4 Reactor

4.0 Reactor

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.1 Summary Description

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.2 Fuel System Design

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.3 Nuclear Design

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.4 Thermal-Hydraulic Design

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.5 Reactor Materials

This section of the referenced DCD is incorporated by reference with no departures or supplements.

4.6 Functional Design of Reactivity Control System

This section of the referenced DCD is incorporated by reference with no departures or supplements.

5 Reactor Coolant and Connecting Systems

5.0 Reactor Coolant and Connecting Systems

5.1 Summary Description

This section of the referenced DCD is incorporated by reference with no departures or supplements.

5.2 Integrity of Reactor Coolant Pressure Boundary

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

5.2.1.1 Compliance with 10 CFR 50.55a

STD COL 5.2(11)

Replace the third sentence of the second paragraph in DCD Subsection 5.2.1.1 with the following.

The licensee uses ASME Code editions and addenda that is the same as those specified in the US-APWR DCD Table 5.2.1-1 and DCD Subsection 3.9.10, Reference 3.9-13.

5.2.1.2 Compliance with Applicable Code Cases

STD COL 5.2(1)
STD COL 5.2(2)
STD COL 5.2(3)

Replace the third paragraph in DCD Subsection 5.2.1.2 with the following.

The licensee uses no Code Cases listed in Regulatory Guide (RG) 1.84 beyond those listed in the referenced DCD. The use of Code Cases including those listed in RG 1.147 is identified in the inservice inspection (ISI) program (Subsection 5.2.4 and Section 6.6). The use of Code Cases including those listed in RG 1.192 is identified in the inservice testing (IST) program (Subsection 3.9.6 and 5.2.4).

5.2.3.2.1 Chemistry with Reactor Coolant

STD COL 5.2(12)

Replace the second sentence of the third paragraph with the following.

The reactor coolant chemistry control program is based on the latest effective version of the EPRI Water Chemistry Guidelines.

5.2.4.1 Inservice Inspection and Testing Program

NAPS SUP 5.2(1)

Add the following at the end of the third paragraph.

Preservice and ISI of threaded fasteners is discussed in DCD Section 3.13.2.

STD COL 5.2(4)

Replace the first sentence of the fourth paragraph in DCD Subsection 5.2.4.1 with the following.

The implementation milestones for the ISI program and the IST program are provided in Table 13.4-201.

Add the following text after the first sentence of the fifth paragraph in DCD Subsection 5.2.4.1.

The boric acid corrosion control program (BACCP) includes procedures for determining the principal locations where leakage may cause degradation of the primary pressure boundary by boric acid corrosion. Procedures for controlling leakage include provisions to detect and locate small leaks using on-line leakage monitoring and/or visual inspection. Leakage that is below allowable Technical Specification limits is detected by indication and trending of on-line leakage detection data gathered from containment sump level and flow monitoring, containment air cooler condensate flow rate monitoring, containment airborne particulate radioactivity monitoring, humidity, temperature, and pressure monitoring of the containment atmosphere, and observing gross leakage from changes in the reactor coolant inventory. If a trend indicates reactor coolant leakage, operators are trained to take action to identify possible leak locations.

In addition, the following visual inspections are routinely conducted in order to identify leakage.

- Visual inspection of accessible and observable components during system walkdowns (including walkdowns conducted early in the outage to ensure evidence of RCS leakage, such as boric acid deposits at the leakage sites, is not disturbed prior to engineering evaluation).
- Visual inspections during plant outages (including bare metal inspection of specific components that have higher risk of corrosion).

The BACCP also contains methods for conducting examinations, performing engineering evaluations to establish the impact on the reactor coolant pressure boundary when leakage is located, and establishing corrective actions to prevent recurrences of this type of corrosion.

5.2.4.1.1 Arrangement and Accessibility

STD COL 5.2(13)

Replace the last paragraph with the following.

Class 1 component design is the same as the DCD design.

5.2.4.2 Preservice Inspection and Testing Program

STD COL 5.2(5)

Replace the fourth sentence of the first paragraph in DCD Subsection 5.2.4.2 with the following.

The preservice inspection (PSI) program complies with the editions and addenda of American Society of Mechanical Engineers (ASME) Code Section XI incorporated by reference in Code of Federal Regulations, Title 10 (10 CFR) 50.55a(b) as applied to the construction of the component. The implementation milestones for the PSI and preservice testing (PST) program are provided in Table 13.4-201.

STD COL 5.2(14)
STD COL 5.2(15)

Add the following Subsection after DCD Subsection 5.2.5.8.

5.2.5.9 Operating Procedures

The operating procedures regarding conversion of the referenced leak detection instruments into a common leak rate and operator actions in response to prolonged leakage are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

The procedure guidance as described in RG 1.45, Revision 1 Regulatory Position C.3. is used to develop these and other procedures to identify, monitor, and respond to leakage. The essential elements of these procedures include the following:

Monitoring instrumentation as required by technical specification surveillance requirements including:

- Containment sump level
- Containment airborne particulate radioactivity
- Condensate flow rate from air coolers

- Equivalent leak rate conversion

Establishing alarm setpoints to provide operators an early warning signal so they can take corrective actions in response to leakage rates less than Technical Specification limits including:

- Facilitation of stepwise operator action levels
- Response to administrative limits
- Allowance for individual instrument sensitivity and response times

Actions in response to unexpected leakage rates less than Technical Specification Limits including:

- A validated computer program consistent with procedures and technical data to perform water inventory balance calculations
- Action levels to provide Operators guidance based on escalating administrative leakage limits below that are below Technical Specification limits
- Leak rate determination
- System walk downs
- Limits on continued operation
- Contingency plans

Guidance to recognize and respond to a prolonged low-level leakage condition including:

- Trending that includes action requirements based on deviations from the mean
- Outage and maintenance practices
- Corrective Action Program practices

5.2.6 Combined License Information

Replace the content of DCD Subsection 5.2.6 with the following.

STD COL 5.2(1)

5.2(1) ***ASME Code Cases that are approved in Regulatory Guide 1.84***

This Combined License (COL) item is addressed in Subsection 5.2.1.2.

STD COL 5.2(2)

5.2(2) ***ASME Code Cases that are approved in Regulatory Guide 1.147***

This COL item is addressed in Subsection 5.2.1.2.

STD COL 5.2(3)

5.2(3) ***ASME Code Cases that are approved in Regulatory Guide 1.192***

This COL item is addressed in Subsection 5.2.1.2.

STD COL 5.2(4)

5.2(4) ***Inservice inspection and testing program for the Reactor Coolant Pressure Boundary (RCPB)***

This COL item is addressed in Subsection 5.2.4.1 and Table 13.4-201.

STD COL 5.2(5)

5.2(5) ***Preservice inspection and testing program for the RCPB***

This COL item is addressed in Subsection 5.2.4.2 and Table 13.4-201.

5.2(6) ***Deleted from the DCD.***

5.2(7) ***Deleted from the DCD.***

5.2(8) ***Deleted from the DCD.***

5.2(9) ***Deleted from the DCD.***

5.2(10) ***Deleted from the DCD.***

STD COL 5.2(11)

5.2(11) ***ASME Code Edition and Addenda***

This COL item is addressed in Subsection 5.2.1.1.

STD COL 5.2(12)

5.2(12) ***EPRI Primary Water Chemistry Guideline***

This COL item is addressed in Subsection 5.2.3.2.1.

STD COL 5.2(13)

5.2(13) ***ISI Accessibility***

This COL item is addressed in Subsection 5.2.4.1.1.

STD COL 5.2(14)

5.2(14) ***Procedure for conversation into common leakage rate***

This COL item is addressed in Subsection 5.2.5.9.

STD COL 5.2(15)

5.2(15) ***Procedure for operator response to prolonged low-level leakage***

This COL item is addressed in Subsection 5.2.5.9.

5.3 Reactor Vessel

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

5.3.1.6 Material Surveillance

STD COL 5.3(2)

Replace the second paragraph with the following in DCD Subsection 5.3.1.6.

The reactor vessel material surveillance program is implemented as an operational program. As the reactor vessel materials do not begin to be affected by neutron fluence until the reactor begins critical operation, this program is implemented prior to initial criticality, as identified in Table 13.4-201.

5.3.1.6.1 Surveillance Capsules

STD COL 5.3(3)

Replace the last sentence in the fifth paragraph with the following in DCD Subsection 5.3.1.6.1.

These lead factors and the capsule orientation are shown in DCD Figure 5.3-1.

STD COL 5.3(2)

Replace the last sentence in the sixth paragraph with the following in DCD Subsection 5.3.1.6.1.

The recommended general capsule withdrawal schedule is applied and the use of the standby surveillance capsules is incorporated by updating the surveillance program once sufficient data are retrieved to determine the withdrawal schedule for these capsules.

STD COL 5.3(2)

Replace the last paragraph with the following in DCD Subsection 5.3.1.6.1.

Accelerated irradiation capsules as defined in American Society for Testing and Materials (ASTM) E-185 (Ref. 5.3-24) and integrated surveillance program for multiple reactors at a single site, are not applicable.

5.3.1.6.3 Predicted Effects of Radiation on Beltline Region Materials

STD COL 5.3(2) Add the following text after the last paragraph in DCD Subsection 5.3.1.6.3.

A summary technical report, including test results, is submitted as specified in 10 CFR 50.4, for the contents of each capsule withdrawn, within one year of the date of capsule withdrawal unless an extension is granted by the Director, Office of Nuclear Reactor Regulation.

The report includes the data required by ASTM E-185-82, as specified in paragraph III.B.1 of 10 CFR 50, Appendix H, and includes the results of the fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions.

If the test results indicate a change in the Technical Specifications, either in the pressure-temperature limits or in the operating procedures, the expected date for submittal of the revised Technical Specifications is provided with the report.

5.3.2.1 Limit Curves

STD COL 5.3(1) Replace the last sentence in the second paragraph with the following in DCD Subsection 5.3.2.1.

The generic pressure and temperature limits reports (PTLR) for the US-APWR reactor vessel will be applied.

The COL Holder will update the P/T limits prior to fuel loading using the PTLR methodologies approved in the US-APWR DCD and the plant specific material properties and inform the NRC of the updated P/T limits as required by the Technical Specifications.

5.3.2.2 Operating Procedures

STD COL 5.3(1) Replace the first sentence in the last paragraph with the following in DCD Subsection 5.3.2.2.

Operating procedures will be developed in accordance with Section 13.5, such that the plant-specific pressure-temperature limit curves are not exceeded and Technical Specification requirements are satisfied.

5.3.2.3 Pressurized Thermal Shock

STD COL 5.3(4) Replace the last paragraph with the following in DCD Subsection 5.3.2.3.

Reference pressurized thermal shock temperature (RT_{PTS}) values are calculated based on the material property requirements detailed in DCD Subsection 5.3.1.5, and the results are as shown in DCD Table 5.3-4.

5.3.2.4 Upper Shelf Energy

STD COL 5.3(4) Replace the last paragraph with the following in DCD Subsection 5.3.2.4.

The upper shelf energy (USE) at end-of-life (EOL) is calculated based on material property requirements detailed in DCD Subsection 5.3.1.5, and the results are as shown in DCD Table 5.3-4.

5.3.3.7 Inservice Surveillance

STD COL 5.3(5) Replace the fourth and fifth sentences in the first paragraph of DCD Subsection 5.3.3.7 with the following.

A detailed list of inservice and preservice inspections is shown in DCD Tables 5.3-2 and 5.3-3.

5.3.4 Combined License Information

Replace the content of DCD Subsection 5.3.4 with the following.

STD COL 5.3(1) *5.3(1)* ***Pressure-Temperature Limit Curves***

This COL item is addressed in Subsections 5.3.2.1 and 5.3.2.2.

STD COL 5.3(2) *5.3(2)* ***Reactor Vessel Material Surveillance Program***

This COL item is addressed in Subsection 5.3.1.6.

STD COL 5.3(3) *5.3(3)* ***Surveillance Capsule Orientation and Lead Factors***

This COL item is addressed in Subsection 5.3.1.6.1.

STD COL 5.3(4) *5.3(4)* ***Reactor Vessel Material Properties Verification***

The material property verification portion of this COL item is addressed in DCD Subsection 5.3.1.1. Other portions of this COL item are addressed in Subsections 5.3.2.3 and 5.3.2.4.

STD COL 5.3(5)

5.3(5) ***Preservice and Inservice Inspection***

This COL item is addressed in Subsection 5.3.3.7.

5.4 Reactor Coolant System Component and Subsystem Design

This section of the referenced DCD is incorporated by reference with no departures or supplements.

6 Engineered Safety Features

6.0 Engineered Safety Features

This section of the referenced DCD is incorporated by reference with no departures or supplements.

6.1 Engineered Safety Feature Materials

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.1.2 Organic Materials

STD COL 6.1(7)

Replace the last sentence of the fifth paragraph in DCD Subsection 6.1.2 with the following.

Coatings program will be developed and implemented prior to procurement phase.

6.1.3 Combined License Information

Replace the content of DCD Subsection 6.1.3 with the following.

6.1(1) ***Deleted from the DCD.***

6.1(2) ***Deleted from the DCD.***

6.1(3) ***Deleted from the DCD.***

6.1(4) ***Deleted from the DCD.***

6.1(5) ***Deleted from the DCD.***

6.1(6) ***Deleted from the DCD.***

STD COL 6.1(7)

6.1(7) ***Preparation of a coating program***

This COL item is addressed in *Subsection 6.1.2**.*

6.2 Containment Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.2.1.6 Testing and Inspection

NAPS DEP 14.2(3)

Replace the third sentence of the first paragraph of DCD Subsection 6.2.1.6 with the following.

A description of the ITP for the containment is included in Section 14.2.

6.2.2.3 Design Evaluation

STD COL 6.2(5)

Replace the last sentence of the first bullet of the tenth paragraph in DCD Subsection 6.2.2.3 with the following.

Administrative procedures in Subsection 13.5.1 implement the containment cleanliness program.

The program includes the following:

- Organizational responsibilities for implementing the program
- Controls and limits on type and quantity of materials for all modes of operation (not limited to outages)
- Guidance documents used to develop the cleanliness program survey/sampling methods
- Inspection frequency
- Evaluation frequency
- Reporting requirements for degraded conditions or nonconforming results

Procedures to remove foreign materials and minimize the amount of debris that might be left in containment following refueling and maintenance outages address the following:

- Frequency of cleanliness control and inspection activities for operation and maintenance
- Restriction of materials introduced into the containment
- Accounting for materials introduced into and out of the containment (e.g., scaffold, tape, labels, plastic film, paper, cloth, keys, and pens)

- Cleaning of maintenance outage area, including areas associated with removal or replacement of insulation
- Cleanliness inspections and removal of debris/foreign material, including operation and maintenance areas, RWSP, debris interceptors, RWSP vent and drain lines (available for inspection), and strainer debris
- Preparation and review of entry/exit logs and inspection records

The containment cleanliness program including administrative procedures will be developed and implemented prior to initial fuel load.

6.2.5.2 System Design

NAPS DEP 3.7(1)

Replace the last sentence of the fifth paragraph of DCD Section 6.2.5.2 with the following.

However, in considering the importance of the containment hydrogen monitoring and control system to maintain the containment integrity during postulated severe accidents. it is designed satisfying the plant high confidence of low probability of failure (HCLPF) is evaluated not less than 1.67*SSE.

6.2.6.1 Containment Integrated Leakage Rate Testing

STD COL 6.2(8)

Replace the first and second sentences of the first paragraph in DCD Subsection 6.2.6.1 with the following.

The containment leakage rate test program requirements are defined by Technical Specifications Subsection 5.5.16. Implementation milestone of the containment leak rate tests program is provided in Table 13.4-201.

6.2.8 Combined License Information

Replace the content of DCD Subsection 6.2.8 with the following.

6.2(1) ***Deleted from the DCD.***

6.2(2) ***Deleted from the DCD.***

6.2(3) ***Deleted from the DCD.***

6.2(4) ***Deleted from the DCD.***

STD COL 6.2(5)

6.2(5) ***Preparation of a cleanliness, housekeeping and foreign materials exclusion program***

This COL item is addressed in Subsection 6.2.2.3 and Table 6.2.2-2R.

6.2(6) ***Deleted from the DCD.***

6.2(7) ***Deleted from the DCD.***

STD COL 6.2(8)

6.2(8) ***Containment leakage rate testing program***

This COL item is addressed in Subsections 6.2.6.1.

6.2(9) ***Deleted from the DCD.***

6.2(10) ***Deleted from the DCD.***

Table 6.2.2-2R Comparison of RWSP Recirculation Intake Debris Strainer Design to RG 1.82 Requirements (Sheet 6 of 17)

	No.	Regulatory Position	US-APWR Design
	1.1.1.15	Advanced strainer designs (e.g., stacked disc strainers) have demonstrated capabilities that are not provided by simple flat plate or cone-shaped strainers or screens. For example, these capabilities include built-in debris traps where debris can collect on surfaces while keeping a portion of the screen relatively free of debris. The convoluted structure of such strainer designs increases the total screen area, and these structures tend to prevent the condition sometimes referred to as the TBE. It may be desirable to include these capabilities in any new sump strainer/screen designs. The performance characteristics and effectiveness of such designs should be supported by the appropriate test data for any particular intended application.	An advanced strainer design is planned for the US-APWR. Thin Bed Effects (TBE) are addressed in the US-APWR Sump Strainer Performance document (Ref. 6.2-34).
	1.1.2	**Minimizing Debris**	**Design Features and Capabilities**
		The debris (see Regulatory Position 1.3.2) that could accumulate on the sump screen should be minimized.	The design features and capabilities employed to minimize debris are presented below.
STD COL 6.2(5)	1.1.2.1	Cleanliness programs should be established to clean the containment on a regular basis, and plant procedures should be established for the control and removal of foreign materials from the containment.	~~Cleanliness, housekeeping, and foreign material exclusion areas are administrative controls developed by any applicant referencing the certified US-APWR design for construction and operation.~~ Cleanliness programs are addressed in Subsection 6.2.2.3.
	1.1.2.2	Insulation types (e.g., fibrous and calcium silicate) that are sources of debris known to readily transports to the sump screen and cause higher head losses may be replaced with insulation (e.g., reflective metallic insulation) that transports less readily and causes less severe head losses once deposited onto the sump screen. If insulation is replaced or otherwise removed during maintenance, abatement procedures should be established to avoid generating debris or its residue in the containment.	Particulate (e.g., Min-K-based) insulation is excluded from the containment by design. Insulation is a purchased product and its use is controlled to meet the parameters provided in the US-APWR Sump Strainer Performance document (Ref. 6.2-34)

Table 6.2.2-2R Comparison of RWSP Recirculation Intake Debris Strainer Design to RG 1.82 Requirements (Sheet 6 of 17) *(continued)*

No.	Regulatory Position	US-APWR Design
1.1.2.3	To minimize potential debris caused by chemical reaction of the pool water with metals in the containment, exposure of bare metal surfaces (e.g., scaffolding) to containment cooling water through spray impingement or immersion should be minimized, either by removal or by chemical-resistant protection (e.g., coatings or jackets).	The principal measures taken by the US-APWR design to preclude adverse chemical effects include the use of a buffering agent, NaTB, and minimizing the use of aluminum.

Table 6.2.2-2R Comparison of RWSP Recirculation Intake Debris Strainer Design to RG 1.82 Requirements (Sheet 13 of 17)

	No.	Regulatory Position	US-APWR Design
STD COL 6.2(5)	1.3.2.5	The cleanliness of the containment during plant operation should be considered when estimating the amount and type of debris available to block the ECC sump screens. The potential for such material (e.g., thermal insulation other than piping insulation, ropes, fire hoses, wire ties, tape, ventilation system filters, permanent tags or stickers on plant equipment, rust flakes from unpainted steel surfaces, corrosion products, dust and dirt, latent individual fibers) to impact head loss across the ECC sump screens should also be considered.	~~Cleanliness, housekeeping and foreign material exclusion areas are administrative controls and programs to be developed by any applicant referencing the certified US-APWR design for construction and operation.~~ The cleanliness of the containment during plant operation will be done with programs addressed in Subsection 6.2.2.3.
	1.3.2.6	In addition to debris generated by jet forces from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) should be considered in the analyses. Examples of this type of debris would be disbondment of coatings in the form of chips and particulates or formation of chemical debris (precipitants) caused by chemical reactions in the pool.	Principal measures taken by the US APWR design to preclude adverse chemical effects include the use of the buffering agent, NaTB, and minimizing the use of aluminum.
	1.3.2.7	Debris generation that is due to continued degradation of insulation and other debris when Subjected to turbulence caused by cascading water flows from upper regions of the containment, or near the break overflow region should be considered in the analyses.	Break properties and debris production considerations are based on Nuclear Energy Institute (NEI) 04-07 methodology and are addressed in the US-APWR Sump Strainer Performance document (Ref. 6.2-34).

Table 6.2.2-2R Comparison of RWSP Recirculation Intake Debris Strainer Design to RG 1.82 Requirements (Sheet 13 of 17) *(continued)*

No.	Regulatory Position	US-APWR Design
1.3.2.3	A sufficient number of breaks in each high-pressure system that relies on recirculation should be considered to reasonably bound variations in debris generation by the size, quantity, and type of debris. At a minimum, the following postulated break locations should be considered. Breaks in the reactor coolant system (e.g., hot leg, cold leg, pressurizer surge line) and, depending on the plant licensing basis, main steam and main feedwater lines with the largest amount of potential debris within the postulated ZOI. Large breaks with two or more different types of debris, including the breaks with the most variety of debris, within the expected ZOI. Breaks in areas with the most direct path to the sump, medium and large breaks with the largest potential particulate debris to insulation ratio by weight. Breaks that generate an amount of fibrous debris that, after its transport to the sump screen, could form a uniform thin bed that could subsequently filter sufficient particulate debris to create a relatively high head loss referred to as the TBE. The minimum thickness of fibrous debris needed to form a thin bed has typically been estimated at 0.125 inch thick, based on the nominal insulation density (NUREG/CR-6224).	The break properties (e.g., sizes, locations) used in the NEI 04-07 methodology are addressed in the US-APWR Sump Strainer Performance document (Ref. 6.2-34).

6.3 Emergency Core Cooling Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.3.2.5 System Reliability

NAPS DEP 14.2(3)

Replace the first sentence of the sixth paragraph of DCD Subsection 6.3.2.5 with the following.

Chapter 14 discusses the ITP for the Emergency Core Cooling Systems (ECCS).

6.3.4.1 ECCS Performance Tests

NAPS DEP 14.2(3)

Replace the seventh paragraph of DCD Subsection 6.3.4.1 with the following.

The ITP for the ECCS is described in Section 14.2.

6.4 Habitability Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.4.3 System Operational Procedures

NAPS COL 6.4(2)

Replace the third paragraph in DCD Subsection 6.4.3 with the following.

The analyses of control room habitability during a postulated release of toxic or asphyxiating chemicals described in Subsection 6.4.4.2 identify no hazardous chemical that exceeds the IDLH criteria of RG 1.78, or displaces a significant fraction of the control room air in accordance with RG 1.78. Therefore, no specific automatic action of MCR HVAC system is required to protect operators within the CRE. The emergency isolation mode may be initiated by manual action as described in Subsection 6.4.4.2.

Procedures and training address the toxic or asphyxiating chemical events addressed in Sections 2.2 and 6.4, consistent with the guidance provided in Regulatory Position C.5 of RG 1.78, including arrangements with Federal, State, and local agencies or other cognizant organizations for the prompt notification of the nuclear power plant when accidents involving hazardous chemicals occur within five miles of the plant.

Procedures provide appropriate directions to operators upon sensing of toxic or asphyxiating chemicals or upon notification by external sources that a release of such material has occurred. The procedures are consistent with the guidance of Regulatory Position C.2.6 of RG 1.196 on "Reactor Control." The procedures include guidance to operators as to the assessment of the threat to the operators and provide criteria for the implementation of a range of potential protective actions, such as the donning of respirators and manual isolation of the CRE.

Procedures for testing and maintenance are consistent with DCD Section 6.4.5; Technical Specifications, Section 5.5.20, "Control Room Envelope Habitability Program"; the Maintenance Rule Program (Section 17.6); and the guidance provided in Regulatory Position C.2.7.1 of RG 1.196.

