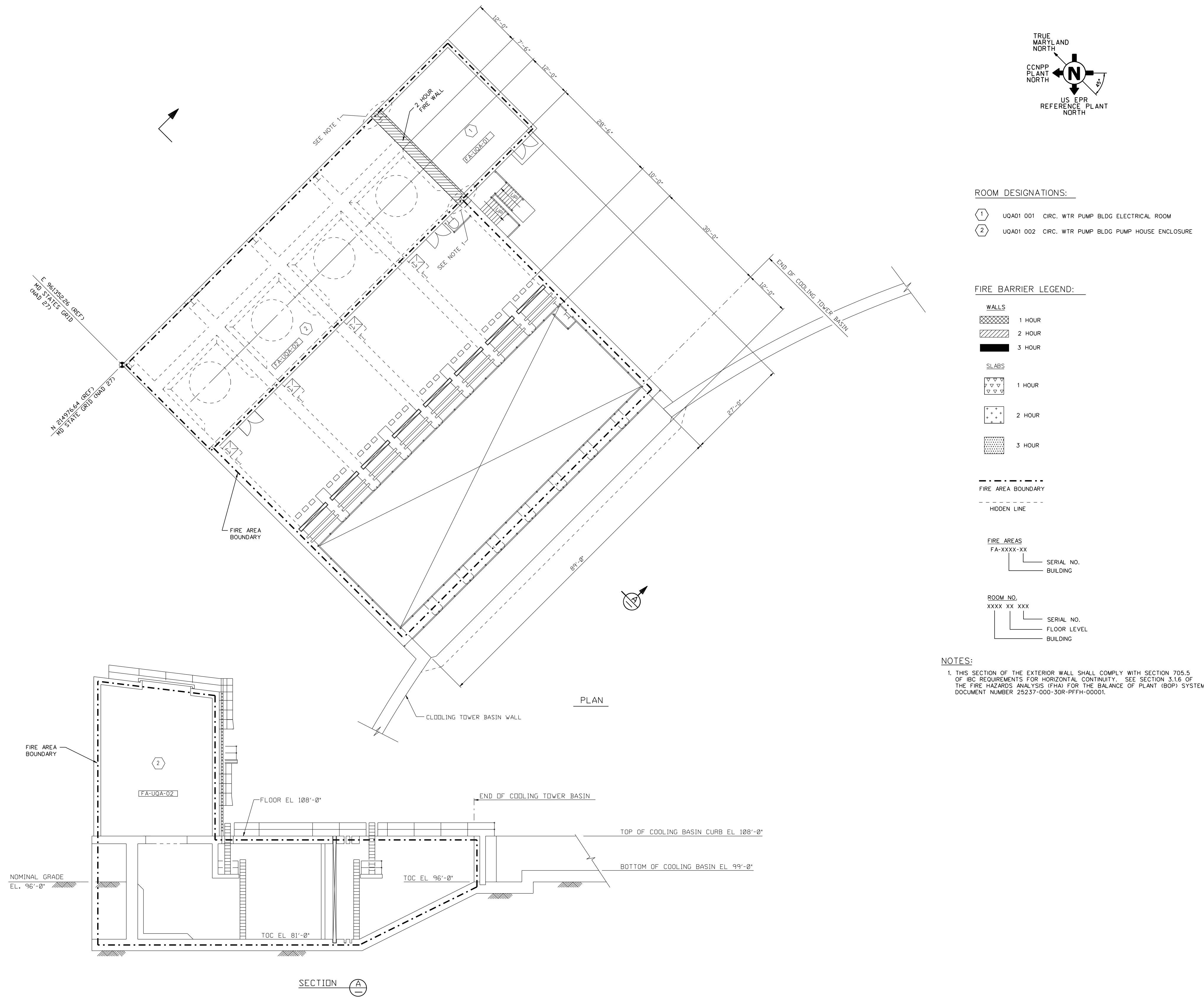


Figure 9B-23 — CCNPP Unit 3 Fire Barrier Location, UHS Makeup Water Intake Structure, Plan View and Section A-A