6.4.4.1 Radiological Protection

NAPS SUP 6.4(1)

Add the following text after the paragraph in DCD Subsection 6.4.4.1:

The impact of a post-accident release on the maximum MCR dose has been evaluated and addressed in the DCD. The DCD analysis credits operation of the MCR HVAC system in the pressurization mode. Impact from North Anna Unit 1 or Unit 2 design basis accidents to Unit 3, without credit for any benefit of the MCR HVAC system, is bounded by the DCD analyses. Simultaneous post-accident radiological releases from multiple units at a single site are not considered to be credible.

6.4.4.2 Toxic Gas Protection

NAPS COL 6.4(1)
NAPS COL 6.4(2)

Replace the second paragraph in DCD Subsection 6.4.4.2 with the following.

Accidents involving the release of toxic or asphyxiating chemicals are evaluated to confirm that an external release of hazardous chemicals does not impact control room habitability. These sources include: 1) offsite industrial facilities and transportation routes; 2) Units 1 and 2; and 3) Unit 3.

Evaluation of potentially hazardous off-site chemicals within 8 km (5 miles) of the MCR is addressed in Section 2.2. As described therein, there are no manufacturing plants, chemical plants, storage facilities, major water transportation routes, oil pipelines or gas pipelines within

8 km (5 miles) of the MCR. There are also no significant control room habitability impacts due to chemicals being transported along offsite routes within 8 km (5 miles) of the plant.

Toxic gas analysis for potentially hazardous chemicals stored on site is performed in accordance with the guidelines of RG 1.78. RG 1.78 establishes the OSHA National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life or Health (IDLH) guidelines for 30-minute exposure as the required screening criteria for airborne hazardous chemicals. Per RG 1.78, the NIOSH IDLH values were used to screen chemicals and to evaluate concentrations of hazardous chemicals to determine their effect on control room habitability. Asphyxiating chemicals were evaluated to determine if their release resulted in the displacement of a significant fraction of the MCR air defined by the OSHA in accordance with RG 1.78. The on-site storage locations and quantities for potentially toxic chemicals at Units 1 and 2 and Unit 3 are identified in Table 2.2-202. Table 2.2-203 provides the toxicity limits for these chemicals.

In the evaluation of control room habitability following a postulated release of hazardous chemicals, RG 1.78 states that the atmospheric transport of a released hazardous chemical should be calculated using a dispersion or diffusion model that permits temporal as well as spatial variations in release terms and concentrations. With the exception of the evaluation of NOVEC 1230, and the asphyxiation analysis for R-134a, the subject evaluation for Unit 3 used the ALOHA air dispersion model. The ALOHA air dispersion model provides the required evaluation consistent with the requirements presented in RG 1.78 to predict the concentrations of toxic or asphyxiating chemical clouds as they disperse downwind. Using the ALOHA model, a meteorological sensitivity analysis was performed.

NOVEC 1230 is a fire suppressant that is used inside the Unit 3 MCR, and R-134a is a refrigerant contained in the Essential Chilled Water System and Non-Essential Chilled Water System in the PS/Bs and Auxiliary Building, respectively. To evaluate NOVEC 1230 and R-134a for asphyxiation hazards, the entire quantity of each was released and the maximum concentration was determined by dividing the gaseous volume by the MCR volume. A second chemical, sodium hypochlorite, required an upfront evaluation prior to modeling the release. Because of the nature of this chemical, sodium hypochlorite may decompose, especially

upon heating, and release chlorine. Thus, a decomposition analysis was performed to determine the quantity of chlorine that may be released into the atmosphere over a 60 minute period. That quantity was then released, as chlorine, and evaluated using the ALOHA code. The results of the hazardous chemical dispersion analyses are presented in Table 6.4-201, which provides the postulated maximum MCR concentrations for the evaluated chemicals.

Hydrogen and nitrogen storage facilities are 986 ft and 910 ft from the Unit 3 MCR, respectively. Nitrogen and hydrogen can cause asphyxiation if enough oxygen is displaced in the MCR. Standard air contains 21 percent oxygen by volume. An oxygen-deficient atmosphere is any atmosphere containing oxygen at a concentration below 19.5 percent per 29 CFR 1910.134. Calculations performed to evaluate the habitability of the MCR for accidental releases of hydrogen or nitrogen indicate MCR personnel are not subject to the hazard of breathing air with insufficient oxygen inside the MCR due to a release of hydrogen or nitrogen.

The relative locations for the chemical storage areas, as well as the MCR intakes and refresh rates for Unit 3 were considered in the analysis along with the properties of the stored chemicals. The analysis performed shows that the MCR concentration for a given chemical does not exceed the applicable toxicity limit. However, in the event of a hazardous chemical release, the MCR operators are provided with criteria for the implementation of a range of potential protective actions, such as donning of respirators and manually actuating the emergency isolation mode of the MCR HVAC system.

In accordance with RG 1.196, Regulatory Position C.2.5, Hazardous Chemicals, surveys will be conducted annually for onsite chemical hazards. The periodicity of surveys for offsite chemical hazards is determined based on the number, size, and types of industrial and transportation activities, as well as changes in regional and local land use in the vicinity of the plant. As described in SSAR Section 2.2.3, there are no industrial facilities within a 5-mile radius of the NAPS site. As such, offsite mobile and stationary sources of hazardous chemicals within five miles of the site will be surveyed every five years.

The control room habitability program will be developed in accordance with RGs 1.196 and 1.78.

6.4.6 Instrumentation Requirement

STD COL 6.4(5) Replace the last paragraph in DCD Subsection 6.4.6 with the following.

Instrumentation to detect and alarm a hazardous chemical release in the vicinity, and to automatically isolate the control room envelope (CRE) from such releases is not required based on analyses described in Subsection 6.4.4.2. No hazardous chemicals concentrations in the MCR exceeded the IDLH criteria of RG 1.78.

6.4.7 Combined License Information

Replace the content of DCD Subsection 6.4.7 with the following.

NAPS COL 6.4(1)

6.4(1) ***Toxic chemicals of mobile and stationary sources and evaluation of the control room habitability***

This COL item is addressed in Subsection 6.4.4.2.

NAPS COL 6.4(2)

6.4(2) ***Automatic and manual action for the MCR HVAC system that are required in the event of postulated toxic gas release***

This COL item is addressed in Subsection 6.4.3 and Subsection 6.4.4.2.

6.4(3) ***Deleted from the DCD.***

6.4(4) ***Deleted from the DCD.***

STD COL 6.4(5)

6.4(5) ***Toxic gas detection requirements necessary to protect the CRE***

This COL item is addressed in Subsection 6.4.6.

NAPS COL 6.4(1)

Table 6.4-201 MCR Toxic Gas Concentrations

Chemical/Material	Distance to Nearest Control Room Intake (ft)	Toxicity Limit (ppm)	Distance to IDLH (ft)	Maximum MCR Concentration (ppm)
Unit 3				
Acetone[(6)]	223	2,500	< 33	28.9
Ammonium Hydroxide (19% wt solution)[(6)]	360	300	813	266
Carbon Dioxide[(7)]	959	40,000	423	995
Dimethylamine (40% wt solution)[(6)]	360	500	474	216
Dimethylamine (2% wt solution)[(6)]	360	500	306	52.1
Ethanol[(6)]	223	3,300	54	127
Hydrazine (20% wt solution)[(6)(13)]	360	50	417	29.3
Hydrazine (85% wt solution)[(6)(13)]	223	50	75	3.79
Hydrochloric Acid (30% solution)[(6)]	223	50	234	22.2
Hydrogen	986	Asphyxiant[(11)]	NA	2,880
Morpholine (40% wt solution)	290	1,400	255	584
NALCO H-130	1,627	3,300[(3)]	90	25.2
NALCO H-130	429	3,300[(3)]	81	194
Nitrogen[(7)]	910	Asphyxiant[(11)]	NA	2,280
NOVEC 1230	0[(4)]	100,000	NA	2,400
R-134a (1,1,1,2- Tetrafluoroethane)[(8)]	0	Asphyxiant[(11)]	NA	58,000
R-134a (1,1,1,2- Tetrafluoroethane)[(9)]	15[(12)]	50,000	33	43,500
R-134a (1,1,1,2- Tetrafluoroethane)[(10)]	123	50,000	66	13,000
Sodium Hypochlorite (12% Solution) - Access Building[(1),(6)]	223	10[(5)]	39	No significant concentration[(2)]
Sodium Hypochlorite (12% Solution) - Hybrid Cooling Tower[(1)]	1627	10[(5)]	168	0.0754
Sodium Hypochlorite (12% Solution) - Station Water Intake[(1)]	952	10[(5)]	57	0.0294
Sodium Hypochlorite (12% Solution) - UHS[(1)]	429	10[(5)]	39	0.0679

NAPS COL 6.4(1)

Table 6.4-201 MCR Toxic Gas Concentrations

Chemical/Material	Distance to Nearest Control Room Intake (ft)	Toxicity Limit (ppm)	Distance to IDLH (ft)	Maximum MCR Concentration (ppm)
Units 1 & 2				
Acetone	2,198	2,500	93	5.65
Ammonium Hydroxide (30% Solution)	1,199	300	1,278	48.0
Carbon Dioxide	1,199	40,000	1,902	11,300
H-130 Microbiocide (Ethanol)	1,437	3,300 [3]	177	58.9
Halon 1301 (Bromotrifluoromethane)	1,199	40,000	72	9.71
Hydrazine (35% Solution)[13]	1,199	50	873	13.0
Hydrochloric Acid (31% Solution)	1,587	50	438	1.59
Hydrogen	1,199	Asphyxiant[11]	NA	1,060
Nitrogen, liquid	1,121	Asphyxiant[11]	NA	2,670
Sodium Hypochlorite (15% Solution)[1]	1,884	10[5]	39	No significant concentration[2]

NAPS COL 6.4(1)

Table 6.4-201 MCR Toxic Gas Concentrations

Chemical/Material	Distance to Nearest Control Room Intake (ft)	Toxicity Limit (ppm)	Distance to IDLH (ft)	Maximum MCR Concentration (ppm)

Notes:

(1) As Chlorine gas based on a decomposition analysis of sodium hypochlorite.

(2) Concentrations under 0.00100 ppm are reported as “No significant concentration”

(3) As ethanol

(4) This chemical is stored inside the MCR

(5) As chlorine

(6) For those chemicals stored inside the Access Building or Turbine Building, an Urban or Forest roughness factor was selected in ALOHA

(7) An Urban or Forest roughness factor was selected in ALOHA when evaluating Nitrogen and Carbon Dioxide to account for the wakes/eddies that would be generated as the formed cloud moves past the UHS structure

(8) Asphyxiation case, entire volume of refrigerant in the Non-Essential Chilled Water System is released directly into control room. Resulting oxygen concentration is greater than the OSHA 29 CFR 1910.134(b) confined space lower limit of 19.5%.

(9) Assumes pressure relief device on the Non-Essential Chilled Water System functions as designed and vents refrigerant to exterior of building.

(10) Assumes pressure relief device on the Non-Essential Chilled Water System fails and the refrigerant plume enters MCR through the MCR door. No credit is taken for MCR air exchange rate.

(11) Concentration required to displace sufficient oxygen to generate an oxygen deficient atmosphere (<19.5%) as defined by OSHA 29 CFR 1910.134(b) is calculated to be 71,400 ppm.

(12) ANSI/ASHRAE Standard 15 requires that the pressure relief vents be located greater than 20 feet horizontal distance from any ventilation intake, and 15 feet off of the ground. Conservatively, the toxicity analysis was conducted using a 15 foot separation between the refrigeration release point and MCR intake.

(13) All hydrazine solutions were analyzed as pure hydrazine.

6.5 Fission Product Removal and Control Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.5.2.4 Tests and Inspections

NAPS DEP 14.2(3)

Delete the second sentence of the second paragraph of DCD Subsection 6.5.2.4.

6.6 Inservice Inspection of Class 2 and 3 Components

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 6.6(1)

Replace the second sentence of the second paragraph in DCD Section 6.6 with the following.

A preservice inspection program (non-destructive base line examination) and an Inservice inspection program for American Society of Mechanical Engineers (ASME) Code Section III Class 2 and 3 systems, components (pumps and valves), piping, and supports will be developed and implemented in accordance with Table 13.4-201.

6.6.8 Augmented ISI to Protect Against Postulated Piping Failures

STD COL 6.6(2)

Replace the first sentence of the second paragraph in DCD Subsection 6.6.8 with the following.

Implementation milestones of the augmented ISI program are the same as that specified for inservice inspection of Class 2 and 3 components provided in Table 13.4-201.

6.6.9 Combined License Information

Replace the content of DCD Subsection 6.6.9 with the following.

STD COL 6.6 (1)

6.6(1) ***Preparation of a preservice inspection program and an inservice inspection program***

This COL item is addressed in Section 6.6.

STD COL 6.6 (2)

6.6(2) ***Preparation of an augmented inservice inspection program for high-energy fluid system piping***

This COL Item is addressed in Subsection 6.6.8.

7 Instrumentation and Controls

7.1 Introduction

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.2 Reactor Trip System

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.3 Engineered Safety Feature Systems

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.4 Systems Required for Safe Shutdown

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.4.1.2.2 Chemical and Volume Control System

NAPS DEP 9.2(1)

Replace the last sentence with the following:

The Chemical and Volume Control System (CVCS) includes: the degasifier subsystem, the regenerative heat exchanger, letdown heat exchanger, letdown orifices, purification filters, demineralizers, volume control tank (VCT), BATs, boric acid transfer pumps, charging pumps (CHPs), seal water injection filters, required piping, valves, and instrumentation.

7.4.1.6 Normal and Safe Shutdown Functions

STD COL 7.4(1)

Replace the second paragraph in DCD Subsection 7.4.1.6 with the following.

Site-specific component control and indication to achieve shutdown and as related to the ultimate heat sink (UHS) is presented in Tables 7.4-201 and 7.4-202. A system description of the UHS is provided in Section 9.2.5.2.

7.4.4 Combined License Information

Replace the content of DCD Subsection 7.4.4 with the following.

STD COL 7.4(1)

7.4(1) ***Description of component controls and indications required for safe shutdown related to UHS***

This Combined License (COL) item is addressed in Subsection 7.4.1.6, and Tables 7.4-201 and 7.4-202.

NAPS COL 7.4(1)

Table 7.4-201 Site-Specific Component Controls for Shutdown

Systems	Components	Normal Shutdown	Safe Shutdown
UHSS	UHS Cooling Tower Fans	Yes	Yes
	UHS Cooling Tower Isolation Valve	Yes	Yes
	UHS Cooling Tower Bypass Valve	Yes	Yes
	UHS Transfer Pump	No	Yes
	UHS Transfer Pump Discharge Valve	No	Yes
	UHS Transfer Pump Discharge Valve (Winter Operation)	No	Yes
	UHS Transfer Line Basin Inlet Valve	No	Yes
	UHS Winter Operation Basin Inlet Valve	No	Yes
	UHS Basin Makeup Control Valve	Yes	No
	UHS Winter Operation Heat Tracing	No	Yes
ESWS	UHS Blowdown Control Valve	Yes	Yes
HVAC	ESW Pump Room Exhaust Fan	Yes	Yes
	UHS Transfer Pump Room Exhaust Fan	No	Yes
	ESW Pump Room Unit Heater	Yes	Yes
	UHS Transfer Pump Room Unit Heater	No	Yes

STD COL 7.4(1)

Table 7.4-202 Site-Specific Indication for Shutdown

Systems	Instruments	Number of Channels	Normal Shutdown	Safe Shutdown
UHSS	UHS Basin Water Level	2 per Basin	Yes	Yes
	UHS Basin Temperature	1 per Basin	Yes	Yes

7.5 Information Systems Important to Safety

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.5.1.1 Post-Accident Monitoring

STD COL 7.5(1)

Replace the seventh paragraph in DCD Subsection 7.5.1.1 with the following.

Site-specific type D post accident monitoring (PAM) variables related to the UHS and site-specific type E PAM variables for monitoring the meteorological parameters are presented in Table 7.5-201.

7.5.1.6.2 Emergency Operations Facilities

NAPS COL 7.5(2)

Replace the third paragraph in DCD Subsection 7.5.1.6.2 with the following.

The emergency operations facility (EOF) is described in the Emergency Plan.

Post-accident monitoring, bypassed and inoperable status indication, plant alarms, and safety parameter display system information is displayed on non-safety human-system interface equipment in the EOF. The information displayed in the EOF is functionally identical to the information displayed in the MCR and technical support center (TSC), although the manner in which it is displayed may vary (e.g., single screen, multiple screens, single monitor, multiple monitors, etc.). The displays and communication related auxiliary equipment is strategically located in the existing EOF. Neither the EOF nor the TSC has plant control capability.

7.5.4 Combined License Information

Replace the content of DCD Subsection 7.5.4 with the following.

STD COL 7.5(1)
NAPS COL 7.5(1)

7.5(1) ***Description of site-specific PAM variables***

This COL item is addressed in Subsection 7.5.1.1 and Table 7.5-201.

NAPS COL 7.5(2)

7.5(2) ***Description of site-specific EOF***

This COL item is addressed in Subsection 7.5.1.6.2.

NAPS COL 7.5(1)

Table 7.5-201 Site-Specific PAM Variables

Variable	Range	Monitored Function or System	Quantity	Type
UHS Basin Water Level	0–100% Span	Cooling Water System	2 per Basin	D
ESW Header Pressure	0–150 psig	Cooling Water System	1 per Line	D
UHS Basin Temperature	32–140°F	Cooling Water System	1 per Basin	D
Meteorological Parameters	Note 1	Meteorology	1 per each variable	E

Note:

1. Site-specific PAM meteorological variables include wind speed and direction, ambient temperature and differential temperature. (See FSAR Subsection 2.3.3.)

7.6 Interlock Systems Important to Safety

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.7 Control Systems Not Required for Safety

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.8 Diverse Instrumentation and Control Systems

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.9 Data Communication Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.9.2.6 Cyber Security

STD COL 7.9(1) Replace the second paragraph in DCD Subsection 7.9.2.6 with the following.

The Cyber Security Plan is submitted to the NRC as described in Section 13.6.

7.9.4 Combined License Information

STD COL 7.9(1) *7.9(1)* ***Description of cyber security provisions***

This Combined License (COL) item is addressed in Subsection 7.9.2.6.

8 Electric Power

8.0 Electric Power

8.1 Introduction

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.1.2.1 Utility Power Grid Description

NAPS COL 8.2(1) Replace the paragraph in DCD Subsection 8.1.2.1 with the following.

The output of Unit 3 is delivered to a main 500/230 kV switchyard through the unit main step-up transformers, as described in Sections 8.2 and 8.3. The switchyard serves four 500 kV lines and one 230 kV line. The plant is connected to the main switchyard by a 500 kV alternate preferred transmission line, and a 230 kV normal preferred transmission line that supplies power to the four reserve auxiliary transformers (RATs). The 500 kV lines go to the Ladysmith, Morrisville, and Midlothian substations. The 230 kV line goes to the Gordonsville substation. These intra-system ties transit from the NAPS switchyard to the east, west, north, and south as shown in Figure 8.2-203. Dominion's transmission system and intra-system ties are further described in Section 8.2.

NAPS SUP 8.1(1)

8.1.5.3.2 Nuclear Regulatory Commission Regulatory Guides

Add the following regulatory guides after the last bulleted text in DCD Subsection 8.1.5.3.2.

- Regulatory Guide 1.210, “Qualification of Safety-Related Battery Chargers and Inverters for Nuclear Power Plants,” Rev. 0, June 2008
- Regulatory Guide 1.211, “Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants,” Rev. 0, April 2009
- Regulatory Guide 1.212, “Sizing of Large Lead-Acid Storage Batteries,” Rev. 0, November 2008
- Regulatory Guide 1.213, “Qualification of Safety-Related Motor Control Centers for Nuclear Power Plants,” Rev. 0, May 2009

8.1.5.3.5 Institute of Electrical and Electronics Engineers Standards

NAPS COL 8.2(3)

Replace the first paragraph in DCD Subsection 8.1.5.3.5 with the following.

The onsite electric power system design conforms to the criteria and recommendations provided in the following IEEE and other industry standards such as American National Standards Institute (ANSI), National Electrical Manufacturers Association (NEMA), National Fire Protection Association (NFPA) and Insulated Cable Engineers Association (ICEA). The switchyard and transmission system design conforms to Dominion Transmission design standards as discussed in Section 8.2.

NAPS DEP 8.2(1)

Table 8.1-1R Design Criteria and Guidelines for Electric Power Systems (Sheet 1 of 7)

Criteria Provided in Referenced Documents	DCD FSAR Section/ Subsection 8.2	8.3.1	8.3.2	8.4	Remarks
1. 10 CFR 50 Appendix A – GDC					
a. GDC 2, "Design Bases for Protection Against Natural Phenomena" (NAPS DEP 8.2(1))	A	A	A		
b. GDC 4, "Environmental and Dynamic Effects Design Basis" (NAPS DEP 8.2(1))	A	A	A		
c. GDC 5, "Sharing of Structures, Systems, and Components"					Not applicable
d. GDC 17, "Electric Power Systems"	A	A	A	A	
e. GDC 18, "Inspection and Testing of Electric Power Systems"	A	A	A	A	
f. GDCs 33, 34, 35, 38, 41, and 44	A	A	A		
g. GDC 50, "Containment Design Basis"		A	A		

NAPS DEP 8.2(1)

Note: "A" denotes that US-APWR Unit 3 conforms to the requirements and criteria provided in the subject document.
"G" denotes that US-APWR Unit 3 conforms to the guidance provided in the subject document.

8.2 Offsite Power System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.2.1.1 Transmission System

NAPS COL 8.2(1) Replace the paragraph in DCD Subsection 8.2.1.1 with the following.

NAPS, that is, Units 1, 2 and 3, is connected to the Dominion transmission system by four 500 kV lines (three of which were constructed for Units 1 and 2) and one 230 kV line. The lines are designed and located to minimize the likelihood of simultaneous failure.

The Unit 3 main generator feeds electric power through a 26 kV isolated-phase bus to a bank of three single-phase transformers, stepping the generator voltage up to the transmission voltage of 500 kV. Figure 8.2-201 provides a one-line diagram of the electric system from the switchyard to the onsite system. The physical arrangement of power lines from offsite power sources is shown in Figure 8.2-202. Figure 8.2-203 maps the offsite transmission lines.

The transmission lines and towers connecting the switchyard to the transmission system are as follows:

- Two 500 kV overhead lines to the Ladysmith substation (approximately 15 miles)
- A 500 kV overhead line to the Midlothian substation (approximately 41 miles)
- A 500 kV overhead line to the Morrisville substation (approximately 33 miles)
- A 230 kV overhead line to the Gordonsville substation (approximately 31 miles)

The two Ladysmith lines (one of which was constructed for Units 1 and 2) utilize a common right-of-way. Each of the other lines utilizes separate rights-of-way. The 230 kV Gordonsville line crosses under the 500 kV Morrisville line and one of the Ladysmith lines near the switchyard.

Transmission tower separation, line installation, and clearances are consistent with the National Electric Safety Code (NESC) and Dominion transmission line standards. Basic tower structural design parameters, including the number of conductors, height, materials, color, and finish

are consistent with Dominion transmission line design standards. Adequate clearance exists between wire galloping ellipses to minimize conductor or structure damage. (Reference 8.2-202)

8.2.1.2 Offsite Power System

NAPS COL 8.2(4)
NAPS COL 8.2(5)

Replace the first paragraph in DCD Subsection 8.2.1.2 with the following.

The offsite power system is a nonsafety-related, non-class 1E system, beginning at the transmission grid and ending at the line-side terminals of the main power supply circuit breakers feeding the 13.8 kV and 6.9 kV buses, and at the terminals on the MT side of the generator load break switch (GLBS). Power is supplied from multiple independent and physically separate offsite power sources. The normal preferred power source is any one of the four 500 kV lines, and the alternate preferred power source is one of the other three 500 kV lines.

NAPS COL 8.2(4)
NAPS COL 8.2(5)

Replace the first four sentences of the second paragraph in DCD Subsection 8.2.1.2 with the following.

Electric power is provided to the switchyard from the transmission system and other generating stations by four physically independent 500 kV transmission lines. During unit startup, shutdown, maintenance, and during all postulated accident conditions, two physically independent transmission tie lines supply the offsite electric power from the plant high voltage switchyard to the plant. One of these two transmission lines is constructed as a 500 kV overhead line and connects to the high voltage side of the MT. The other transmission tie line consists of 230 kV insulated cables in underground ducts and connects to the high voltage side of the RATs. The underground cables have a metallic sheath to prevent moisture ingress in the cable insulation. The metallic sheath is machine applied to the cable core and mechanically sealed to form a continuous barrier against moisture. Manholes associated with the cable ducts are inspected every six months for excessive accumulation of water. Each of the outgoing transmission lines between the switchyard and the remote offsite switching stations has the capacity and capability to supply full auxiliary loads of the unit for all normal, abnormal and postulated accident conditions.

NAPS COL 8.2(4)
NAPS COL 8.2(5)

Add the following information after the last sentence of the second paragraph in DCD Subsection 8.2.1.2.

Neither the grid stability analysis in Subsection 8.2.2.2 nor the FMEA in Subsection 8.2.2.3 identified the non-safety related offsite power system as risk-significant during any mode of plant operation.

STD* COL 8.2(4)
STD* COL 8.2(5)

Add the following information after the last sentence of the eleventh paragraph in DCD Subsection 8.2.1.2.

The force-cooled continuous-current rating of the iso-phase bus duct section between the main generator and the main transformer is 44.4 kA, which provides 5 percent margin with respect to the 42.2 kA continuous current rating of the main generator.

STD COL 8.2(10)

Replace the last sentence of the fifteenth paragraph in DCD Subsection 8.2.1.2 with the following.

In case of a sudden pressure relay operation, the transformer is isolated.

NAPS COL 8.2(4)
NAPS COL 8.2(5)
NAPS CDI

Replace the second sentence of the eighteenth paragraph in DCD Subsection 8.2.1.2 with the following

Minimum one-hour fire barriers are provided between all transformers. Cables associated with the normal PPS between the switchyard and the RATs are routed in underground duct banks. Normal and alternate PPS cables are physically separated which minimizes the chance of simultaneous failure. The underground duct bank for the normal PPS circuit is sealed to prevent degradation in wetted or submerged conditions.

8.2.1.2.1 Switchyard

NAPS COL 8.2(3)

Replace the content of DCD Subsection 8.2.1.2.1 with the following.

The NAPS switchyard, is a 500/230 kV, air-insulated, breaker-and-a-half bus arrangement. Unit 3 is connected to this switchyard by an overhead 500 kV circuit for the alternate preferred power supply (PPS) and an underground 230 kV circuit for the normal PPS. The two circuits are physically and electrically independent.

The physical location and electrical interconnection of the switchyard is shown on Figure 8.2-201 and Figure 8.2-202.

NAPS COL 8.2(8)
NAPS COL 8.2(9)

AC Power is fed to the 500 kV and 230 kV switchyard control houses from four switchyard service transformers. Each switchyard service transformer is a 19.9 kV/120-240V transformer and is aligned using manual throw switches. Multiple switchyard service transformers can be aligned to both the 500 kV and 230 kV control houses.

DC power for the 500 kV switchyard controls is provided by two systems from separate and completely independent batteries and chargers. Each DC system in the 500 kV house consists of a single lead-acid storage battery maintained by two chargers (one as normal and one as backup). The batteries are located in separate, ventilated rooms of the control house. The chargers are located in the same room in the central part of the control house and are separated to minimize interaction. The 500 kV control house battery chargers can be fed from any of the AC power sources supplying the 500 kV control house, but are typically powered from separate sources.

DC power for the 230 kV switchyard controls is provided by a separate system located in the 230 kV switchyard control house. This system consists of a single lead-acid storage battery maintained by two chargers (one as normal and one as backup). The 230 kV control house battery chargers are fed from the AC power source supplying the 230 kV control house.

Switchyard batteries are 125 Vdc and have an 8-hour duty cycle. The batteries are sized in accordance with Dominion substation engineering standards and the sizing is verified using the manufacturer’s sizing program that adheres to battery sizing methodologies found in IEEE 485 (Reference 8.2-210). Battery charger sizing is verified in accordance with Dominion substation engineering standards.

The switchyard grounding system, which overlays an older grounding system, was designed and installed in accordance with the Dominion Substation Engineering Manual and IEEE 80 (Reference 8.2-211). In accordance with IEEE 80, the switchyard ground grid resistance is less than 1 ohm.

The switchyard grounding grid is connected to the station grounding grid. The connection utilizes conductors installed directly under the tie lines to

the MT in accordance with the recommendations of IEEE Std 665 (Reference 8.2-214).

The North Anna switchyard uses surge suppressors on the high and low sides of Transformers 1, 2, 3, 5, and 6 to protect equipment from voltage surges, including lightning events. The insulation coordination and surge protective devices are applied in compliance with IEEE 1313.2 (Reference 8.2-203) and IEEE C62.22 (Reference 8.2-204). The surge protective devices are maintained according to NEMA requirements and manufacturer's recommendations.

A shield wire arrangement is designed for lightning abatement in the switchyard in accordance with IEEE C62.22 (Reference 8.2-204), IEEE 998 (Reference 8.2-205), and reference book entitled "Insulation Coordination for Power Systems"(Reference 8.2-206).

Induced signals are minimized by using shielded cable with parallel, grounded messenger cables continuously from field equipment into the switchyard control houses. Grounded messenger cables are bonded to the control house cable tray. Open racks are bonded to the same ground. Microprocessor circuits are routed separately from power and control circuits within the control houses. Telecommunications cables and communications/data circuits are gathered at the telephone backboard in the control house and grounded to a single isolated ground bar that is connected to the substation ground. Fiber optic cabling is used to transmit information from data collectors in the control house to offsite locations.

The capacity and electrical characteristics for switchyard equipment are as follows:

Transformers	Voltage Rating	MVA Rating
1 and 2	500/36.5 kV	60/80/100/112
3	230/36.5 kV	67.2/89.6/112
5 and 6	500/230 kV	67.2/89.6/112

Breakers	Max Design Voltage	Rated Current	Interrupting Current at Max kV
500 kV	550 kV	3000A	50 kAIC
230 kV	242 kV	2000A	40 kAIC

Disconnect Switch	Maximum Voltage	Basic Impulse Insulation Level	Continuous Current Rating
500 kV	550 kV	1550 kV	3000A
230 kV	242 kV	900 kV	2000A

Transmission Lines	Rated Current at 100ºF
500 kV	3954A
230 kV	2190A

Bus Work	Rated Current at 100ºF	Short Circuit Current (Bus Bracing Limit)
500 kV	3891A	50 kA
230 kV	2750A	40 kA

NAPS COL 8.2(7)

The 500 kV transmission lines are protected with redundant high-speed relay schemes with re-closing and communication equipment to minimize line outages. The 500 kV switchyard buses have redundant bus differential protection using separate and independent current and control circuits. Generating unit tie-lines and auxiliary transformer underground cable circuits are protected with redundant high-speed relay schemes. Transformers 1 and 2 are protected with differential relays. Transformer 3, 5, and 6 are protected with differential relays and overcurrent relays.

Dominion is responsible for engineering, constructing, operating, and maintaining its electric transmission system, and for interfacing with PJM, the Regional Transmission Organization (RTO). Dominion's responsibility includes designing, maintaining, and operating all switchyard protective relaying associated with connecting Unit 3 to the North Anna switchyard. PJM studied the interconnection of Unit 3 to the North Anna switchyard and recommended no additional design requirements above those typically used by Dominion in the design of the protective relaying scheme at the switchyard.

500 kV breakers are equipped with dual trip coils. Each redundant protection circuit is powered from its redundant DC power load group and connected to a separate trip coil. Equipment and cabling associated with each redundant system is physically separated from its redundant

counterpart. Breakers are provided with a breaker failure scheme that isolates a breaker that fails to trip due to a malfunction.

NAPS COL 8.2(3)

8.2.1.2.2 Switchyard and Transmission Lines Testing and Inspection

Transmission lines are inspected via an aerial inspection program approximately twice per year. The inspection focuses on such items as right-of-way encroachment, vegetation management, conductor and line hardware condition, and the condition of supporting structures.

Routine switchyard inspection activities include, but are not necessarily limited to, the following:

- Daily transformer inspections
- Periodic inspections of circuit breakers and batteries
- Quarterly infrared scans
- Semi-annual infrared scans (relay panels)
- Semi-annual inspection of substation equipment
- Annual infrared scans
- Annual corona camera scan

Routine switchyard testing activities include, but are not necessarily limited to, the following:

- Semiannual dissolved gas analysis on transformers
- Biennial circuit breaker profile or timing tests
- Biennial 500 kV relay testing
- Triennial 230 kV relay testing
- 4-year dissolved gas analysis on transformer load tap changers
- 5-year battery discharge testing
- 8-year PT testing
- 8-year ground grid testing
- 10-year coupling capacitor voltage transformer testing
- 10-year arrester testing
- 10-year wave trap testing

Switchyard protection system monitoring, maintenance, and testing are performed in accordance with North American Electric Reliability Corporation (NERC) Standard PRC-005-1, (Reference 8.2-207) Standard

PRC-008-0, (Reference 8.2-208) and Standard PRC-017-0, (Reference 8.2-209).

NAPS COL 8.2(1)

8.2.1.2.3 **Communication with PJM**

Dominion has established a Switchyard Interface Agreement and protocols for Maintenance, Communications, Switchyard Control, and System Analysis sufficient to safely operate and maintain the power station interconnection to the transmission system. The switchyard interface agreement and protocols were established to address INPO SOER 99-1 (Reference 8.2-212) and to implement the requirements of NERC NUC-001 (Reference 8.2-213). The Nuclear Switchyard Interface Agreement document provides the overall guidance to establish clear lines of ownership, responsibility, and interface between Dominion Virginia Power Electric Transmission, the Dominion Virginia Power Market Operations Center (responsible for communication and coordination with PJM), and North Anna Unit 3 during normal, potentially degrading, or degraded station or grid electrical voltage or frequency conditions.

Dominion Virginia Power Electric Transmission is the owner of transmission facilities within the Dominion Virginia Power retail service territory and is responsible for the reliable and safe operation of the system under the direction and control of PJM. The responsibilities include engineering, construction and maintenance of the switchyard components. Dominion Virginia Power Electric Transmission has the responsibility for coordinating switchyard work. Within the switchyard, Dominion Virginia Power Electric Transmission normally performs switching operations above 34.5 kV. The switchyard interface agreement specifies the required notifications that the Dominion Virginia Power Electric Transmission System Operations Center (SOC) must provide to North Anna Unit 3 regarding the status of the transmission system. Notification to the operations shift manager is required when the normal or emergency voltage or frequency limits will be exceeded if a single contingency occurs and the SOC cannot effectively mitigate the conditions to avoid the violation, or the SOC has lost the ability to assess the condition of the offsite electrical distribution system.

The operations shift manager has the responsibility for the safe operation of North Anna Unit 3, including authorizing the operation and maintenance of switchyard equipment.

Operating procedures exist to maintain the switchyard voltage within the limits of the normal voltage schedule. Upon deviation from the normal voltage schedule, these procedures verify the availability of required and contingency equipment and materials, and direct notifications to outside agencies, until the normal voltage schedule can be restored.

The TSO provides analysis capabilities for both Long Term Planning and Real Time Operations. System conditions are evaluated to ensure a bounding analysis and model parameters are selected that are influential in determining the system's ability to provide offsite power adequacy. Elements included in the analysis are system load forecasts (including sufficient margin to ensure a bounding analysis over the life of the study), system generator dispatch (including outages of generators known to be particularly influential in offsite power adequacy of affected nuclear units), outage schedules for transmission elements that have significant influence on offsite power adequacy, cross-system power transfers and power imports/exports, and system modification plans and schedules. A Real Time State Estimator is used to assist in the evaluation of actual system conditions. These capabilities are described in the System Analysis Protocol of the Switchyard Interface Agreement.

8.2.2.1 Applicable Criteria

NAPS DEP 8.2(1)

Delete the first bullet line and following paragraph and the second bullet line and following paragraph in this section.

NAPS COL 8.2(3)

Add the following sentence at the end of the paragraph following the twelfth bullet line in this section.

The site-specific portion of the offsite power supply design meets alternate standards for the North Anna switchyard lightning protection system design as described in Section 8.2.1.2.1.

NAPS COL 8.2(11)

Add the following new subsections after DCD Subsection 8.2.2.1.

8.2.2.2 Grid Reliability and Stability Analysis

A system impact study was performed to assess the effects of interconnection of the 1900 MVA US-APWR on the transmission system in the areas of load flow, import/export capability, short circuit analysis, system stability, and voltage sensitivity. (Reference 8.2-201) The study was prepared using the 2013 light load base case and the 2014 summer

peak case projections. The analysis was performed using Power Technology International Software PSS/E for load flow, import/export capability and stability evaluation, and ASPEN One-liner for short circuit evaluation.

The equipment considered is from the point of interconnection of Unit 3 at the switchyard out to the 500 kV transmission system. This includes the 230 kV buses and interconnections. The 34.5 kV portion of the North Anna switchyard is not modeled separately, but the 34.5 kV loads are considered at the 500 kV level. Maximum and minimum switchyard voltage limits have been established for the 500 kV switchyard at 540 kV and 505 kV, respectively.

The system was studied for stability and voltage sensitivity based on the following scenarios:

- Close in 3 phase faults cleared in primary time
- Close in 3 phase faults cleared in primary time with prior outage of selected transmission lines
- Close in breaker failure faults with delayed clearing
- Loss of largest generating unit
- Loss of most limiting transmission line
- Sequential loss of all generating units at North Anna
- Loss of North Anna Unit 3 with Units 1 and 2 in refueling
- Accident on North Anna Unit 3 with normal shutdown of Units 1 and 2
- Sudden simultaneous loss of Units 1 and 2 with Unit 3 operating

A separate case was studied and confirmed that after a turbine trip, adequate power to the RCPs is maintained for at least three seconds as required in the transient and accident analysis in Chapter 15.

The study concluded in all cases analyzed that the generator rotor angles and system voltage recover to acceptable operating points, with no unstable frequency deviations during the transients. Although in certain cases the maximum frequency decay rate exceeds 5 Hz/sec, the maximum low frequency variation for the most severe case is –0.585 Hz (minimum frequency of 59.415 Hz) prior to recovery to nominal frequency. Since all cases are stable, and worst case minimum frequency does not approach the minimum RCP speed setpoint of 95 percent (57 Hz), none of the cases result in either a reactor trip or RCP trip due to

frequency variation. Therefore, grid frequency stability is consistent with the requirements of Chapter 15.

Short circuit analyses were performed to verify the interrupting capability of the 500 kV breakers. The study results show that symmetrical short circuit current does not exceed 40 kA and asymmetrical short circuit current does not exceed 46 kA. The 500 kV breakers are rated to interrupt at 50 kA and are, therefore, adequately sized. Results of the study also showed that symmetrical and asymmetrical short circuit currents did not exceed the 40 kA rating of the 230 kV circuit breakers.

The reliability of the overall system design is indicated by the fact that there have been no widespread system interruptions. Failure rates of individual facilities are low. Transmission lines are designed to have less than one lightning flashover per 100 miles per year, and the record shows much better performance, indicating conservative designs. Most lightning-caused outages are momentary, with few instances of line damage. Other facilities do fail occasionally, but these are random occurrences, and experience has shown that equipment specifications are adequate.

Grid availability in the region over the past 20 years was also examined and it was confirmed that the system has been highly reliable with minimal outages due to equipment failures.

Site-specific designs with the potential to affect PRA results are described in Table 1.8-1R. The offsite power transmission system is addressed in that table as a system interface for the US-APWR electrical power system. As described in Section 19.1.1.2.1, the offsite power transmission system is considered to have no potential influence on the results of the PRA.

Grid stability is evaluated on an ongoing basis based on load growth, the addition of new transmission lines, or new generation capacity.

NAPS COL 8.2(11)

8.2.2.3 Failure Modes and Effects Analysis

8.2.2.3.1 Introduction

There are no single failures that can prevent the NAPS offsite power system from performing its function to provide power to Unit 3. (Reference 8.2-201)

8.2.2.3.2 Transmission System Evaluation

Unit 3 is connected to the Dominion transmission system via four 500 kV and one 230 kV overhead transmission lines. The normal preferred power source is any one of the four 500 kV lines. (See Section 8.2.1.1 and Section 8.2.1.2.) The alternate preferred power source is one of the other three 500 kV lines.

Each transmission line occupies a separate right-of-way, except the two parallel Ladysmith lines, which share the same right-of-way. The 500 kV towers provide clearances consistent with the NESC. The towers are grounded with either ground rods or a counterpoise ground system. Failure of any one tower due to structural failure can at most disrupt and cause a loss of power distribution to itself and the adjacent line.

Failure of a line conductor would cause the loss of one of the four 500 kV lines, with the other three lines remaining available as normal and alternate preferred power sources.

8.2.2.3.3 Switchyard Evaluation

A breaker-and a-half scheme is incorporated in the design of the switchyard. The equipment in the switchyard is rated and positioned within the bus configuration according to the following criteria in order to maintain incoming and outgoing load flow from Unit 3.

- Equipment continuous current ratings are such that no single contingency in the switchyard (e.g., a breaker being out of service for maintenance) results in current exceeding 100 percent of the continuous current rating of the equipment.
- Interrupting duties are such that no faults occurring on the system exceed the equipment rating.
- Momentary ratings are such that no fault occurring on the system exceeds the equipment momentary rating.
- Voltage ratings for the equipment are specified to be greater than the maximum expected operating voltage.

The breaker-and-a-half switchyard arrangement offers the following flexibility to control a failed condition within the switchyard:

- Any faulted transmission line into the switchyard can be isolated without affecting any other transmission line.
- Either bus can be isolated without interruption of any transmission line or other bus.
- Relay schemes used for protection of the offsite power circuits and the switchyard equipment, with the exception of the 230 kV bus, include primary and backup protection features. The relay scheme used for protection of the 230 kV bus includes primary protection features. All 500 kV breakers are equipped with dual trip coils. Each protection circuit that supplies a trip signal is connected to a separate trip coil.

Within the switchyard at North Anna, simultaneous failure of both the 500 kV and 230 kV offsite circuits associated with Unit 3 as a result of a single event is prevented by the layout of the switchyard and the design of the protection and control systems. The NAPS switchyard is designed in a breaker and a half scheme to allow for selective isolation of any faulted transmission line, bus, transformer, or station interconnection.

For the condition of a circuit breaker not operating during a fault condition, switchyard relaying employs breaker failure protection to trip all breakers adjacent to the failed breaker necessary to isolate the failed breaker. The most limiting location would be a fault on bus 1 with the failure of the 500 kV breaker between bus 1 and the Unit 3 MT leads, or a fault on the 230 kV bus connected to transformer 6 with the failure of the 230 kV breaker between the bus and the RAT feeder. In either case, one of the preferred power sources would be lost as the breaker adjacent to the failed breaker opened to clear the fault. Therefore, the worst result would be isolation of either the normal PPS on Unit 3 or the alternate PPS on Unit 3, but not both.

A fault on a 500 kV switchyard bus will be isolated by opening the 500 kV and 34.5 kV breakers associated with that bus. The opposite 500 kV bus remains energized and connected to the offsite power sources and the alternate preferred power source for Unit 3. The normal preferred power source remains energized from its 230 kV bay that is connected to the unaffected 500 kV bus. A single faulted 230 kV bus would be isolated by operation of the 230 kV and 500 kV breakers associated with that bus. The Unit 3 normal PPS would remain energized from the unaffected 230 kV bus, and the Unit 3 alternate PPS would remain energized from either 500 kV bus.

A fault on a transformer would cause isolation of the affected transformer only for transformers 3, 5, and 6. A fault on transformer 1 or 2 would result in isolation of both the affected transformer and its associated 500 kV bus and would be similar to the faulted bus case previously evaluated. However, loss of a single transformer, or transformer and associated bus, would not cause a loss of either the normal or alternate preferred power source.

Spurious operation of a relay would cause similar effects as previously evaluated. Spurious operation of a line protection relay would cause isolation of a single line. Spurious operation of a bus protection relay would cause isolation of a single bus, and spurious operation of a transformer relay would cause isolation of a single transformer (transformers 3, 5, and 6) or a single transformer and associated bus (transformer 1/bus 1 or transformer 2/bus 2). In all cases, as previously demonstrated, spurious operation of a relay would not cause the loss of both the normal and alternate preferred power sources.

On loss of a control power source in the 500 kV control house, the backup control power source provides for protection and tripping of associated 500 kV components. A loss of control power in the 230 kV control house is identified by loss of communications to the systems operations center (SOC). The loss of communications initiates an alarm in the SOC and an investigation into the problem at the site. There is no false operation of any 230 kV breakers resulting from loss of 230 kV control power.

8.2.3 Design Bases Requirements

NAPS COL 8.2(11)

Replace the first sentence of the second paragraph in DCD Subsection 8.2.3 with the following.

An FMEA is provided in Subsection 8.2.2.3 and the offsite power system conforms to the following requirements.

STD COL 8.2(11)

Replace the last sentence of the third paragraph in DCD Subsection 8.2.3 with the following.

A grid stability analysis is provided in Subsection 8.2.2.2 and the grid stability conforms to this requirement.

NAPS COL 8.2(11)

Replace the last sentence of the fourth paragraph in DCD Subsection 8.2.3 with the following.

A transmission system reliability analysis is provided in Subsection 8.2.2.2.

8.2.4 Combined License Information

Replace the content of DCD Subsection 8.2.4 with the following.

NAPS COL 8.2(1)

8.2(1) ***Utility power grid and transmission line***

This Combined License (COL) Item is addressed in Subsections 8.1.2.1, 8.2.1.1, 8.2.1.2.3, and Figure 8.2-203.

8.2(2) ***Deleted from the DCD.***

NAPS COL 8.2(3)

8.2(3) ***Switchyard description***

This COL Item is addressed in Subsections 8.1.5.3.5, 8.2.1.2.1, 8.2.1.2.2, 8.2.2.1, and Figures 8.2-201 and 8.2-202.

STD* COL 8.2(4)
NAPS COL 8.2(4)

8.2(4) ***Normal preferred power***

This COL Item is addressed in Subsection 8.2.1.2, and Figure 8.2-201.

STD* COL 8.2(5)
NAPS COL 8.2(5)

8.2(5) ***Alternate preferred power***

This COL Item is addressed in Subsection 8.2.1.2, and Figure 8.2-201.

8.2(6) ***Deleted from the DCD.***

NAPS COL 8.2(7)

8.2(7) ***Protective relaying***

This COL Item is addressed in Subsection 8.2.1.2.1.

NAPS COL 8.2(8)

8.2(8) ***Switchyard dc power***

This COL Item is addressed in Subsection 8.2.1.2.1.

NAPS COL 8.2(9)

8.2(9) ***Switchyard ac power***

This COL Item is addressed in Subsection 8.2.1.2.1.

STD COL 8.2(10)

8.2(10) ***Transformer protection***

This COL Item is addressed in Subsection 8.2.1.2.

STD COL 8.2(11)
NAPS COL 8.2(11)

8.2(11) ***Stability and Reliability of the Offsite Transmission Power Systems***

This COL Item is addressed in Subsections 8.2.2.2, 8.2.2.3, 8.2.3.