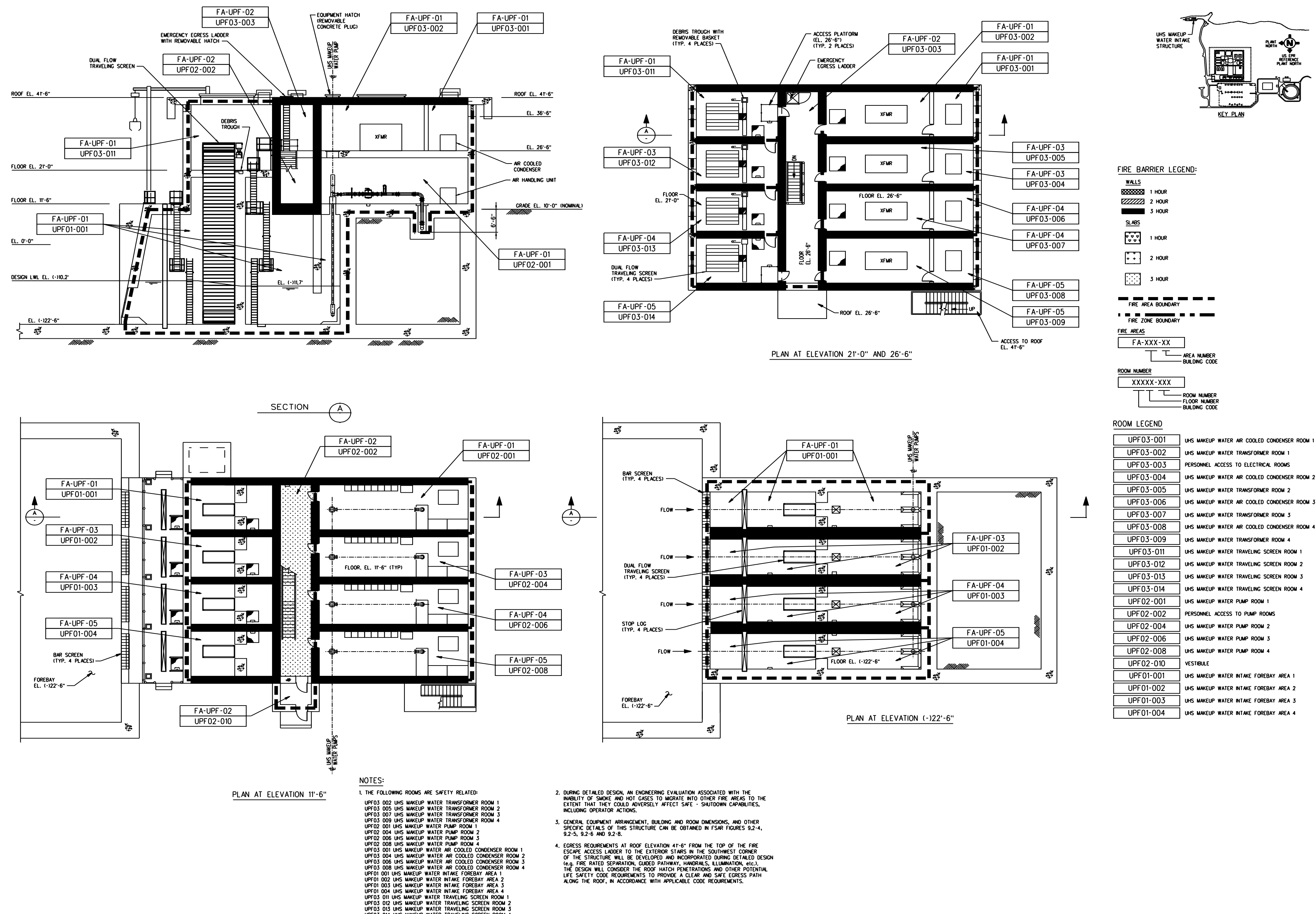


Figure 9B-24 — CCNPP Unit 3 Fire Barrier Location, CW Makeup Intake Structure, Plan View and Section A-A