8.2(12) ***Deleted from the DCD.***

8.2.5 References

8.2-201 PJM Generator Interconnection Q65 North Anna 500 kV (1594 MW Capacity) Revised System Impact Study and Facilities Study Report Resulting from Necessary Studies Agreement, April 2011

8.2-202 VA PJM Design and Application of Overhead Transmission Lines 69kV and above, May 20, 2002

8.2-203 IEEE Std 1313.2-1999 (R2005), "IEEE Guide for the Application of Insulation Coordination"

8.2-204 IEEE Std C62.22-2009, "IEEE Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems"

8.2-205 IEEE Std 998-1996 (R2002), "IEEE Guide for Direct Lightning Stroke Shielding of Substations"

8.2-206 Hileman, A. R.: Insulation Coordination for Power Systems; Taylor & Francis, Inc., Boca Raton, FL, 1999

8.2-207 NERC Standard PRC-005-1, "Transmission and Generation Protection System Maintenance and Testing," May 1, 2006

8.2-208 NERC Standard PRC-008-0, "Implementation and Documentation of Underfrequency Load Shedding Equipment Maintenance Program," April 1, 2005

8.2-209 NERC Standard PRC-017-0, "Special Protection System Maintenance and Testing," April 1, 2005

8.2-210 IEEE Std 485-1997, "IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications"

8.2-211 IEEE Std 80-2000, "IEEE Guide for Safety in AC Substation Grounding"

8.2-212 INPO Significant Operating Experience Report (SOER) 99-1, "Loss of Grid," dated December 27, 1999 and SOER 99-1 "Loss of Grid – Addendum," dated December 9, 2004

8.2-213 NERC Standard NUC-001, Revision 1, “Nuclear Plant Interface Coordination”

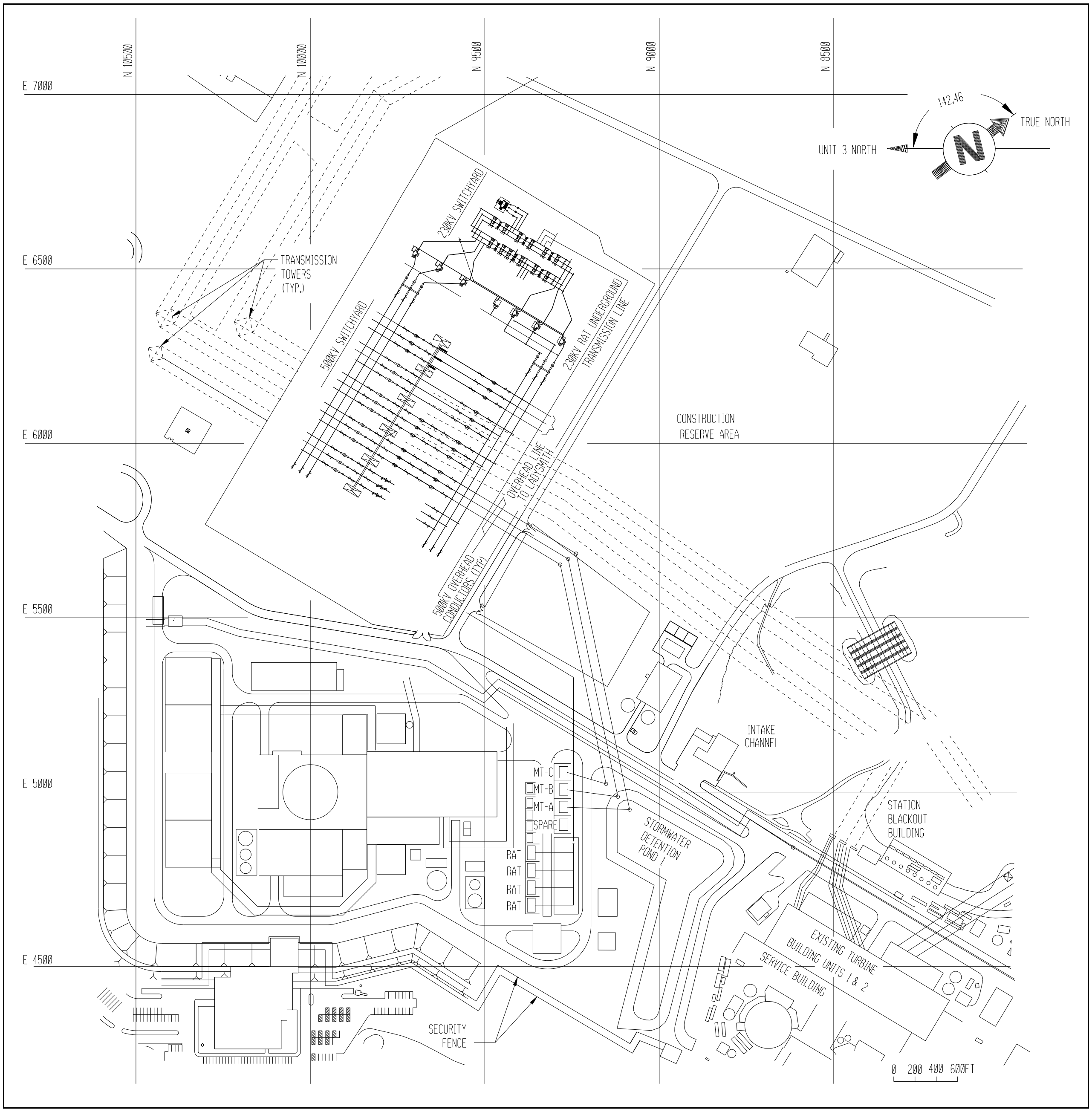
8.2-214 IEEE Std 665-1995 (R2001), “IEEE Guide for Generating Station Grounding”

NAPS COL 8.2(3)
NAPS COL 8.2(4)
NAPS COL 8.2(5)

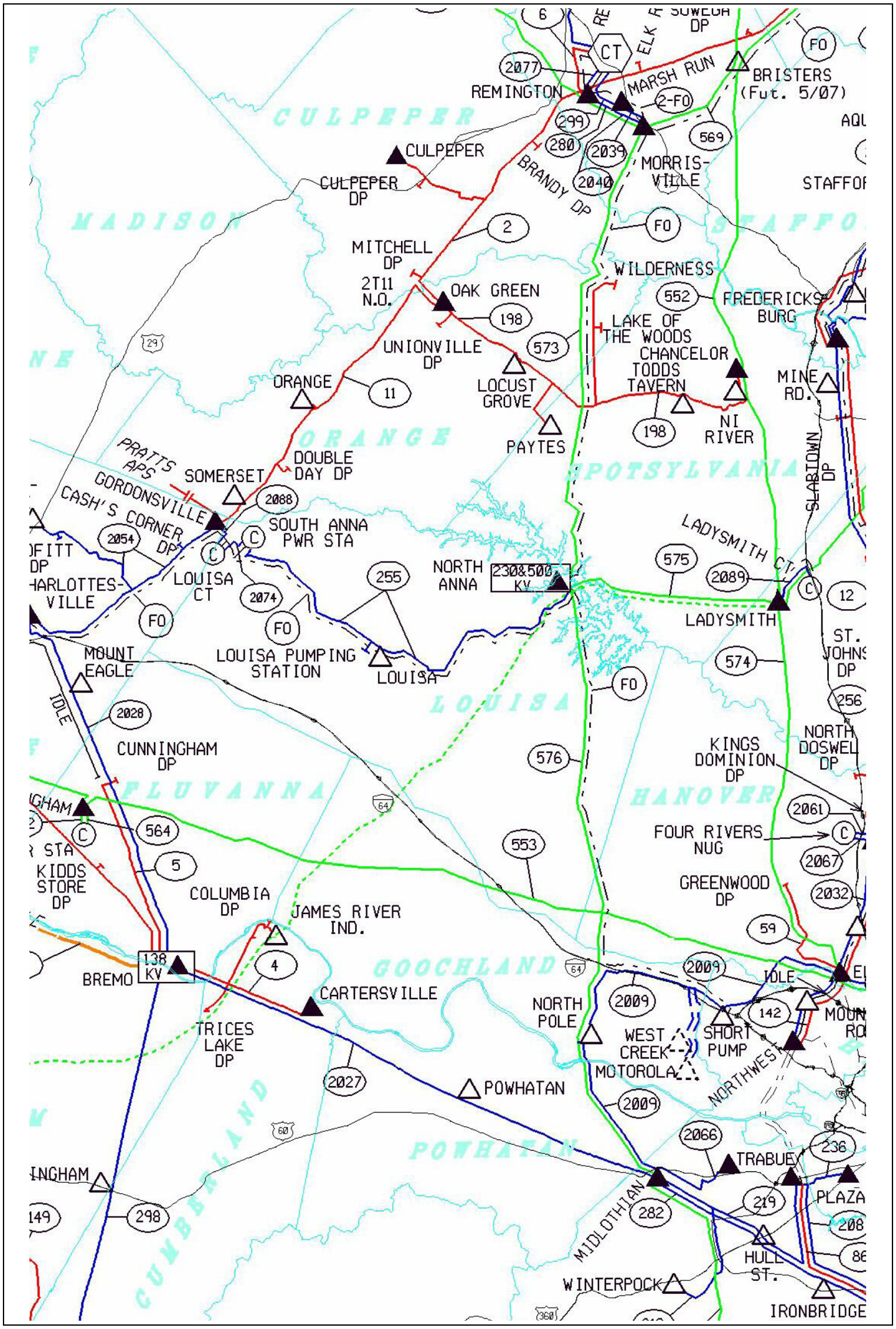
Figure 8.2-201 500/230 kV Switchyard Single Line Diagram

NAPS COL 8.2(3)

Figure 8.2-202 500/230 kV Switchyard Arrangement



NAPS COL 8.2(1) **Figure 8.2-203 Dominion Transmission Line Map**



8.3 Onsite Power Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.3.1.1 Description

NAPS COL 8.3(1)

Replace the first sentence of the second paragraph in DCD Subsection 8.3.1.1 with the following.

The onsite ac power system is supplied offsite power from the 500/230 kV switchyard by two independent connections.

Replace the seventh sentence of the second paragraph in DCD Subsection 8.3.1.1 with the following.

The rated voltage of the high-voltage winding of the RAT is 230 kV.

8.3.1.1.9 Design Criteria for Class 1E Equipment

STD COL 8.3(3)

Replace the last sentence of the ninth paragraph in DCD Subsection 8.3.1.1.9 with the following.

Short circuit analysis for ac power system is addressed in Subsection 8.3.1.3.2.

8.3.1.1.11 Grounding and Lightning Protection System

NAPS COL 8.3(2)

Add the following sentences after the last sentence of the second paragraph in DCD Subsection 8.3.1.1.11

The ground grid is designed in the shape of uniform square or rectangular meshes. The ground grid is shown in Figure 8.3.1-201.

Replace the last paragraph in DCD Subsection 8.3.1.1.11 with the following.

The lightning air terminals are designed to protect from direct lightning stroke to the buildings, electrical power equipment and instrumentation. The layout of the air terminals is shown in Figure 8.3.1-201.

8.3.1.3.2 Short Circuit Studies

STD COL 8.3(3)

Replace the last two sentences of the first paragraph in DCD Subsection 8.3.1.3.2 with the following.

As a result of the studies, maximum short circuit current has been confirmed to satisfy short circuit interrupt rating of circuit breakers indicated in Table 8.3.1-1R.

8.3.1.3.4 Equipment Protection and Coordination Studies

STD COL 8.3(10)

Replace the last sentence of the first paragraph in DCD Subsection 8.3.1.3.4 with the following.

Coordination of protective devices is confirmed as part of equipment procurement.

8.3.1.3.5 Insulation Coordination (Surge and Lighting Protection)

NAPS COL 8.3(11)

Replace the last sentence of the first paragraph in DCD Subsection 8.3.1.3.5 with the following.

Surge arresters are selected to be compatible with the lightning impulse insulation level of the 500 kV and 230 kV offsite power circuit so that the insulation of the onsite power system is protected from lightning surges.

8.3.2.1.1 Class 1E DC Power System

STD COL 8.3(8)

Replace the last sentence of the third paragraph in DCD Subsection 8.3.2.1.1 with the following.

Short circuit analysis for dc power system is addressed in Subsection 8.3.2.3.2.

8.3.2.1.2 Non-Class 1E DC Power System

STD COL 8.3(8)

Replace the last sentence of the fourth paragraph in DCD Subsection 8.3.2.1.2 with the following.

Short circuit analysis for dc power system is addressed in Subsection 8.3.2.3.2.

8.3.2.3.2 Short Circuit Studies

STD COL 8.3(8)

Replace the last two sentences of the first paragraph in DCD Subsection 8.3.2.3.2 with the following.

As a result of the studies, maximum short circuit current has been confirmed to satisfy short circuit interrupt rating of circuit breakers indicated in DCD Table 8.3.2-3.

8.3.3 Tests and Inspections

NAPS COL 8.3(12)

Replace the last sentence of the last paragraph of Subsection 8.3.3 with the following.

Cable monitoring for underground and inaccessible cables within the scope of the maintenance rule is described in Section 17.6.

8.3.4 Combined License Information

Replace the content of DCD Subsection 8.3.4 with the following.

NAPS COL 8.3(1)

8.3(1) ***Transmission voltages***

This COL Item is addressed in Subsection 8.3.1.1, in Table 8.3.1-1R and in Figure 8.3.1-1R.

NAPS COL 8.3(2)

8.3(2) ***Ground grid and lightning Protection***

This COL Item is addressed in Subsection 8.3.1.1.11 and in Figure 8.3.1-201.

NAPS COL 8.3(3)

8.3(3) ***This COL Item is addressed in Subsections 8.3.1.1.9 and 8.3.1.3.2.***

8.3(4) ***Deleted from the DCD.***

8.3(5) ***Deleted from the DCD.***

8.3(6) ***Deleted from the DCD.***

8.3(7) ***Deleted from the DCD.***

STD COL 8.3(8)

8.3(8) ***Short circuit analysis for dc power system***

This COL Item is addressed in Subsections 8.3.2.1.1, 8.3.2.1.2 and 8.3.2.3.2.

8.3(9) ***Deleted from the DCD.***

STD COL 8.3(10)

8.3(10) ***Equipment Protection and Coordination Studies***

This COL Item is addressed in Subsection 8.3.1.3.4.

NAPS COL 8.3(11)

8.3(11) ***Insulation Coordination (Surge and Lightning Protection)***

This COL Item is addressed in Subsection 8.3.1.3.5.

NAPS COL 8.3(12)

8.3(12) ***Cable Monitoring Program.***

This COL Item is addressed in Subsection 8.3.3.

Table 8.3.1-1R Electrical Equipment Ratings - Component (Sheet 1 of 3)

Main ac Power System (Nominal Values)

	1) Main Transformer (MT)			
	Quantity	Three single phase units (Besides one spare)		
	MVA rating	1 phase 610MVA (3 phase 1830MVA)		
	Low voltage winding	26kV		
NAPS COL 8.3(1)	High voltage winding	~~the high voltage rating is site-specific (COL Applicant to provide)~~ 500kV		
	2) Unit Auxiliary Transformers (UATs)	UAT1, 2	UAT3, 4	
	Quantity	Two 3 phase, 2 winding units	Two 3 phase, 2 winding units	
	MVA rating	72MVA	53MVA	
	Low voltage winding	13.8kV	6.9kV	
	High voltage winding	26kV	26kV	
	On-Load Tap Changer (OLTC)	Provided on high voltage side	Provided on high voltage side	
	3) Reserve Auxiliary Transformers (RATs)	RAT1, 2	RAT3, 4	
	Quantity	Two 3 phase, 3 winding units (including delta tertiary winding)	Two 3 phase, 3 winding units (including delta tertiary winding)	
	MVA rating	72MVA	53MVA	
	Low voltage winding	13.8kV	6.9kV	
NAPS COL 8.3(1)	High voltage winding	~~(by COL Applicant)~~ 230kV	~~(by COL Applicant)~~ 230kV	
	On-Load Tap Changer (OLTC)	Provided on high voltage side	Provided on high voltage side	
	4) Generator Load Break Switch (GLBS)			
	Rated Voltage	Over 28 kV		
	Rated Current	Over 44.4kA		
	Rated Frequency	60Hz		

Table 8.3.1-1R Electrical Equipment Ratings - Component (Sheet 1 of 3) *(continued)*

Main ac Power System (Nominal Values)

5) Isolated Phase Busduct (IPB) – Main Circuit	
Type	Forced air cooling (Cooling air is cooled by water)
Rated Voltage	Over 28kV
Rated current	Over 44.4kA
Rated frequency	60Hz

Table 8.3.1-4R Electrical Load Distribution - Class 1E GTG Loading (Sheet 1 of 4)

A Class 1E GTG

	Load	Quantity Installed	Rated Output (kW)	Load Input (kW)	Efficiency (%)	Power Factor (%)	Load Factor (%)	LOCA Concurrent with a LOOP				LOOP Hot Shutdown				LOOP Cold Shutdown			
								Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA
	A Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-
	A Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758
STD COL 9.2(6)	A Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808
	A Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497
	A Charging Pump	1	820	866	90	85	95	0	-	-	-	1	866	537	1019	1	866	537	1019
	A Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112
	A Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405
	A Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)
	A Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-
	A Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	A Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420
STD COL 9.2(20)	Motor Control Centers (A&A1)	2						2	320	199	377	2	270	168	318	2	270	168	318
	Total								3771	2441	4495		3777	2095	4402		3637	2358	4337

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R Electrical Load Distribution - Class 1E GTG Loading (Sheet 2 of 4)

B Class 1E GTG

	Load	Quantity Installed	Rated Output (kW)	Load Input (kW)	Efficiency (%)	Power Factor (%)	Load Factor (%)	LOCA Concurrent with a LOOP				LOOP							
												Hot Shutdown				Cold Shutdown			
								Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA
	B Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-
	B Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758
STD COL 9.2(6)	B Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808
	B Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497
	B Charging Pump	1	590	475	90	85	73	1	475	295	559	1	475	295	559	0	-	-	-
	B Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112
	B Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405
	B Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)
	B Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-
	B Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	B Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420
STD COL 9.2(20)	Motor Control Centers (B&A1)	2						2	320	199	377	2	270	168	318	2	270	168	318
	Total								4246	2736	5054		3386	1853	3942		2771	1821	3318

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R Electrical Load Distribution - Class 1E GTG Loading (Sheet 3 of 4)

C Class 1E GTG

	Load	Quantity Installed	Rated Output (kW)	Load Input (kW)	Efficiency (%)	Power Factor (%)	Load Factor (%)	LOCA Concurrent with a LOOP				LOOP: Hot Shutdown				LOOP: Cold Shutdown			
								Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA
	C Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-
	C Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758
STD COL 9.2(6)	C Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808
	C Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497
	C Charging Pump	1	590	475	90	85	73	1	475	295	559	1	475	295	559	0	-	-	-
	C Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112
	C Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405
	C Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)
	C Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-
	C Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	C Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420
STD COL 9.2(20)	Motor Control Centers (C&D1)	2						2	320	199	377	2	270	168	318	2	270	168	318
	Total								4246	2736	5054		3386	1853	3942		2771	1821	3318

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R Electrical Load Distribution - Class 1E GTG Loading (Sheet 4 of 4)

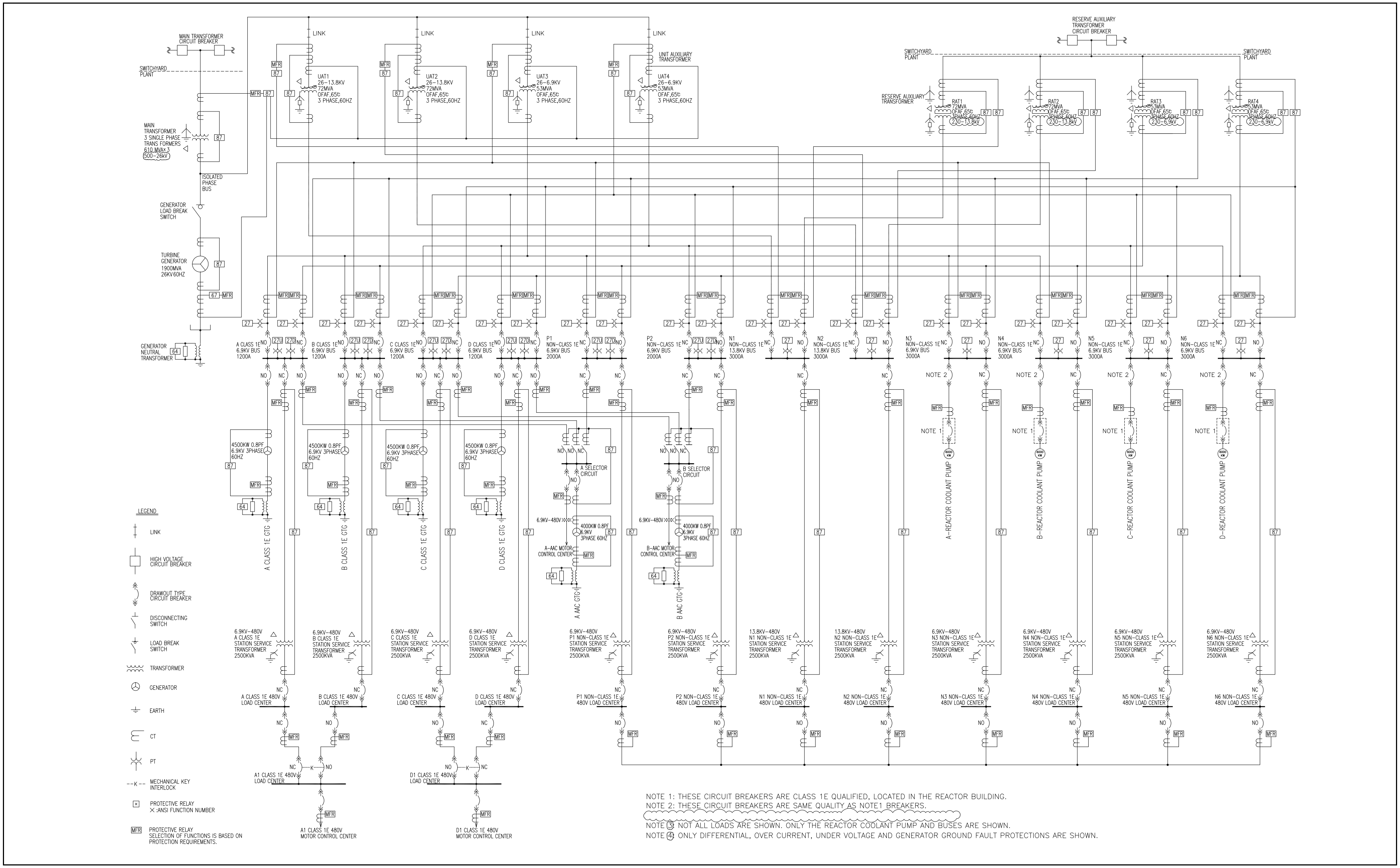
D Class 1E GTG

	Load	Quantity Installed	Rated Output (kW)	Load Input (kW)	Efficiency (%)	Power Factor (%)	Load Factor (%)	LOCA Concurrent with a LOOP				LOOP							
												Hot Shutdown				Cold Shutdown			
								Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA	Quantity	kW	kVAR	kVA
	D Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-
	D Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758
STD COL 9.1(6)	D Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808
	D Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497
	D Charging Pump	1	820	866	90	85	95	0	-	-	-	1	866	537	1019	1	866	537	1019
	D Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112
	D Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405
	D Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)
	D Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-
	D Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	D Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420
STD COL 9.2(20)	Motor Control Centers (D&D1)	2						2	320	199	377	2	270	168	318	2	270	168	318
	Total								3771	2441	4495		3777	2095	4402		3637	2358	4337

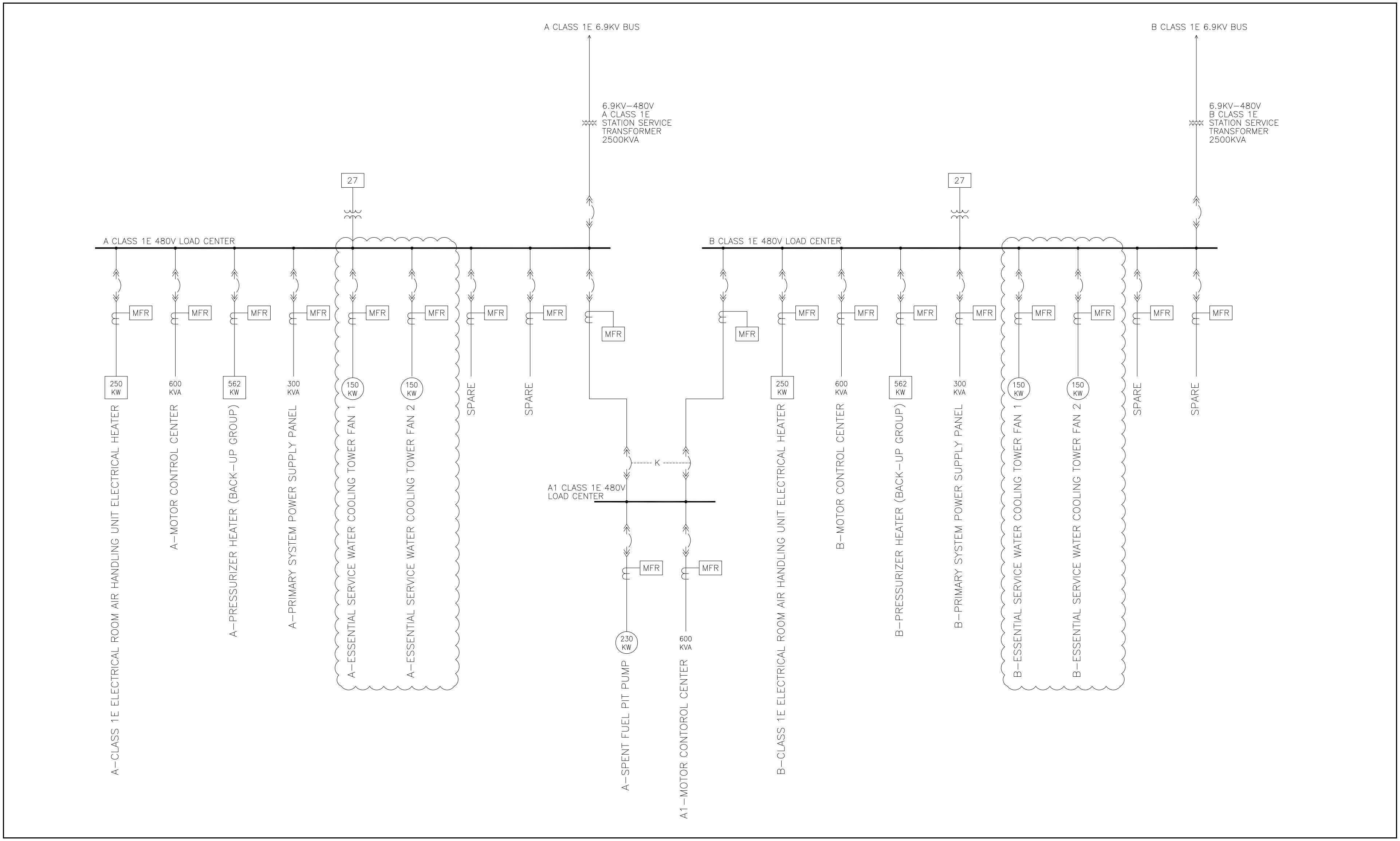
( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

NAPS COL 8.3(1)

Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 1 of 7) — Main One Line Diagram



STD COL 9.2(20) **Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 5 of 7) — Class 1E 480V Buses A and B One Line Diagram**



STD COL 9.2(20) **Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 6 of 7) — Class 1E 480V Buses C and D One Line Diagram**

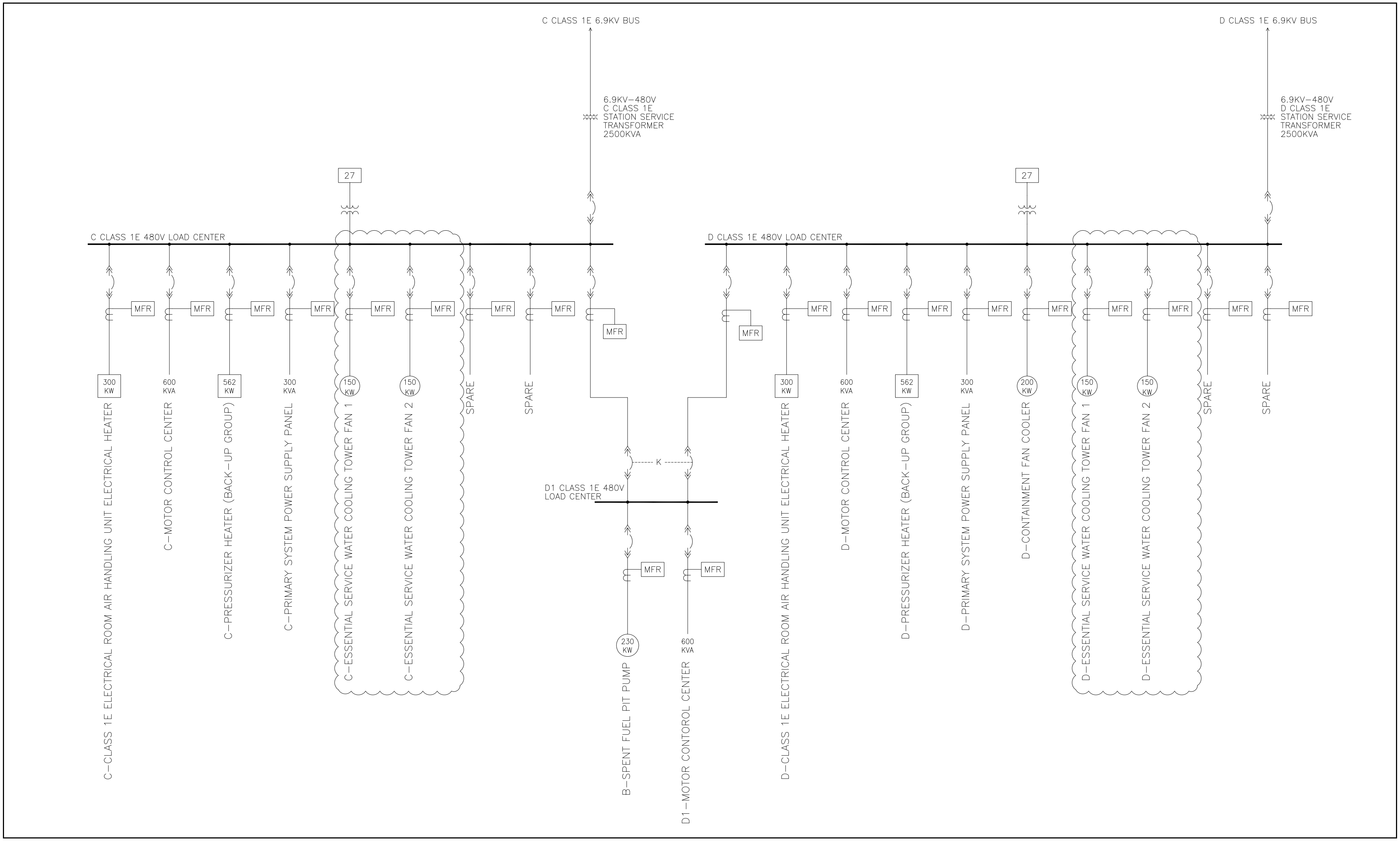
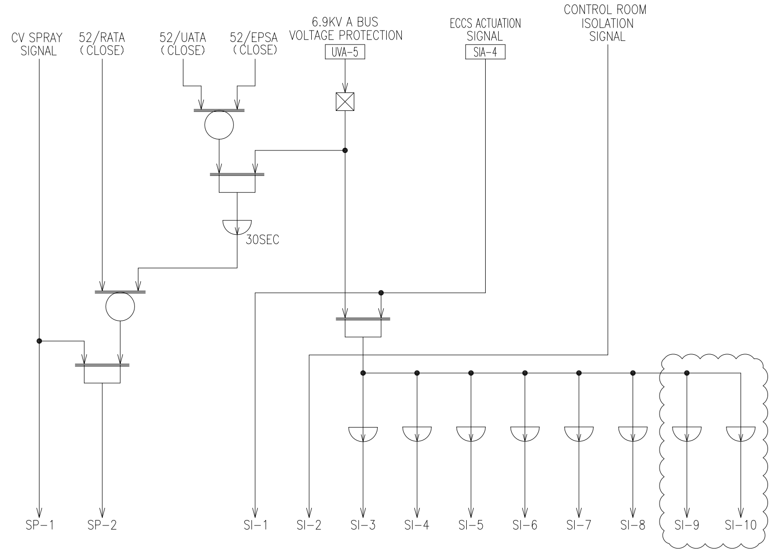
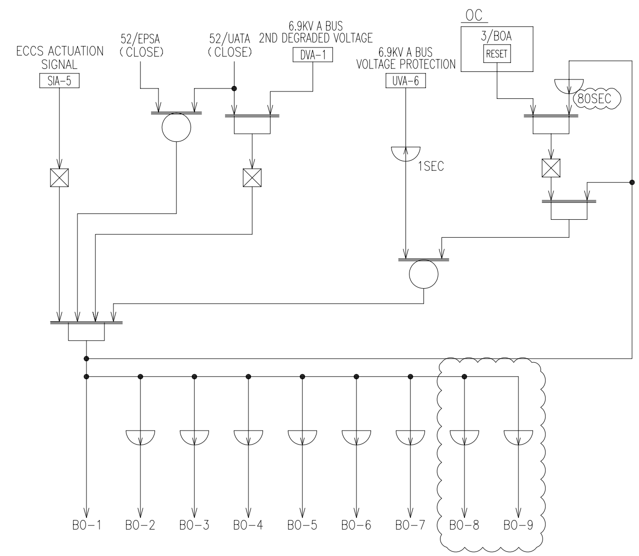


Figure 8.3.1-2R Logic Diagrams (Sheet 18 of 24) — Class 1E Train A LOOP and LOCA Load Sequencing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS	STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(A TRAIN)	—		SI-6	A-EMERGENCY FEED WATER PUMP	—	20SEC	
SP-2	A-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV A-BUS	30SEC		SI-7	A-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V A-BUS	40SEC	(NOTE2)
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(A TRAIN) MCC-A,A1	—	※1	SI-8	A-ESSENTIAL CHILLER UNIT	480V A-BUS	50SEC	
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-A,A1	—	※2	SI-9	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V A-BUS	60SEC	
SI-3	A-SAFETY INJECTION PUMP	6.9KV A-BUS	5SEC		SI-10	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V A-BUS	70SEC	
SI-4	A-COMPONENT COOLING WATER PUMP A-ESSENTIAL CHILLED WATER PUMP	6.9KV A-BUS MCC-A	10SEC						
SI-5	A-ESSENTIAL SERVICE WATER PUMP	6.9KV A-BUS	15SEC						

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-A	—	※3
BO-2	A-CHARGING PUMP	6.9KV A-BUS	5SEC	
BO-3	A-COMPONENT COOLING WATER PUMP	6.9KV A-BUS	10SEC	
BO-4	A-ESSENTIAL SERVICE WATER PUMP A-ESSENTIAL CHILLED WATER PUMP	6.9KV A-BUS MCC-A	15SEC	
BO-5	A-EMERGENCY FEED WATER PUMP	—	20SEC	
BO-6	A-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V A-BUS	30SEC	(NOTE2)
BO-7	A-ESSENTIAL CHILLER UNIT	480V A-BUS	40SEC	
BO-8	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V A-BUS	50SEC	
BO-9	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V A-BUS	60SEC	

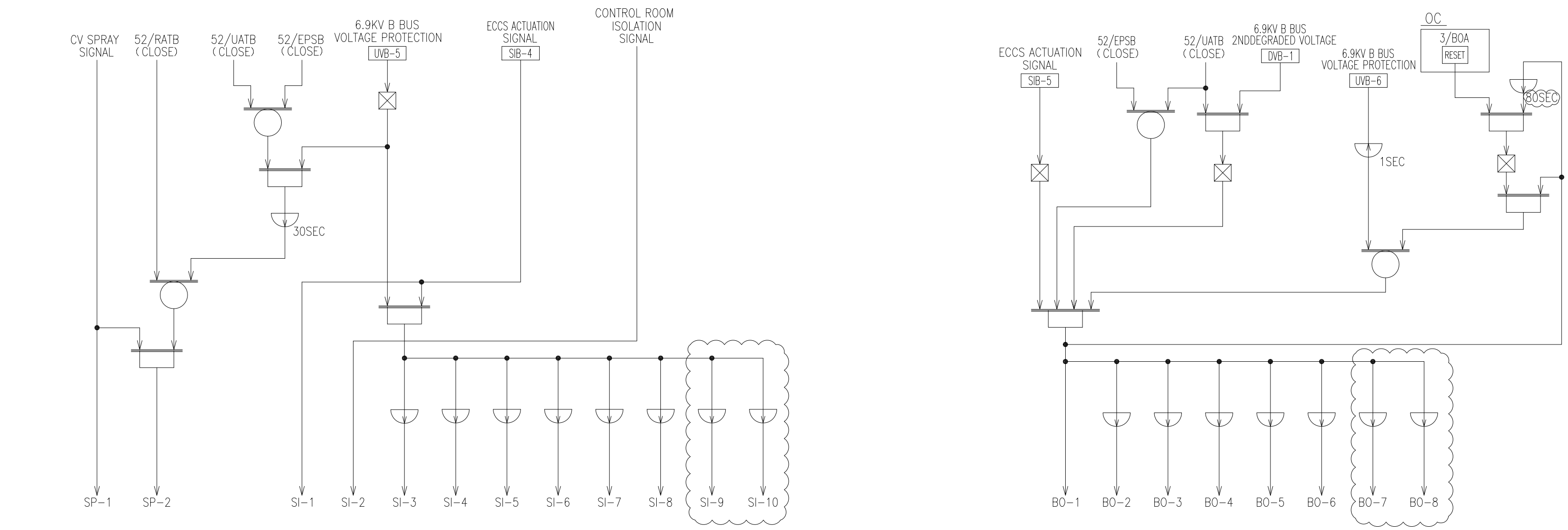
※ 1	REMARKS
A-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT FAN	
A-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT	
A-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
A-CLASS 1E BATTERY ROOM EXHAUST FAN	
A-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
A-MAIN CONTROL ROOM AIR HANDLING UNIT	
A-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT	
A-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT FAN	

※ 3	REMARKS
A-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
A-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
A-CLASS 1E BATTERY ROOM EXHAUST FAN	
A-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN A
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

Figure 8.3.1-2R Logic Diagrams (Sheet 19 of 24) — Class 1E Train B LOOP and LOCA Load Sequencing



STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS	STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(B TRAIN)	—		SI-6	B-EMERGENCY FEED WATER PUMP	6.9KV B-BUS	20SEC	
SP-2	B-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV B-BUS	30SEC		SI-7	B-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V B-BUS	40SEC	(NOTE2)
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(B TRAIN) MCC-B,A1	—	※1	SI-8	B-ESSENTIAL CHILLER UNIT	480V B-BUS	50SEC	
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-B,A1	—	※2	SI-9	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V B-BUS	60SEC	
SI-3	B-SAFETY INJECTION PUMP	6.9KV B-BUS	5SEC		SI-10	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V B-BUS	70SEC	
SI-4	B-COMPONENT COOLING WATER PUMP B-ESSENTIAL CHILLED WATER PUMP	6.9KV B-BUS MCC-B	10SEC						
SI-5	B-ESSENTIAL SERVICE WATER PUMP	6.9KV B-BUS	15SEC						

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-B	—	※3
BO-2	B-COMPONENT COOLING WATER PUMP	6.9KV B-BUS	10SEC	
BO-3	B-ESSENTIAL SERVICE WATER PUMP B-ESSENTIAL CHILLED WATER PUMP	6.9KV B-BUS MCC-B	15SEC	
BO-4	B-EMERGENCY FEED WATER PUMP	6.9KV B-BUS	20SEC	
BO-5	B-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V B-BUS	30SEC	(NOTE2)
BO-6	B-ESSENTIAL CHILLER UNIT	480V B-BUS	40SEC	
BO-7	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V B-BUS	50SEC	
BO-8	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V B-BUS	60SEC	

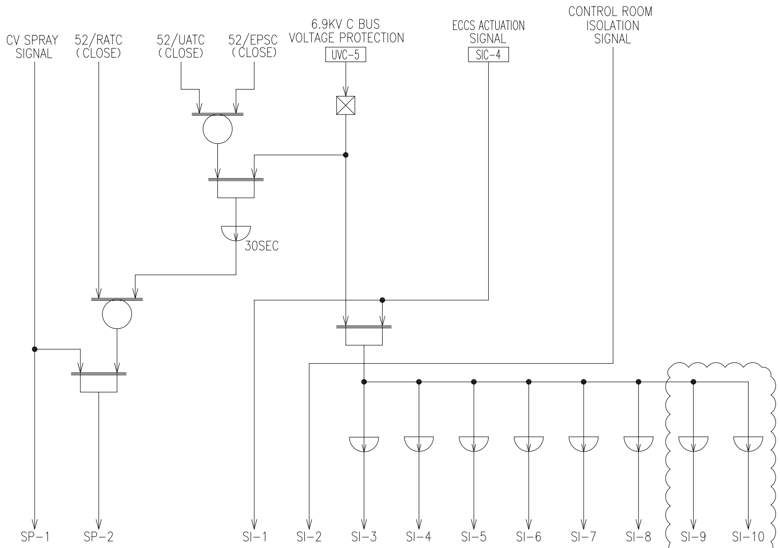
※ 1	REMARKS
B-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
B-CLASS 1E BATTERY ROOM EXHAUST FAN	
B-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

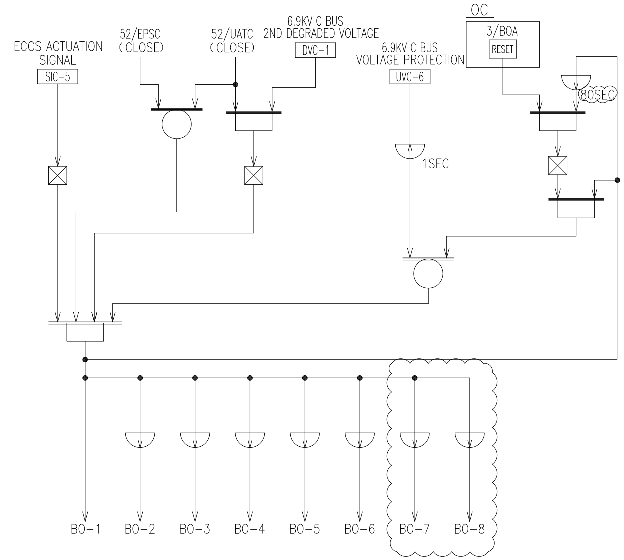
※ 2	REMARKS
B-MAIN CONTROL ROOM AIR HANDLING UNIT	

※ 3	REMARKS
B-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
B-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
B-CLASS 1E BATTERY ROOM EXHAUST FAN	
B-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN B
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

Figure 8.3.1-2R Logic Diagrams (Sheet 20 of 24) — Class 1E Train C LOOP and LOCA Load Sequencing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(C TRAIN)	—	
SP-2	C-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV C-BUS	30SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(C TRAIN) MCC-C,D1	—	※1
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-C,D1	—	※2
SI-3	C-SAFETY INJECTION PUMP	6.9KV C-BUS	5SEC	
SI-4	C-COMPONENT COOLING WATER PUMP C-ESSENTIAL CHILLED WATER PUMP	6.9KV C-BUS MCC-C	10SEC	
SI-5	C-ESSENTIAL SERVICE WATER PUMP	6.9KV C-BUS	15SEC	
SI-6	C-EMERGENCY FEED WATER PUMP	6.9KV C-BUS	20SEC	
SI-7	C-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V C-BUS	40SEC	(NOTE2)
SI-8	C-ESSENTIAL CHILLER UNIT	480V C-BUS	50SEC	
SI-9	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V C-BUS	60SEC	
SI-10	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V C-BUS	70SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-C	—	※3
BO-2	C-COMPONENT COOLING WATER PUMP	6.9KV C-BUS	10SEC	
BO-3	C-ESSENTIAL SERVICE WATER PUMP C-ESSENTIAL CHILLED WATER PUMP	6.9KV C-BUS MCC-C	15SEC	
BO-4	C-EMERGENCY FEED WATER PUMP	6.9KV C-BUS	20SEC	
BO-5	C-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V C-BUS	30SEC	(NOTE2)
BO-6	C-ESSENTIAL CHILLER UNIT	480V C-BUS	40SEC	
BO-8	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V C-BUS	50SEC	
BO-9	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V C-BUS	60SEC	

※ 1	REMARKS
C-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
C-CLASS 1E BATTERY ROOM EXHAUST FAN	
C-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

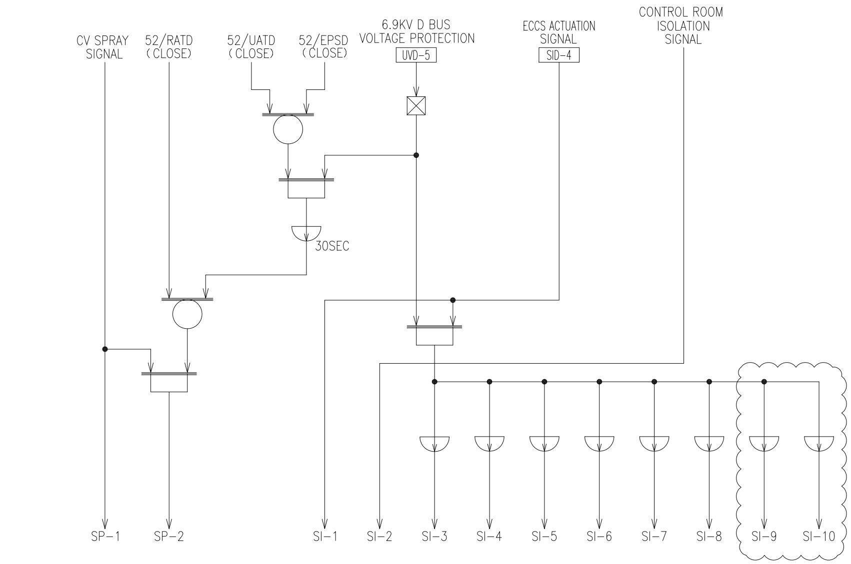
※ 2	REMARKS
C-MAIN CONTROL ROOM AIR HANDLING UNIT	

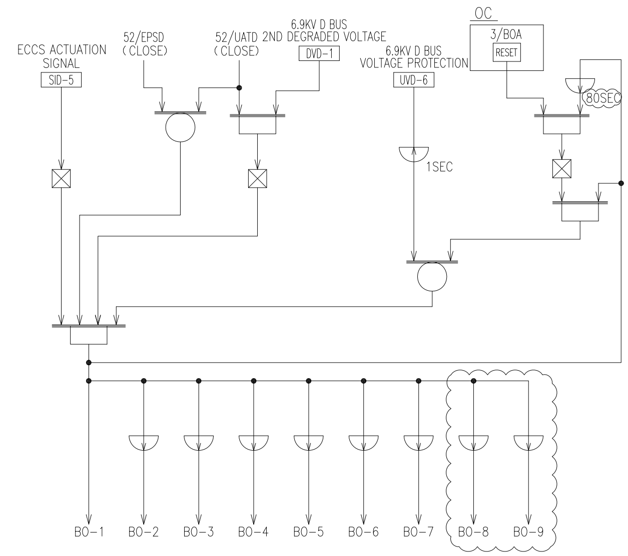
※ 3	REMARKS
C-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
C-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
C-CLASS 1E BATTERY ROOM EXHAUST FAN	
C-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN C
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

STD COL 9.2(20)

Figure 8.3.1-2R Logic Diagrams (Sheet 21 of 24) — Class 1E Train D LOOP and LOCA Load Sequencing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(D TRAIN)	—	
SP-2	D-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV D-BUS	30SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(D TRAIN) MCC-D,D1	—	※1
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-D,D1	—	※2
SI-3	D-SAFETY INJECTION PUMP	6.9KV D-BUS	5SEC	
SI-4	D-COMPONENT COOLING WATER PUMP D-ESSENTIAL CHILLED WATER PUMP	6.9KV D-BUS MCC-D	10SEC	
SI-5	D-ESSENTIAL SERVICE WATER PUMP	6.9KV D-BUS	15SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SI-6	D-EMERGENCY FEED WATER PUMP	—	20SEC	
SI-7	D-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V D-BUS	40SEC	(NOTE2)
SI-8	D-ESSENTIAL CHILLER UNIT	480V D-BUS	50SEC	
SI-9	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V D-BUS	60SEC	
SI-10	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V D-BUS	70SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-D	—	※3
BO-2	B-CHARGING PUMP	6.9KV D-BUS	5SEC	
BO-3	D-COMPONENT COOLING WATER PUMP	6.9KV D-BUS	10SEC	
BO-4	D-ESSENTIAL SERVICE WATER PUMP D-ESSENTIAL CHILLED WATER PUMP	6.9KV D-BUS MCC-D	15SEC	
BO-5	D-EMERGENCY FEED WATER PUMP	—	20SEC	
BO-6	D-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V D-BUS	30SEC	(NOTE2)
BO-7	D-ESSENTIAL CHILLER UNIT	480V D-BUS	40SEC	
BO-8	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V D-BUS	50SEC	
BO-9	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V D-BUS	60SEC	

※ 1	REMARKS
B-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT FAN	
B-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT	
D-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
D-CLASS 1E BATTERY ROOM EXHAUST FAN	
D-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
D-MAIN CONTROL ROOM AIR HANDLING UNIT	
D-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT	
D-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT FAN	

※ 3	REMARKS
D-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
D-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
D-CLASS 1E BATTERY ROOM EXHAUST FAN	
D-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN D
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

NAPS COL 8.3(2)

Figure 8.3.1-201 Ground Grid and Lightning Protection System

8.4 Station Blackout

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS SUP 8.4(1)

8.4.1.4 Recovery from SBO

Add the following information prior to the first paragraph.