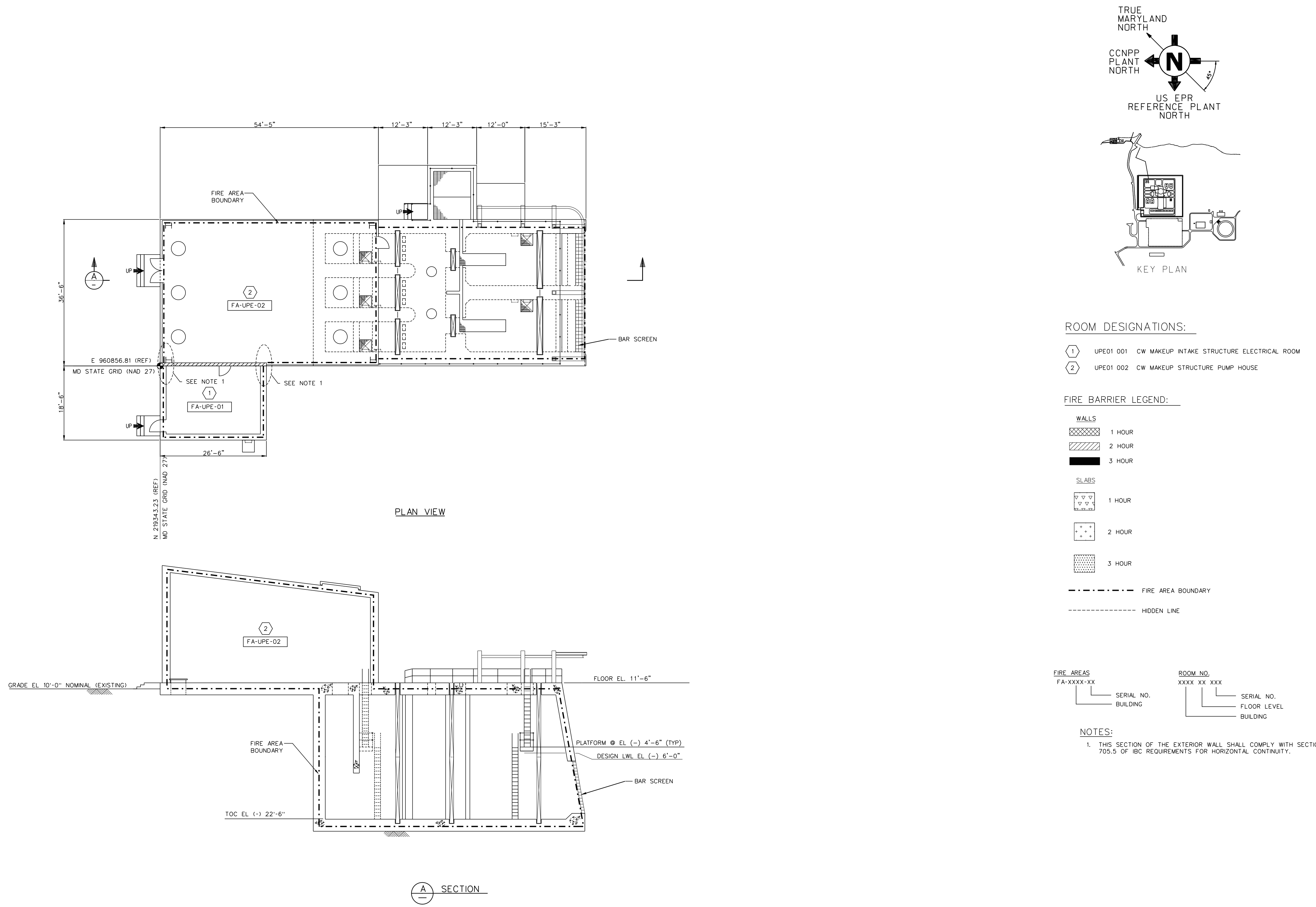


Figure 9B-25 — CCNPP Unit 3 Fire Barrier Location, Desalinization / Water Treatment Building Plan View at Elevation 100'0"