Each of the 500 kV transmission lines and the 230 kV transmission line connected to the NAPS switchyard individually has sufficient capacity to supply the total required auxiliary loads for Unit 3 under any station condition. Circuit breaker closing coil power to each of the 500 kV circuit breakers is fed from one or the other of the two batteries in the 500 kV control house. Circuit breaker closing coil power for the 230 kV circuit breakers is fed from the battery in the 230 kV control house.

In order to restore power to Unit 3 following a SBO event it is necessary to restore at least one transmission circuit and the interconnections from the switchyard to the unit. Loss of a DC power system in conjunction with a SBO event will not prevent restoration of power as described in the following scenarios:

1. Loss of 500 kV Control House Battery 1

   Power is recovered by closing 500 kV breakers using control power from battery 2 to reenergize the switchyard from a 500 kV transmission line. The 230 kV switchyard is repowered from the 230 kV transmission line by closing breakers using control power from the 230 kV control house battery. Unit 3 power can then be restored by closing breakers associated with either the UAT feeder or the RAT feeder.

2. Loss of 500 kV Control House Battery 2

   Power is recovered by closing 230 kV breakers using control power from the 230 kV control house battery to reenergize the 230 kV switchyard from the 230 kV transmission line. Unit 3 power can then be restored by closing 230 kV breakers associated with the RAT feeder.

3. Loss of 230 kV Control House Battery

   Power is recovered by closing 500 kV breakers using control power from battery 1 or battery 2 to reenergize the switchyard from a 500 kV transmission line. Unit 3 power can then be restored by closing breakers associated with the UAT feeder.

8.4.2.2 Conformance with Regulatory Guidance

STD* SUP 8.4(1)

Add the following text after the ninth paragraph of DCD Subsection 8.4.2.2.

The procedures to cope with SBO are addressed in Section 13.5 and the training is addressed in Section 13.2. In particular, although not specifically referenced, SBO procedures are discussed in Section 13.5.2.1. This section addresses Operating and Emergency Operating Procedures as well as the Procedure Generation Package. The Station Blackout Response Guideline, the AC Power Restoration Guideline, and a Severe Weather Guideline are covered by the discussions in Section 13.5.2.1.

9 Auxiliary Systems

9.0 Auxiliary Systems

9.1 Fuel Storage and Handling

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

9.1.2.1 Design Bases

STD COL 9.1(9)

Replace the last sentence of the last paragraph in DCD Subsection 9.1.2.1 with the following.

A procedure that will instruct the operator to perform formal inspection of the integrity of the spent fuel racks will be established prior to first fuel load.

9.1.5.1 Design Bases

NAPS COL 9.1(6)

Replace the last sentence in the fifth paragraph of DCD Subsection 9.1.5.1 with the following.

Non-critical lifts are evaluated and documented in a manner similar to that described in the Heavy Load Handling Program for a critical heavy load lift.

9.1.5.3 Safety Evaluation

STD COL 9.1(6)

Replace the last paragraph in DCD Subsection 9.1.5.3 with the following.

To assure proper handling of heavy loads during the plant life, a Heavy Load Handling Program, including associated procedural and administrative controls, will be established prior to first fuel load. The program will satisfy commitments made in Subsection 9.1.5 of the DCD, and meet the guidance of ANSI/ASME B30.2, ANSI/ASME B30.9, ANSI N14.6, ASME NOG-1, CMMA Specification 70-2000, NUREG-0554, NUREG-0612, and NUREG-0800, Section 9.1.5. The Heavy Load Handling Program will include consideration of temporary cranes and hoists. The Heavy Load Handling Program will adopt a defense-in-depth strategy to enhance safety when handling heavy loads. For instance, the program will restrict lift heights to practical minimums and limit lifting activities as much as practical to plant modes in which

load drops have a small potential for adverse consequences, particularly when critical loads are being handled. Further, prior to the lifting of heavy loads after initial fuel loading, the program will institute additional reviews to assure that potential drops of these loads due to inadvertent operations or equipment malfunctions, separately or in combination, will not jeopardize safe shutdown functions, cause a significant release of radioactivity, a criticality accident, or inability to cool fuel within the reactor vessel or spent fuel pit.

9.1.6 Combined License Information

Replace the content of DCD Subsection 9.1.6 with the following.

9.1(1) ***Deleted from the DCD.***

9.1(2) ***Deleted from the DCD.***

9.1(3) ***Deleted from the DCD.***

9.1(4) ***Deleted from the DCD.***

9.1(5) ***Deleted from the DCD.***

STD COL 9.1(6)
NAPS COL 9.1(6)

9.1(6) ***The establishment of a Heavy Load Handling Program***

This COL item is addressed in Sections 9.1.5.1 and 9.1.5.3.

9.1(7) ***Deleted from the DCD.***

9.1(8) ***Deleted from the DCD.***

STD COL 9.1(9)

9.1(9) ***The establishment of an inspection procedure of spent fuel rack integrity***

This COL item is addressed in Section 9.1.2.1.

9.2 Water Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

9.2.1.2.1 General Description

STD COL 9.2(7)

Replace the first sentence of the first paragraph in DCD Subsection 9.2.1.2.1 with the following.

Figure 9.2.1-1R shows the piping and instrumentation diagrams (P&IDs) of the essential service water system (ESWS).

STD COL 9.2(31)
STD CDI

Replace the first and second sentences of the fifth paragraph in DCD Subsection 9.2.1.2.1 with the following.

The piping layout of the UHS maintains the ESWS/UHS system pressure downstream of the pump discharge check valve above their saturation pressure at 140°F design temperature by ensuring that no piping high points are above the cooling tower spray header.

NAPS COL 9.2(25)

Replace the seventh paragraph in DCD 9.2.1.2.1 with the following:

Filling, venting and operating procedures are developed and followed to minimize the occurrence of water hammer and mitigate its effects. These are included in the Operating and Maintenance Procedures described in Subsection 13.5.2.1.

The system is analyzed for water hammer impact and the system piping is designed to withstand the potential water hammer forces in accordance with NUREG-0927.

STD COL 9.2(6)
STD CDI

Replace the fifth to seventh sentences of the eighth paragraph in DCD Subsection 9.2.1.2.1 with the following.

The design of the UHS cooling tower to deliver the design water flow rate to the ESWS does not exceed the maximum design temperature of 95°F under all operating conditions to assure sufficient cooling capacity. Design of the basin provides adequate submergence of the pumps to assure the NPSH for the pumps. The ESWP is designed to operate with the lowest expected water level (after 30 days of accident mitigation). The basins have sufficient water inventory to assure adequate cooling

and NPSH for 30 days without makeup. This is discussed further in Subsection 9.2.5.2.

STD COL 9.2(8)
STD CDI

Replace the ninth and tenth paragraphs in DCD Subsection 9.2.1.2.1 with the following.

Chemicals are added to the basin to control corrosion, scaling, and biological growth. The water chemistry is managed through a Chemistry Control Program such as following a standard Langelier Saturation Index. The chemical injection system is described in Subsection 10.4.5.2.2.8.

Blowdown is used to maintain acceptable water chemistry composition. This is accomplished by tapping each essential service water pump (ESWP) discharge header. Additional description about blowdown is discussed in Subsection 9.2.5.2.

NAPS COL 9.2(31)

Replace the eleventh paragraph in DCD Subsection 9.2.1.2.1 with the following.

Layout of the ESWS and UHS piping and equipment, and system operating procedures, ensure that the water pressure remains above saturation conditions for all operating modes.

STD COL 9.2(26)

Replace the twelfth paragraph in DCD 9.2.1.2.1 with the following:

Maintenance and test procedures (see Operating and Maintenance Procedures in Subsection 13.5.2.1) are followed to monitor and flush debris accumulated in the system.

9.2.1.2.2 Component Description

STD COL 9.2(6)

Replace the sentence in DCD Subsection 9.2.1.2.2 with the following.

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

9.2.1.2.2.1 ESWPs

NAPS COL 9.2(6)

Replace the third and fourth sentences of the third paragraph in DCD Subsection 9.2.1.2.2.1 with the following.

Total dynamic head (TDH) of an ESWP is 220 feet. Total calculated system head losses including maximum expected static lift are approximately 182 feet. This provides approximately 38 feet margin. The static lift is based on the lowest expected water level in an ESW intake basin of approximately 12 feet. During plant operation and the initiation of the design basis accident, the water level will be at a minimum of approximately 42 feet above the ESW intake basin floor. This reduces the expected static lift by 30 feet, increasing the available margin.

Available NPSH with the lowest expected water level (after 30 days of accident mitigation) in the basin is approximately 40 feet. The minimum available NPSH is based on the lowest expected water level of approximately 12 feet, noted above and a maximum water temperature of 95°F. Available NPSH is approximately 70 feet based on a water level of approximately 42 feet, noted above, and a temperature of 93°F at the initiation of the accident.

STD* COL 9.2(6)

Replace the fifth sentence of the third paragraph in DCD Subsection 9.2.1.2.2.1 with the following.

The system pressure during shut-off head operation of the ESW pump including the static head of the system is below the ESWS design pressure of 150 psig.

NAPS COL 9.2(6)

Replace the eighth sentence of the third paragraph in DCD Subsection 9.2.1.2.2.1 with the following.

The lowest expected water level of approximately 12 feet in an ESW intake basin provides adequate submergence at the pump suction. Under these conditions, no other pump operates simultaneously with an ESWP in an ESW intake basin. This precludes vortex formation.

NAPS COL 9.2(6)

Replace the last paragraph in DCD Subsection 9.2.1.2.2.1 with the following.

The ESW pump motors are air-cooled. Each UHS ESW pump house ventilation system maintains the air temperature within the required range in an ESW pump room.

9.2.1.2.2.2 **Strainers**

NAPS COL 9.2(33)

Replace the second sentence of the third paragraph in DCD Subsection 9.2.1.2.2.2 with the following.

The strainer backwash line discharges to the UHS basin.

NAPS COL 9.2(33)

Replace the sixth paragraph in DCD Subsection 9.2.1.2.2.2 with the following.

The strainer backwash line discharges to the UHS basin to support the 30 day basin water inventory without makeup in the event of an accident.

9.2.1.2.2.5 **Piping**

NAPS COL 9.2(7)
NAPS CDI

Replace the fourth to seventh sentences of the first paragraph in DCD Subsection 9.2.1.2.2.5 with the following.

ESW piping from an ESW pump house enters the ESWPT. The ESW discharge piping exits the ESWPT and connects to UHS cooling tower piping. No ESW piping is buried underground. The ESWS piping will be carbon steel or internally lined carbon steel depending on ESWS water chemistry requirements.

9.2.1.2.3.1 **Normal Operation**

NAPS COL 9.2(32)

Replace the last sentence of the fifth paragraph in DCD Subsection 9.2.1.2.3.1 with the following.

The piping layout, vacuum breaker located between the pump discharge and the check valve, and the vents located at high points, minimize the potential for void formation in the ESW pump discharge piping such that a void detection system is not required.

STD COL 9.2(7)

Replace the fifth sentence of the sixth paragraph in DCD Subsection 9.2.1.2.3.1 with the following.

The IST program with detailed criteria, including valve leak rates committed in the implementation Milestones is identified in Table 13.4-201 of FSAR Section 13.4.

9.2.1.3 Safety Evaluation

NAPS COL 9.2(1)

Replace the eleventh paragraph in DCD Subsection 9.2.1.3 with the following.

Design of the basin provides adequate submergence of the pumps to assure the NPSH for the pumps. The basin is divided into two sections: the ESW intake basin and UHS basin. The bottom of the ESW basin is approximately 12 feet lower than the bottom of the UHS basin. The ESW pump house is located directly above the ESW basin. The ESWP is installed in the pump house. The ESWP is designed to operate with the lowest expected water level (after 30 days of accident mitigation). The basins have sufficient water inventory to assure adequate cooling and NPSH for 30 days without makeup. This is discussed further in Subsection 9.2.5.2.

Recovery procedures contained in the Operating and Maintenance Procedures (see Subsection 13.5.2.1) are implemented if the UHS approaches low water level.

NAPS COL 9.2(2)
NAPS CDI

Replace the twelfth paragraph in DCD Subsection 9.2.1.3 with the following.

Based on the lowest anticipated ambient temperature, the following operational and design features are provided to prevent freezing of the ESW in the basins or piping:

- The basins are located partially below grade and thus ground temperature helps to prevent the water from freezing.
- In the operating trains, water is continuously circulated which helps to prevent freezing. Ultimate heat sink (UHS) transfer pumps can be used to circulate water from the idle basins. Plant procedures are developed to operate the pumps in this mode based on the basin water and ambient air temperatures.

- UHS ESW pump house ventilation system maintains pre determined minimum temperature in the pump house areas. This is further described in Subsection 9.4.
- Any exposed essential piping that may be filled with water while the pump is not operating is heat traced. The heat tracing is activated when the thermostat senses a pre-set low ambient air temperature.

For the thermal overpressure protection of the component cooling water (CCW) heat exchanger ESW side, the valves located at the CCW heat exchanger ESW side inlet and outlet lines are administratively locked open valves. These locked open valves assure protection from the thermal overpressurization due to the erroneous valve operation coincident with the heat input from the CCW side to ESW side. During backflush operation of the heat exchanger, ESW flows from the discharge side of the heat exchanger and then exits from the inlet side to the discharge header. Cooling operation is continued and there is no overpressurization.

NAPS COL 9.2(7)
NAPS COL 9.2(29)
NAPS CDI

Replace the thirteenth paragraph in DCD Subsection 9.2.1.3 with the following.

The ESWS downstream of the CCW heat exchanger vent and drain valves is nonsafety-related. The positions of these valves are controlled by the Operating and Maintenance Procedures mentioned in Subsection 13.5.2.1 in order to maintain water-tight conditions and prevent inadvertent draining of the ESWS.

The ESWS serves as a backup source of water for the FSS in the R/B and in the ESWP house. This is in conformance with the requirement for an alternative fire protection water supply from a seismic category I water system in the event of a safe-shutdown earthquake, in accordance with RG 1.189. Two hose stations at approximately 150 gpm total take water from the ESWS for a maximum of two hours. Approximately 18,000 gallons is consumed by the FSS. This water volume has minimal impact on the UHS water inventory and does not jeopardize the 30 day capacity requirement. Administratively locked closed valves in each of the fire protection water supply taps assure that water inventory loss is controlled.

The ESW system is not required to supply water to the FSS during any other design basis event including LOCA. Specific design conditions such

as maximum operating water temperature and required UHS water volume are described in detail in Subsections 9.2.5.2.3 and 9.2.5.3.

The counter measures to prevent long-term corrosion and organic fouling per GL 89-13 are reflected in the system operating procedures in Subsection 13.5.2.1.

STD COL 9.2(26)

Replace the last paragraph in DCD Subsection 9.2.1.3 with the following.

The size of the strainer backwash line is considered to provide adequate velocity to preclude debris buildup without challenging the integrity of the lining. The hole diameter of the orifices installed in the backwash lines are also considered to have adequate diameter to preclude debris buildup. If necessary, the hole diameter should be sufficient; however, the differential pressure will be lower, so the number of orifices will be increased.

9.2.1.4 **Inspection and Testing Requirements**

STD* COL 9.2(30)

Replace the last paragraph in DCD Subsection 9.2.1.4 with the following.

Periodic inspection, monitoring, maintenance, performance and functional testing are performed according to the in-service inspection program and in-service testing program that are described in FSAR Section 13.4. Periodic inspections and testing of the CCW heat exchangers and essential chiller units, consistent with GL 89-13 and GL 89-13 supplement 1 are performed. The inspections and testing above are subject to programmatic requirements and procedural controls as described in FSAR Section 13.5.

The operating procedures to periodically alternate the operating trains for monitoring performance of all ESWS trains are included in the system operating procedures in FSAR Section 13.5.2.1.

9.2.2.1.2.1 **Normal Operation**

NAPS DEP 9.2(1)

Replace the third sentence in DCD Subsection 9.2.2.1.2.1 with the following.

Normal operating heat loads are the RCP, charging pump, letdown heat exchanger, instrument air system, spent fuel pool cooling heat exchanger, sample heat exchanger, seal water heat exchanger,

blowdown sample cooler, degasifier, waste gas compressor, and other smaller loads. Throttle valves are located throughout the system to maintain flow balance and adequate heat removal.

9.2.2.2.2 System Operations

STD COL 9.2(27)

Replace the last paragraph in DCD Subsection 9.2.2.2.2 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Section 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

9.2.4 Potable and Sanitary Water Systems

NAPS COL 9.2(9)
NAPS COL 9.2(11)
NAPS CDI

Replace the paragraph in DCD Subsection 9.2.4 with the following.

The objectives of the PSWS are to provide clean and potable water for domestic use and human consumption and to collect sanitary waste for treatment, dilution, and discharge during normal plant operation and shutdown periods. The system serves the following buildings:

- R/B
- Turbine Building
- Auxiliary Building
- Access Building
- Water Treatment Building
- Administration Building
- Maintenance Building
- Guard House
- Miscellaneous Office Space

9.2.4.1 Design Bases

NAPS COL 9.2(9)
NAPS COL 9.2(10)
NAPS COL 9.2(11)
NAPS CDI

Replace the first and second sentences in DCD Subsection 9.2.4.1 with the following.

Safety Design Basis

The PSWS does not perform any safety-related function. Therefore, the PSWS has no safety design basis.

NAPS COL 9.2(15)

Power Generation Design Basis

The PSWS is designed to provide potable water supplies and sewage collection and treatment necessary for normal plant operation and shutdown periods. The PSWS provides sufficient supply and is sized to accommodate potable water peak demand.

The potable water system supplies the quality of water required by the authorities having jurisdiction.

The sanitary drainage system is designed to produce a waste water effluent quality required by Federal, state, and local regulations and permits.

NAPS CDI

Replace the first, second and fourth bullets in DCD Subsection 9.2.4.1 with the following before the third bullet.

- The potable water system for Unit 3 is designed to receive water from on-site wells. The potable water system layout is designed with no interconnection and/or sharing between systems to prevent contamination due to potential radioactivity or due to backflow. This ensures that the water remains fit for human consumption and conforms to the requirements of GDC 60 (Reference 9.2.11-1).
- There is no chemical treatment required for the potable water system. The receipt of potable water from the wells conforms to the requirements of the Environmental Protection Agency “National Primary Drinking Water Standards,” 40 CFR 141 (Reference 9.2.11-4). All state and local environmental protection standards are applied and followed, as these may be more stringent than federal requirements.

Replace the seventh bullet in DCD Subsection 9.2.4.1 with the following.

- The sanitary drainage system is designed to accommodate up to 1720 people at the site during normal plant operation as well as during refueling outages.

NAPS COL 9.2(12)
NAPS COL 9.2(17)
NAPS CDI

Replace the eighth bullet in DCD Subsection 9.2.4.1 with the following.

- Sanitary waste generated by Unit 3 facilities will be directed to individual sump lift stations via underground sanitary sewer lines and then pumped to the Unit 3 sewage treatment plant. Each lift station will be equipped with duplex grinder pumps.

9.2.4.2.1 General Description

NAPS COL 9.2(9)
NAPS COL 9.2(10)
NAPS COL 9.2(11)
NAPS COL 9.2(12)
NAPS COL 9.2(14)
NAPS COL 9.2(15)
NAPS CDI

Replace the content of DCD Subsection 9.2.4.2.1 with the following.

Potable Water System

The potable water system for Unit 3 consists of ground wells at various locations on site. As shown on Figure 9.2.4-1R, Sheet 1 of 2, for each well house there is a pump, compressor, hydro-pneumatic tank, and interconnecting piping and valves. Combined potable water capacity of the hydro-pneumatic tanks is sufficient to handle peak anticipated demand. Potable water from hydro-pneumatic tanks flows to a common potable water header for supply to Unit 3 facilities. The Unit 3 potable water system underground header is connected to the Units 1 and 2 domestic water header via a normally-closed isolation valve. This cross-tie connection is provided for operational flexibility and ease of system maintenance. In addition to non-radiological areas, potable water is provided to areas where inadvertent backflow into the system could result in radiological contamination of the potable water. For those potable water system branches with outlets in areas where the potential for radiological contamination exists, backflow prevention is provided through the installation of backflow preventers.

NAPS COL 9.2(17)
NAPS CDI

Sanitary Drainage System

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

The sanitary waste generated by Unit 3 is collected by a network of sumps and is pumped to the Unit 3 STP. The Unit 3 STP consists of two packaged units, each rated for a normal capacity of 94,500 liters per day (25,000 gallons per day). The two packaged units in parallel can treat 189,000 liters per day (50,000 gallons per day) of sanitary sewage.

During normal plant operation, only one of the packaged units is required, and during outages, both packaged units can be operated to serve additional demand. The effluent is discharged to the cooling tower blow down sump and subsequently drained to the WHTF.

Analysis of routine STP sludge tank grab samples will detect events that might contaminate the STP downstream of the sludge tank. This provides the action required by Inspection and Enforcement Bulletin No. 80-10. The quality of effluent meets, at a minimum, the standards established by Federal, state, and local regulations and permits. Sewage sludge is transferred to a truck for off-site disposal. A simplified diagram of the sanitary drainage system is shown in Figure 9.2.4-1R (Sheet 2 of 2). Major component data for the PSWS are provided in Table 9.2.4-1R.

9.2.4.2.2.1 Potable Water Storage Tank

STD COL 9.2(9)
STD COL 9.2(15)
STD CDI

Replace the content of DCD Subsection 9.2.4.2.2.1 with the following.

Not applicable.

9.2.4.2.2.2 Potable Water Pumps

STD COL 9.2(9)
STD COL 9.2(15)
STD CDI

Replace the content of DCD Subsection 9.2.4.2.2.2 with the following.

Not applicable.

9.2.4.2.2.3 Jockey Pump

STD COL 9.2(9)
STD COL 9.2(15)
STD CDI

Replace the content of DCD Subsection 9.2.4.2.2.3 with the following.

Not applicable.

9.2.4.2.2.4 Hot Water Heaters

NAPS COL 9.2(9)
NAPS COL 9.2(15)
NAPS CDI

Replace the second sentence of DCD Subsection 9.2.4.2.2.4 with the following.

Water from the hydro-pneumatic tanks is supplied to the hot water heater, which is then routed to the shower and toilet areas and to other plumbing fixtures and equipment requiring domestic hot water service.

NAPS COL 9.2(9)
NAPS COL 9.2(15)

9.2.4.2.2.6 **Hydro-Pneumatic Tanks**

The potable water system includes hydro-pneumatic tanks to store potable water.

9.2.4.2.2.7 **Potable Water Well Submersible Pumps**

The potable water system includes submersible pumps to provide potable water from the wells to the hydro-pneumatic tanks.

9.2.4.2.2.8 **Compressors**

The potable water system includes compressors to provide compressed air to the hydro-pneumatic tanks.

9.2.4.2.3 System Operation

NAPS COL 9.2(11)
NAPS COL 9.2(17)
NAPS CDI

Replace the first, second and third paragraphs in DCD Subsection 9.2.4.2.3 with the following.

Potable water from the wells is supplied directly to end users onsite. Water pressure is controlled by the hydro-pneumatic tank and instrumentation to regulate the flow of potable water based on demand.

Replace the content of the fifth paragraph in DCD Subsection 9.2.4.2.3 with the following.

No interconnections exist between the potable water system and any system using water for purposes other than domestic water service, including any potentially radioactive system.

Add the following text at the end of DCD Subsection 9.2.4.2.3.

The sanitary wastewater generated by Unit 3 is drained to a network of sumps equipped with grinder pumps. The treated effluent meets the permitted discharge limit requirements and is discharged to the blowdown sump. The sludge is trucked off-site.

9.2.4.3 Safety Evaluation

NAPS SUP 9.2(1)

Add the following at the end of this subsection.

Potable Water System

The potable water system has no safety-related function and is not connected to any safety-related system or component. Failure of the

system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant. The potable water system does not handle radioactive fluids. It is neither connected to, nor does it interface with any system that may contain radioactive fluids.

Sanitary Drainage System

The sanitary drainage system has no safety-related function and is not connected to any safety-related system or component. Failure of the system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant.

The sanitary drainage system is not designed to handle radioactive fluids. It is neither connected to, nor does it interface with, any system that may contain radioactive fluids. As a precautionary measure, the STP sludge tank is grab sampled on a batch basis for potential radiological contamination. In the event radioactivity is detected above predetermined limits, controls are in place to initiate treatment and prevent unmonitored, uncontrolled radioactive releases to the environment.

9.2.4.4 Inspection and Testing Requirements

NAPS COL 9.2(11)
NAPS CDI

Replace the content of DCD Subsection 9.2.4.4 with the following.

The potable water system and the sanitary drainage system are proven functional by their use during normal plant operation.

9.2.4.5 Instrumentation Requirements

NAPS COL 9.2(11)
NAPS CDI

Replace the content of DCD Subsection 9.2.4.5 with the following.

The PSWS is furnished with instrumentation that permits local and/or remote monitoring, and local control of each of the processes. This instrumentation includes meters, switches, indicators, pressure gauges, flow switches, transmitters, controllers, and valves as required for service, operation, and protection of plant personnel and equipment.

9.2.5.1 Design Bases

STD COL 9.2(18)

Replace the second sentence of the first paragraph in DCD Subsection 9.2.5.1 with the following.

The UHS is designed to meet the interface requirements applicable to the UHS design established in DCD Subsection 9.2.5.1 based on site-specific characteristics as discussed in Subsections 9.2.5.1, 9.2.5.2, and 9.2.5.3.

NAPS COL 9.2(18)

Replace the first three sentences of the fifth bullet of the seventh paragraph in DCD Subsection 9.2.5.1 with the following.

- The UHS is designed in accordance with RG 1.27 with inventory sufficient to provide cooling for at least 30 days following an accident, with no makeup water. The performance of the UHS is based upon meteorological parameters identified in SSAR Section 2.3.1.3.8.

9.2.5.2 System Description

NAPS COL 9.2(3)
NAPS COL 9.2(4)
NAPS COL 9.2(5)
NAPS COL 9.2(18)
NAPS COL 9.2(19)
NAPS COL 9.2(20)
NAPS COL 9.2(21)
NAPS CDI

Replace the last seven paragraphs in DCD Subsection 9.2.5.2 with the following.

Mechanical draft cooling towers with basins, based on site conditions and meteorological data, are used for Unit 3.

The UHS receives its electrical power from the safety buses so that the safety-related functions are maintained during LOOP. The UHS receives its standby electrical power from the onsite emergency power supplies during a LOOP.

A detailed description of the UHS is provided in Subsection 9.2.5.2.1, Figure 9.2.5-1R, and Table 9.2.5-3R.

The source of makeup water to the UHS inventory and blowdown discharge location are discussed below.

The source of cooling water and location of the UHS are described in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW intake structure are described in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW discharge structure are described in Subsections 9.2.5.2.1 and 9.2.5.2.2.

9.2.5.2.1 General Description

NAPS COL 9.2(3)
NAPS COL 9.2(4)
NAPS COL 9.2(5)
NAPS COL 9.2(18)
NAPS COL 9.2(19)
NAPS COL 9.2(20)
NAPS COL 9.2(21)
NAPS CDI

Replace the content of DCD Subsection 9.2.5.2.1 with the following.

The UHS consists of four 50 percent capacity mechanical draft cooling towers, one for each ESWS train, and four 33 1/3 percent capacity basins to satisfy the thirty day cooling water supply criteria of RG 1.27.

Each cooling tower consists of two cells with fans and motors, drift eliminators, film fills, risers, and water distribution system all enclosed and supported by a seismic category I reinforced concrete structure. Each basin includes an ESWP intake structure that contains one 50 percent capacity ESWP and one 100 percent capacity UHS transfer pump, and associated piping and components. Tornado missile protection for the cooling tower components, ESWPs and piping is provided by the UHSRS safety-related seismic category I structures and UHSRS pipe chase as discussed in Subsection 3.8.4. The UHS structural design, including pertinent dimensions, is also discussed in Subsection 3.8.4.

Each cooling tower consists of two cells, each with a motor-driven (M/D) fan driven with a right-angle gear reducer. The fan motors are powered from the Class 1E normal ac power system. On LOOP, the motors are automatically powered from their respective division emergency power source, i.e., the Class 1E GTGs.

The cooling towers are designed for the following conditions: water flow of 12,000 gpm, hot (inlet) water temperature of 128°F, cold (outlet) water temperature of 95°F, ambient wet bulb temperature of 78.3°F, and DBA design heat load of 196 million Btu/hr.

As noted in DCD Subsection 5.4.7.1, “Design Bases,” and DCD Subsection 5.4.7.3, “Performance Evaluation,” with ESW water temperature of 95°F, the RHRS is capable of reducing the reactor coolant temperature from 350°F to 200°F within 36 hours after shutdown. As the Technical Specifications surveillance requires that the UHS basin water temperature be 93°F or less, the evaluation provided in DCD Section 5.4.7 is bounding.

Inside dimensions of each basin are approximately 123 feet x 123 feet and 34 feet deep at normal water level. The cooling towers utilize the basins for structural foundation.

The ESW intake basin located underneath the ESW pump house occupies the southwest corner of the UHS basin. The ESW intake basin is 12 feet deeper than the UHS basin (elevation 270 ft NAVD88). Water volume occupying this 12 feet depth in the ESW intake basin is not included in the UHS basin inventory. This is to assure adequate NPSH to the ESW pump. The UHS basin floor elevation (282 ft NAVD88) is the reference point for measuring the basin water level.

The UHS operates in conjunction with the ESWS. The ESWS is described in Subsection 9.2.1. P&IDs of the UHS are provided in Figure 9.2.5-1R. The UHS design and process parameters are provided in Table 9.2.5-3R. The normal makeup water to the UHS inventory is from Lake Anna via the cooling tower makeup water and blowdown system described in Subsection 10.4.5.2.1. A CV with instrumentation located in each makeup line maintains basin water level during normal operation. The blowdown water is discharged to the WHTF via the cooling tower makeup water and blowdown system.

The mechanical draft cooling towers are the UHS. Hence, no discharge structure is necessary.

9.2.5.2.2 System Operation

NAPS COL 9.2(3)
NAPS COL 9.2(4)
NAPS COL 9.2(5)
NAPS COL 9.2(18)
NAPS COL 9.2(19)
NAPS COL 9.2(20)
NAPS COL 9.2(21)
NAPS COL 9.2(28)
NAPS COL 9.2(31)
NAPS CDI

Replace the content of DCD Subsection 9.2.5.2.2 with the following.

The ESWPs take suction from the basins as described in Subsection 9.2.1.2.1. The water flows through the CCW heat exchangers and essential chiller units and then is cooled by the cooling tower before being returned to the basins.

Heat rejection to the environment is effected by direct contact with a cooling tower forced airflow, which provides evaporative cooling of a ESW return flow. During normal operation, evaporation, drift and blowdown losses are replaced with the makeup from Lake Anna. Water level controllers provided in each basin automatically open and close the makeup CVs. Low and high water level annunciation in the MCR indicates a malfunction of the makeup CV or the blowdown CV .

The maintained water level in each UHS basin assures adequate NPSH for the ESWP under all operating modes, including LOCA and LOOP, with one train out of service for maintenance, when the source of makeup water is assumed lost for a period of thirty days after the accident. During such conditions, the combined inventory of three basins provides a

thirty-day cooling water supply assuming the worst combination of meteorological conditions and accident heat loads.

The ESWS together with the UHS is designed, arranged and operated to minimize the effects of water hammer forces.

The system layout assures water pressure remains above saturation conditions throughout the system. The ESW discharge pipe from the pump house passes to the pipe tunnel located at an elevation below grade. The ESWS flows to the CCW heat exchanger and the essential chiller unit located at an elevation below grade in the R/B. The discharge pipe is connected to the cooling tower riser and spray nozzles located above grade. The ESW pump is designed to provide positive pressure at the spray nozzle headers. This together with the high point vents minimize system drain down in the idle trains or upon LOOP and subsequent pump trip.

The following features preclude or minimize water hammer forces:

- On LOOP, the discharge motor-operated valve (MOV) of the operating train is closed. This, together with the discharge check valve, prevents draindown to the basin.
- The ESW pump start logic interlocks the discharge MOV operation with the pump operation. The re-start of the tripped pump or start of the stand-by pump, opens the discharge valve slowly after a pre-determined time delay, sweeping out voids from the discharge piping and cooling tower riser and distribution piping.
- The system valve lineup and periodic IST of the idle trains, including testing of the high point vents, help minimize potential voids and water hammer forces.

Four 100% capacity UHS transfer pumps, one located in each UHS ESW pump house, are provided to transfer cooling water from a non-operating UHS basin to the operating UHS basins when required during accident conditions.

All transfer pumps discharge into common headers which in turn discharge to individual UHS basins. All discharge piping is located in missile protected and tornado protected areas. The common discharge headers and other UHS system piping are designed to seismic Category I requirements. The piping is located in seismic Category I structures. There is no non-seismic piping in the vicinity of this header, and there are no seismically induced failures. Pipes are protected from

tornado missiles. The UHS transfer pump(s) operate during accident conditions, during IST in accordance with plant Technical Specifications, during maintenance, and for brief periods during cold weather conditions for recirculation. As the header is normally not in service, deterioration due to flow-accelerated corrosion is insignificant. Transfer of water inventory is required assuming one train/basin of ESW/UHS is out of service (e.g., for maintenance), and a second train is lost due to a single failure. When a transfer pump is in operation, fluid velocity in the header is approximately 5.1 ft/sec. Operating conditions are approximately 20 psig and 95°F. Therefore, header failures are not considered credible.

The UHS transfer pump is designed to supply 800 gpm flow at a total dynamic head (TDH) of 45 feet. Transfer pump capacity is more than adequate to replenish the maximum water inventory losses from two operating ESWS trains. Minimum available NPSH is approximately 40 feet. This is based on the lowest expected water level of approximately 12 feet in the UHS ESW intake basin and 95°F water temperature. Transfer pump location and submergence level precludes vortex formation. In addition, the transfer pump and the ESW pump from the same basin do not operate simultaneously.

The UHS transfer pump and the ESWP located in each basin are powered by different Class 1E buses, e.g., for basin A, the ESWP is powered from bus A, and the UHS transfer pump is powered from bus C or D, depending on manual breaker alignment. The power operated valve at each transfer pump discharge and instrumentation associated with each individual transfer pump are powered from the same buses as the transfer pump. The power operated valves at the transfer lines discharging into the UHS basins are powered from different buses than the transfer pumps in their respective basins.

The cooling tower fans are automatically activated by the ECCS actuation signal, the LOOP sequence actuation signal, or the remote manual actuation signal in case of automatic actuation failure.

The ECCS actuation signal ensures continuous cooling to the reactor during accidents to allow the reactor to be brought to safe shutdown conditions. The LOOP sequence actuation signal automatically starts the Class 1E GTGs to resume power to the active components in each UHS train during LOOP events.

The basins are concrete seismic category I structures and are located partially below grade. The design conditions are discussed in Section 3.8. This partially underground design in addition to the structural integrity of the basin wall provide assurance that a complete failure of the basin resulting in a loss of water inventory will be highly improbable.

Operation details of the ESWS, including chemical treatment, pump NPSH, and freeze protection operation, are provided in Subsection 9.2.

A portion of the basin water is discharged through blowdown via ESWS when makeup water is available. The blowdown rate is determined using a conductivity cell located at ESW pump discharge and is based on the total dissolved solids in the water and the makeup water source. During design-basis accident (DBA) conditions or loss of makeup water, the Class 1E DC powered UHS basin blowdown CVs are interlocked to close on a low UHS basin water level, LOOP signal or ECCS actuation signal to maintain the UHS basin inventory required for cooling the unit for a minimum of 30 days without makeup water. The blowdown valves are also interlocked to close when the ESW pump is stopped to preclude system inventory drain down, which could result in water hammer at pump restart. Table 9.2.5-4R shows the redundancy for the above functions.

9.2.5.2.3 System Performance

NAPS COL 9.2(3)
NAPS COL 9.2(4)
NAPS COL 9.2(5)
NAPS COL 9.2(18)
NAPS COL 9.2(19)
NAPS COL 9.2(20)
NAPS COL 9.2(21)
NAPS COL 9.2(28)
NAPS COL 9.2(31)
NAPS CDI

Replace the content of DCD Subsection 9.2.5.2.3 with the following.

DCD Table 9.2.5-1 lists the UHS peak heat loads during accident conditions (i.e., LOCA) with two trains in operation and four trains in operation. DCD Table 9.2.5-2 provides the heat loads for LOCA and safe shutdown conditions with loss of off-site power for two-train and four-train operations of the ESWS. The heat load per train with two-train operation is higher than the heat load per train with four-train operation. UHS design requires water inventory (capacity) of three basins for accident mitigation. Operation of two UHS trains requires larger water volume per (operating) basin than the operation of four trains. Therefore, the UHS (basin) is sized assuming two-train operation of the ESWS, which bounds four-train operation of the ESWS.

The UHS is designed with sufficient inventory to provide cooling for at least 30 days following an accident with no makeup water. The UHS must be capable of dissipating the design bases heat loads under the worst

environmental conditions that minimize heat dissipation without exceeding the maximum ESW supply temperature of 95°F.

Meteorological parameters for the UHS design are identified in SSAR Section 2.3.1.3.8. Based on this, the worst 30 days daily average wet bulb temperature is 76.3°F. The cooling towers are designed for a 30 day daily average wet bulb temperature of 78.3°F (includes 2°F recirculation penalty).

The UHS is analyzed using the heat loads provided in DCD Table 9.2.5-2 for LOCA and safe shutdown conditions with LOOP and a maximum ESW supply temperature of 95°F. Per Subsection 9.2.1.2.2, each ESWP is designed to provide 13,000 gpm flow. Since cooling water flow is inversely proportional to the cooling tower temperature range, for conservatism, a lower ESW flow of 12,000 gpm to each cooling tower is used in the analysis.

The required total water usage (due to cooling tower drift and evaporation) over the postulated 30 day period is determined as follows:

Total Evaporation (E) and Drift (D) rates were calculated using the ESW flow rate (GPM) of 12,000 gpm times the temperature rise (CR) and a conservative cooling tower factor of 0.0009, E (total)
= GPM × CR × 0.0009.

a. The cooling tower factor of 0.0009 is considered conservative since it is based on standard cooling tower evaporation factor of 0.0008, and typical cooling tower drift rate of 0.0002 This is expressed as

   Total Evaporation (E) = GPM × CR × 0.0008 + GPM × 0.0002

b. The ESW temperature rise (CR) was based on heat rate equation of H as

   Heat Rate (H) = m × specific heat × CR,

   where, m = mass flow rate

c. Accumulative evaporation (gallons/cooling tower) is calculated by multiplying the evaporation rate (gpm) and its corresponding time interval.

d. The total water loss due to evaporation and drift for the 30-day period is calculated and is defined as the plant unit minimum required water capacity for the basin design in accordance with RG 1.27.

Based on the above analyses, the governing case for the maximum required 30-day cooling water capacity is two-train operation during safe shutdown with LOOP condition, with a total required cooling water of approximately 8.40 million gallons. For the cooling tower design heat load the governing case is the safe shutdown conditions with LOOP for two-train operation, with a heat load of 196 million Btu/hr.

9.2.5.3 Safety Evaluation

NAPS COL 9.2(22) Replace the content of DCD Subsection 9.2.5.3 with the following.

The results of the UHS capability and safety evaluation are discussed in detail in Subsection 9.2.5.2.3 and in this Subsection. The UHS is capable of rejecting the heat under limiting conditions as discussed in Subsection 9.2.5.2.3.

The UHS is arranged to support separation of the four divisions of ESWS.

System functional capability is maintained assuming one division is unavailable due to on-line maintenance during a design basis accident with a single active failure, with or without a LOOP.

The FMEA for the UHS is included in Table 9.2.5-4R and demonstrates that the UHS satisfies the single failure criteria.

The safety-related SSCs of the UHS and the ESWS are classified as seismic Category I. The site-specific safety-related components are identified in Table 3.2-201. The non-seismic SSCs are physically separated from the seismic Category I SSCs. Structural failure of the UHS non-safety related SSCs will not adversely impact the seismic category I SSCs. These non-safety SSCs are classified as non-seismic.

The basins are designed to withstand the effect of natural phenomena, such as earthquakes, tornadoes, hurricanes, and floods taken individually, without loss of capability to perform their safety functions.

The basis for the structural adequacy of the UHSRS is provided in Sections 3.3, 3.4, 3.5, 3.7, and 3.8.

Site-specific UHS design features to address limiting hydrology-related events are addressed in Subsection 2.4.2, 2.4.3, 2.4.4, 2.4.7, 2.4.8, 2.4.11, and 2.4.14.

The combined volume of water in three basins is sufficient to provide at least 30 days required cooling capacity.

The total required 30 days cooling water capacity is approximately 8.40 million gallons, or approximately 2.80 million gallons per basin. Each basin dimension, not including any column or wall sections, is 120 feet x 120 feet with a water depth of 29 feet from the minimum maintained water level, the usable water volume available for each basin is approximately 3.12 million gallons. The water depth excludes one foot of unusable space from the basin floor, where sedimentation may accumulate. The UHS basin volume of 2.8 million gallons does not include water volume in the ESW intake basin below the UHS basin floor level (elevation 282 ft. NAVD88).

As clarified in Subsection 9.2.1.2.2.1, 29 feet water depth in the UHS basin excluding 1 foot for sedimentation accumulation provides approximately 70 feet of available NPSH at the initiation of an accident. This assures adequate pump NPSH for 30 days without make up under design basis event conditions.

During normal power operation, the UHS basin water temperature is at or below 93°F under the worst-case ambient conditions (i.e. wet bulb temperature of 84.9°F based on the 0% annual exceedance value).

At the initiation of a design basis event, each basin contains approximately 3.12 million gallons of water (minimum required is 2.8 gallons of water per Technical Specification 3.7.9). The UHS basin water temperature limit evaluation is based on Technical Specification minimum required water volume.

For a Safe Shutdown with LOOP event, the heat load for first three hours is 29.5 million Btu/hr/train. The heat load peaks at 196 million Btu/hr/train at four hours into the event and then decreases continuously. The heat load is approximately 81 million Btu/hr/train at 24 hours into the event. Initially, the cooling tower water discharge is below 93°F due to the small heat load and mixes at a flow rate of 12,000 gpm with the large quantity of basin water resulting in a decrease in basin water temperature. With the peak heat load at the fourth hour, the cooling tower water discharge temperature increases to 95°F and the basin water temperature starts increasing until equilibrium is reached. However, since the cooling tower is designed for 95°F discharge water at a peak heat load of 196 million Btu/hr/train, the basin water temperature will not exceed 95°F.

At the initiation of a LOCA, the heat load is 151.5 million Btu/hr/train. The heat load peaks at 158 million Btu/hr/train within two hours of the

accident, and then decreases continuously. The heat load is approximately 80 million Btu/hr/train at 24 hours into the accident. The basin water temperature increases from the initiation of the event until equilibrium is reached. Since the cooling tower is designed for 95°F discharge water at a peak load of 196 million Btu/hr/train, and the LOCA peak heat load is less than the design heat load, the basin water temperature does not exceed 95°F.

Due to higher initial heat loads, the LOCA is the bounding design basis event for establishing the basin water temperature limit 93°F during normal power operation.

During accident conditions, including LOCA and LOOP, makeup to the basin is presumed lost. During such conditions, the UHS transfer pump operates to permit the use of three of the four basin water volumes. The power supply for each transfer pump is from a different division than the ESWP and cooling tower in that basin. Therefore, loss of one electrical train does not compromise the ability to satisfy the short-term accident requirements.

Subsection 9.2.1.3 describes the features to prevent freezing of the ESWS and the UHS. The following design and operation features provide protection against freezing in the basin and ice formation on the cooling tower fill:

- In operating trains, the water is manually bypassed directly to a basin without passing through spray nozzles, when the water temperature reaches pre-determined low value. The water flow is switched manually back to the spray nozzles at a pre-determined value of basin water temperature. Each UHS cooling tower bypass valve is interlocked with the UHS cooling tower isolation valve so it cannot be opened unless the UHS cooling tower isolation valve is closed. During accident conditions these valves will receive an automatic signal to realign to their normal position. When the operating trains are in winter mode or in normal mode, the cooling tower bypass valves are closed and the cooling tower isolation valves are open in the non-operating (i.e., standby) trains.
- The cooling tower fans are operated at lower speed reducing the cooling rate. The fans may be operated in the reverse direction for short periods of time to minimize ice buildup at the air inlets.

- Heat Tracing is provided for exposed stagnant piping in the unheated areas.
- UHS transfer pumps circulate water between non-operating and operating basins on a pre-determined low water temperature in the non-operating basins. The pumps in the non-operating basins transfer cold water to operating basins and the transfer pump(s) in the operating basins transfer hot water to the non-operating basins. The UHS transfer pump operation is manual.

9.2.5.4 Inspection and Testing Requirements

STD* COL 9.2(23)
NAPS COL 9.2(30)

Replace the content of DCD Subsection 9.2.5.4 with the following.

ISI of piping is performed in accordance with the requirements of ASME Section XI, and is included in Section 6.6.

Inservice testing of pumps and valves is performed to ensure operational readiness and is included in Subsection 3.9.6.

Periodic inspections and testing of the mechanical cooling tower components, including fan, motors, and reducing gears, are performed in accordance with cooling tower manufacturer's recommendations, industry operating experience, and as a part of the monitoring required in Generic Letter 89-13 to maintain acceptable system performance.

Periodic cooling tower fan testing in accordance with Technical Specifications provides a means of detecting and correcting motor failure or excessive vibration.

A test program is developed to verify and monitor heat exchanger performance. Baseline performance and acceptance criteria for heat transfer capability for all heat exchangers are established. CCW heat exchangers, essential chiller cooling units and cooling towers are included in the program. Tests are performed during normal plant operation per an established schedule. Heat transfer capability at operating conditions is calculated and then prorated to accident mitigation heat transfer capability. Performance of each heat exchanger is trended to determine degradation.

An inspection program and test procedures are developed to monitor fouling and degradation of the ESW and UHS and to maintain acceptable system performance. The inspection program includes the following:

- Inspect piping for corrosion, erosion and bio-fouling on a regular basis.
- Perform visual inspection of ESWS and UHS piping for leakage.
- Perform visual inspection of the ESW intake basin and the UHS basin for microscopic biological fouling organism, sedimentation and corrosion once every refueling cycle.
- Analyze water samples on a regular basis.

A preventive maintenance program is developed to remove excessive bio-fouling agents, corrosion products, silt etc. This program will address visual as well as hands-on inspection of fill material and supports, drift eliminators, panels, riser piping, spray nozzles, fans, motors and associated components.

Two ESWS and UHS trains are operating during normal plant operations. Operation of the standby trains is alternated per operating procedures. Thus, the performance of all trains is monitored.

System operation and established inspection, testing and maintenance program assure the integrity and capability of the system over time in accordance with the requirements of GDC 45.

Continuous system operation at pressures and flows near accident conditions, periodic heat exchanger performance tests, surveillance tests and monitoring of various parameters assure that the ESWS and UHS perform their safety functions in accordance with the requirements of GDC 46.

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

Manholes, handholes, inspection ports, ladders, and platforms are provided, as required, for periodic inspection of system components.

Maintenance and test procedures to monitor debris build up and flush out debris in the UHS are discussed in Subsection 9.2.1.2.1.

NAPS ESP COL 2.4-7 An inspection program specifies the monitoring of ice formation during long term plant shutdown in winter months to assure the required water volume is available in the basins prior to plant start-up.

9.2.5.5 Instrumentation Requirements

NAPS COL 9.2(24) Replace the first paragraph in DCD Subsection 9.2.5.5 with the following.

Water level in each of the basins is controlled by level instrumentation that opens or closes the automatic valves in the makeup lines.

Two level transmitters and associated signal processors are provided for each basin to indicate water level in the basin and annunciate in the MCR for both the high and low water levels in the basin.

A water level signal at six inches below the normal water level causes the makeup water CV to open. A signal at normal water level then causes the makeup CV to close. A low level alarm annunciates in the MCR whenever the water level falls four feet below the normal water level.

During accident conditions, level indications from the operating basins are used to alert the MCR operator to start the UHS transfer pump to transfer water from the idle basin to the operating basins.

Blowdown rate is controlled manually. The blowdown CVs close automatically upon receipt of a low water level signal or ECCS actuation signal. The valve is designed to fail in the close position. Failure of the valve to close is indicated in the MCR.

The conductivity cells are provided at the ESW pump discharge line and conductivity is indicated in the MCR.

Temperature elements are provided in each basin and temperatures are indicated in the MCR.

Local flow rate and pressure indicators located in each UHS transfer pump discharge header are used for pump performance testing.

The cooling tower fan is equipped with vibration sensors that alarm in the control room in the event of high vibration.

9.2.6.2.6 Primary Makeup Water Tanks

NAPS DEP 9.2(1) Delete the fifth sentence of the first paragraph in Section 9.2.6.2.6.

9.2.7.2.1 Essential Chilled Water System

STD COL 9.2(27)

Replace the last paragraph in DCD Subsection 9.2.7.2.1 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

9.2.9.2.1 General Description

NAPS DEP 9.2(2)

Replace the first sentence of the ninth paragraph in DCD subsection 9.2.9.2.1 with the following.

The design of this system is based on the design service water temperature of 100°F and the design pressure of 100 psig.

9.2.10 Combined License Information

Replace the content of DCD Subsection 9.2.10 with the following.

NAPS COL 9.2(1)

9.2(1) ***The evaluation of ESWP at the lowest probable water level of the UHS and the recovery procedures when UHS approaches low water level***

This COL item is addressed in Subsection 9.2.1.3.

NAPS COL 9.2(2)

9.2(2) ***The protection against adverse environmental, operating and accident condition that can occur such as freezing, thermal over pressurization***

This COL item is addressed in Subsection 9.2.1.3.

NAPS COL 9.2(3)

9.2(3) ***Source and location of the UHS***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(4)

9.2(4) ***The location and design of the ESW intake structure***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(5)

9.2(5) ***The location and the design of the discharge structure***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

STD COL 9.2(6)
STD* COL 9.2(6)
NAPS COL 9.2(6)

9.2(6) ***The ESWP design details – required total dynamic head, NPSH available***

This COL item is addressed in Subsections 9.2.1.2.1, 9.2.1.2.2, 9.2.1.2.2.1 and Table 9.2.1-1R.

STD COL 9.2(7)
NAPS COL 9.2(7)

9.2(7) ***The design of ESWS related with the site specific UHS***

This COL item is addressed in Subsections 9.2.1.2.1, 9.2.1.2.2.5, 9.2.1.2.3.1, 9.2.1.3, and Figure 9.2.1-1R.

STD COL 9.2(8)

9.2(8) ***The ESW specific chemistry requirements***

This COL item is addressed in Subsection 9.2.1.2.1.

STD COL 9.2(9)
NAPS COL 9.2(9)

9.2(9) ***The storage capacity and usage of the potable water***

This COL item is addressed in Subsections 9.2.4, 9.2.4.1, 9.2.4.2.1, 9.2.4.2.2.1, 9.2.4.2.2.2, 9.2.4.2.2.3, 9.2.4.2.2.4, 9.2.4.2.2.6 through 9.2.4.2.2.8 and Figure 9.2.4-1R.

NAPS COL 9.2(10)

9.2(10) ***State and Local Department of Health and Environmental Protection Standards***

This COL item is addressed in Subsections 9.2.4.1 and 9.2.4.2.1.

NAPS COL 9.2(11)

9.2(11) ***Source of potable water to the site and the necessary required treatment***

This COL item is addressed in Subsections 9.2.4, 9.2.4.1, 9.2.4.2.1, 9.2.4.2.3, 9.2.4.4, 9.2.4.5 and Figure 9.2.4-1R.

NAPS COL 9.2(12)

9.2(12) ***Sanitary waste treatment***

This COL item is addressed in Subsections 9.2.4.1, 9.2.4.2.1, and Figure 9.2.4-1R.

9.2(13) Deleted

NAPS COL 9.2(14)

9.2(14) ***Potable and sanitary water system components data***

This action is addressed in Subsection 9.2.4.2.1 and Table 9.2.4-1R.

STD COL 9.2(15)
NAPS COL 9.2(15)

9.2(15) ***Total number of people at the site, the usage capacity and sizing of the potable water tank and associated pumps.***

This COL item is addressed in Subsections 9.2.4.1, 9.2.4.2.1, 9.2.4.2.2.1, 9.2.4.2.2.2, 9.2.4.2.2.3, 9.2.4.2.2.4, 9.2.4.2.2.6 through 9.2.4.2.2.8, and Table 9.2.4-1R.

9.2(16) Deleted

NAPS COL 9.2(17)

9.2(17) ***Sanitary lift stations and the sizing the appropriate interfaces***

This COL item is addressed in Subsections 9.2.4.1, 9.2.4.2.1, 9.2.4.2.3, Table 9.2.4-1R, and Figure 9.2.4-1R.

STD COL 9.2(18)
NAPS COL 9.2(18)

9.2(18) ***The type of the UHS based on specific site conditions and meteorological data***

This COL item is addressed in Subsections 9.2.5.1, 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(19)

9.2(19) ***The design of the electrical power supply to the UHS***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(20)

9.2(20) ***The description and the P&ID of the UHS***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3, Table 9.2.5-3R and Figure 9.2.5-1R.

NAPS COL 9.2(21)

9.2(21) ***The source of makeup water to the UHS and the blowdown discharge location***

This COL item is addressed in Subsections 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(22)

9.2(22) ***The UHS capability and safety evaluation***

This COL item is addressed in Subsection 9.2.5.3 and Table 9.2.5-4R.

STD* COL 9.2(23)

9.2(23) ***The test and inspection requirements of the UHS***

This COL item is addressed in Subsection 9.2.5.4.

NAPS COL 9.2(24)

9.2(24) ***The required alarms, instrumentation and controls of the UHS system***

This COL item is addressed in Subsection 9.2.5.5.

NAPS COL 9.2(25)

9.2(25) ***The operating and maintenance procedures to address water hammer issues***

This COL item is addressed in Subsection 9.2.1.2.1.

STD COL 9.2(26)

9.2(26) ***Maintenance and test procedures to monitor and flush out debris***

This COL item is addressed in Subsections 9.2.1.2.1 and 9.2.1.3.

STD COL 9.2(27)

9.2(27) ***Operating and maintenance procedures of water hammer prevention***

This COL Item is addressed in Subsections 9.2.2.2.2 and 9.2.7.2.1.

NAPS COL 9.2(28)

9.2(28) ***The piping, valves, materials specifications, and other design details related to the site-specific UHS***

This COL Item is addressed in Subsections 9.2.5.2.2 and 9.2.5.2.3.

NAPS COL 9.2(29)

9.2(29) ***Safety evaluation of the capability of the ESWS to: (1) isolate its site-specific, nonsafety-related portions; and (2) provide measures to prevent long-term corrosion and organic fouling that may degrade its performance, per Generic Letter (GL)89-13.***

This COL Item is addressed in Subsection 9.2.1.3.

STD* COL 9.2(30)
NAPS COL 9.2(30)

9.2(30) ***Conduct periodic inspection, monitoring, maintenance, performance and functional testing of the ESWS and UHS piping and components, including the heat transfer capability of the CCW heat exchangers and essential chiller units, consistent with GL 89-13 and GL 89-13 Supplement 1. Develop operating procedures to periodically alternate the operation of the trains to ensure performance of all trains is regularly monitored.***

This COL Item is addressed in Subsections 9.2.1.4 and 9.2.5.4.

STD COL 9.2(31)
NAPS COL 9.2(31)

9.2(31) ***Verify the system layout of the ESWS and UHS and develop operating procedures to assure that the ESWS and UHS are above saturation conditions for all operating modes***

This COL Item is addressed in Subsections 9.2.1.2.1, 9.2.5.2.2, and 9.2.5.2.3.

NAPS COL 9.2(32)

9.2(32) ***Void detection system with alarms to detect system voiding***

This COL Item is addressed in Subsection 9.2.1.2.3.1.

NAPS COL 9.2(33)

9.2(33) ***Design details of the strainer backwash line, vent line, and their discharge locations***

This COL Item is addressed in Subsection 9.2.1.2.2.2 and Figure 9.2.1-1R.

Table 9.2.1-1R Essential Service Water System Component Design Data

Essential Service Water Pump	
Quantity	4
Type	Vertical, centrifugal, mixed flow
Design flow rate	13,000 gpm
Design Head	220 feet
Design pressure	150 psig
Design temperature	140°F
Materials	Stainless steel
Equipment Class	3
Electric Power Supply Class	Class 1E power source
Essential Service Water Pump Outlet Strainer	
Quantity	8
Design flow rate	13,000 gpm
Design pressure	150 psig
Design temperature	140°F
Maximum allowed differential pressure	7 psi at 13,000 gpm
Strainer mesh size	3 mm
Equipment Class	3
Electric Power Supply Class	Class 1E power source
Essential Service Water Pump Discharge Valve	
Quantity	4
Design flow rate	13,000 gpm
Design pressure	150 psig
Design temperature	140°F
Equipment Class	3
Electric Power Supply Class	Class 1E power source

NAPS COL 9.2(6)

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

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

NAPS DEP 9.2(1)

NAPS COL 9.2(14)
NAPS COL 9.2(15)
NAPS COL 9.2(17)
NAPS CDI

Table 9.2.4-1R Potable and Sanitary Water System Component Data

Tanks	
Quantity	1 per well
Type	Hydro-Pneumatic
Well Pumps	
Quantity	1 per well
Type	Submersible
Compressors	
Quantity	1 per Hydro-Pneumatic Tank
Type	Pneumatic
Duplex Grinder Pumps	
Quantity	18
Type	Submersible
Sewage Treatment Plant (STP)	
Quantity	2 (25,000 gal/day, each)
Type	Aerobic/Anaerobic

NAPS COL 9.2(20)
NAPS CDI

Table 9.2.5-3R Ultimate Heat Sink System Design Data

UHS Cooling Tower and Basin	
Physical Data	
Type and Quantity	Wet, mechanical draft Four (4) – 50 percent cooling tower with basin Two (2) cells per cooling tower
Basin Size	Footprint Approx 123 feet x 123 feet (inside dimensions) Depth Approx ~~31~~ 34 feet (at normal water level)
Usable Basin Water Volume/Required Volume	3.12×10^6 gallons per basin (at minimum maintained water level) /2.8×10^6 gallons per basin
Fan and Motor Quantity	One (1) each per cell
Fan driver	200 rated hp
Design Air Flow	685,900 cfm per fan
Cooling Tower Design Life	60 years
Process Parameters	
Design Cooling Water Flow Rate	12,000 (gpm per cooling tower)
Design Heat Load	1.96×10^8 (Btu/hr per cooling tower)
Cooling Water Temperature	Hot (Inlet) 128°F Cold (Outlet) 95°F
Design wet bulb Temperature	~~80°F~~ 78.3°F
~~[[Design Approach]]~~	~~[[15°F]]~~

UHS Transfer Pump	
Quantity	4
Type	Vertical, centrifugal
Design flow rate	800 gpm
Total Head	45 feet
Design pressure	100 psig
Design temperature	140°F
Materials	Stainless Steel
Equipment Class	3

NAPS COL 9.2(22)
NAPS CDI

Table 9.2.5-4R Failure Modes and Effects Analysis for the Ultimate Heat Sink (Sheet 1 of 3)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
UHS Cooling Tower Fan (UHS-MFN-001A, B, C, D and UHS-MFN-002A, B, C, D)	Circulates ambient air through cooling tower to cool ESW	All	Fails to start upon command	Fan status indication light in MCR	None, Remaining three 50 percent capacity cooling towers are available. Minimum two towers are required for safe shutdown.	One Train out due to maintenance does not affect safety function, because minimum of two cooling towers are required.
			Trips for any reason	Fan status indication light in MCR	None, Same as the failure mode "Fails to start upon command".	
UHS Transfer Pump (UHS-MPP-001A, B, C, D)	Transfers 33-1/3 percent of required 30 days cooling water from inoperable basin to two (2) operating basins	Accident, Safe shutdown, Cooldown – loss of offsite power	Fails to start upon command	Pump status light indication in MCR	None, Even if the single failure is assumed to the transfer pump, the cooling tower located in the same basin as the inoperable transfer pump can use the basin water. It is not necessary to transfer this basin water to other basin.	
UHS Transfer Pump Discharge Valve (MOV-503A, B, C, D), fail as is, motor operated valve	Opens to provide flow path	Accident, Safe shutdown, Cooldown – loss of offsite power Normal operation (winter mode)	Fails to open upon command	Position indication in MCR	None, Even if the single failure is assumed to the valve, the cooling tower located at the same basin as the inoperable valve can use own basin water. It is not necessary to transfer this basin water to other basin.	
UHS Transfer Line Basin Inlet valve (MOV-506A, B, C, D), fail as is, motor operated valve	Opens to provide flow path	Accident, Safe shutdown, Cooldown – loss of offsite power	Fails to open upon command	Position indication in MCR	None, This failure effect is bounded by the failure effect of UHS Cooling Tower Fan.	

Table 9.2.5-4R Failure Modes and Effects Analysis for the Ultimate Heat Sink (Sheet 2 of 3)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
UHS Basin Blowdown Control Valve (EWS-HCV-010, 011, 012, 013), fail close air operated valve	Closes to isolate blowdown	All	Fails to close upon command	Position indication in MCR	None, Blowdown can be isolated by closing manual valves (VLV-541A,B,C,D, VLV-543A,B,C,D) Effect of uncontrolled blowdown for 30 minutes on basin inventory is insignificant.	
UHS Transfer Pump Discharge Valve (Winter operation) (MOV-507 A, B, C, D) Fail as is, motor operated valve	Opens to provide flow path	Accident, Safe Shutdown Cooldown - Loss of offsite power Normal operation (winter mode)	Fails to open upon command	Position indication in MCR	None. Alternate flow path through UHS transfer pump discharge valve (MOV-503A, B, C, D) is available	
UHS Winter Operation Basin Inlet Valve (MOV-508A, B, C, D), Fail as-is, motor operated valve	Opens to provide flow path	Accident, Safe Shutdown, Cooldown - Loss of offsite power Normal operation (winter mode)	Fails to open upon command	Position indication in MCR	None. Alternate flow path through valve (MOV-506 A, B, C, D) is available	
UHS Cooling Tower Isolation Valve (MOV-509A, B, C, D) Fail as is, motor operated valve	Opens to provide flow path to the cooling tower. Closes to isolate cooling tower fill under low ambient temperature conditions (winter operation)	Normal Winter Operation Accident, Safe Shutdown, Loss of Offsite Power	Fails to close upon demand Fails to open upon command	Position indication in MCR	None. Remaining three 50% capacity trains are available. Minimum two trains are required for safety function	

NAPS COL 9.2(22)
NAPS CDI

Table 9.2.5-4R Failure Modes and Effects Analysis for the Ultimate Heat Sink (Sheet 3 of 3)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
UHS Cooling Tower Bypass Valve (MOV-510A, B, C, D) Fail as is, motor operated valve	Opens to provide a means for diverting full ESW return flow directly to the tower basin under low ambient temperature conditions (winter operation)	Normal Winter Operation Accident, Safe Shutdown, Loss of Offsite Power	Fails to open upon command Fails to close Upon command	Position indication in MCR	None. Remaining three 50% capacity trains are available. Minimum two trains are required for safety function	

NAPS COL 9.2(7) **Figure 9.2.1-1R Essential Service Water System Piping and Instrumentation Diagram (Sheet 1 of 3)**

NAPS COL 9.2(33)

NAPS CDI

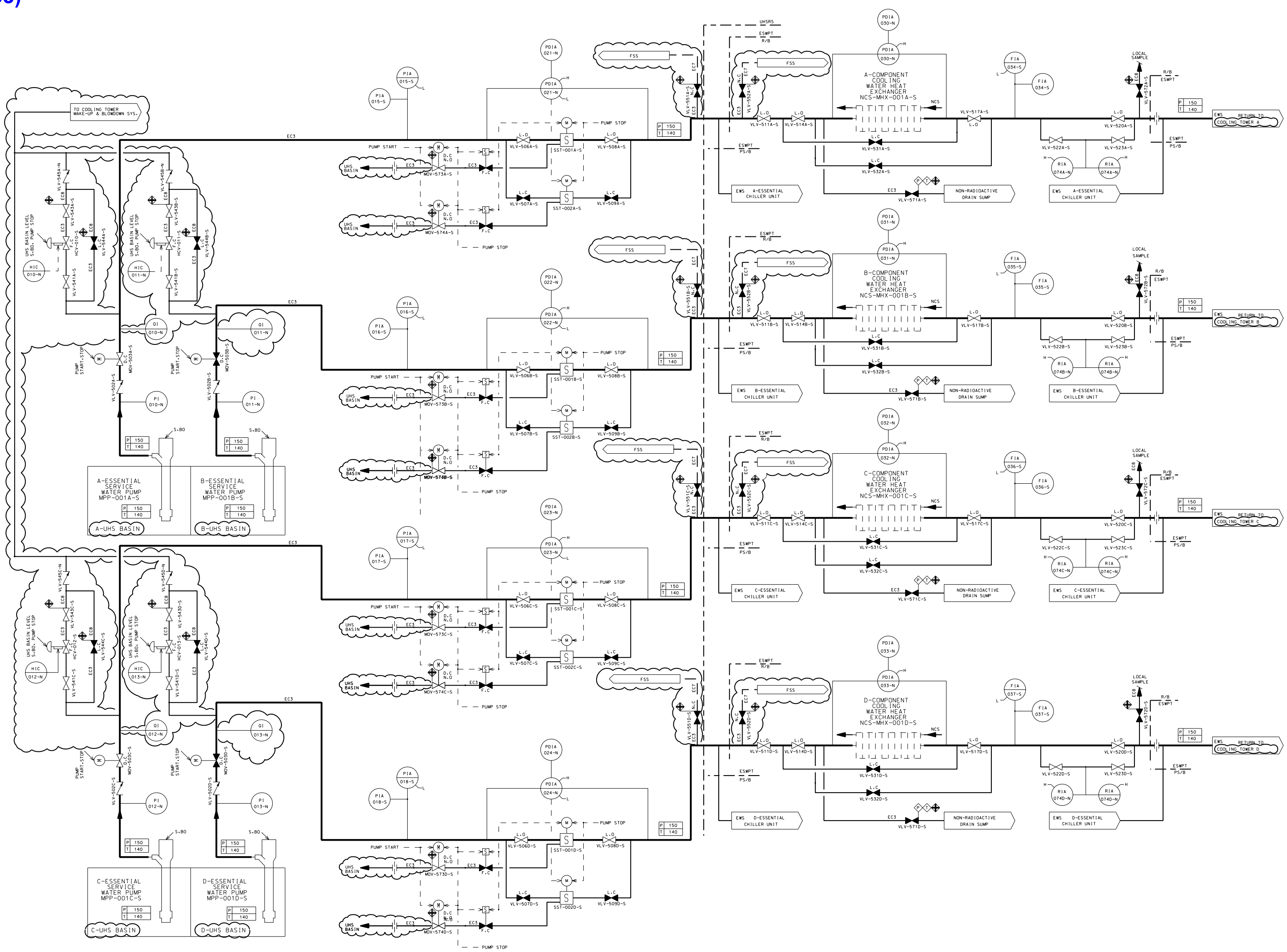


Figure 9.2.1-1R (Sheet 2) [Deleted]

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

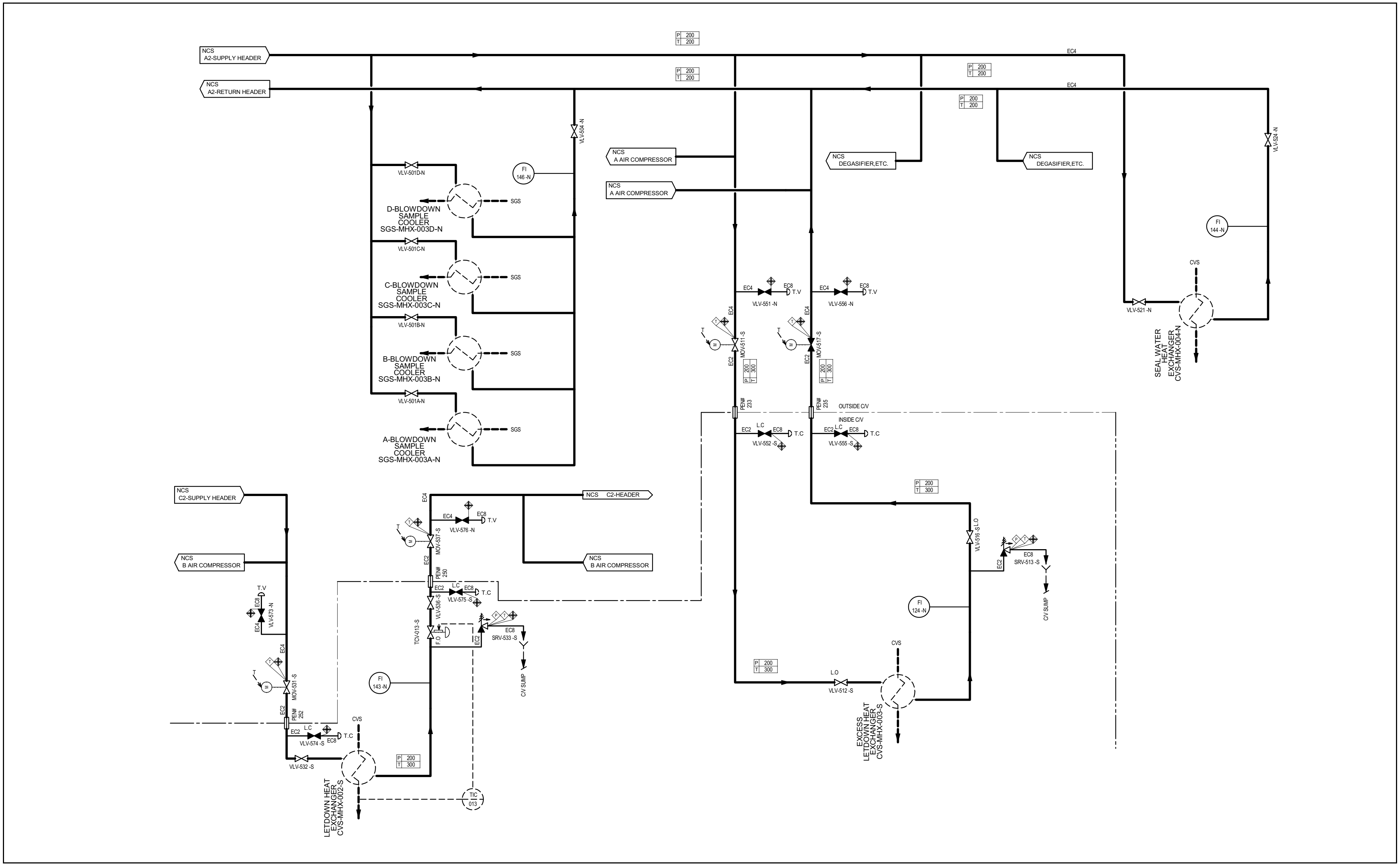
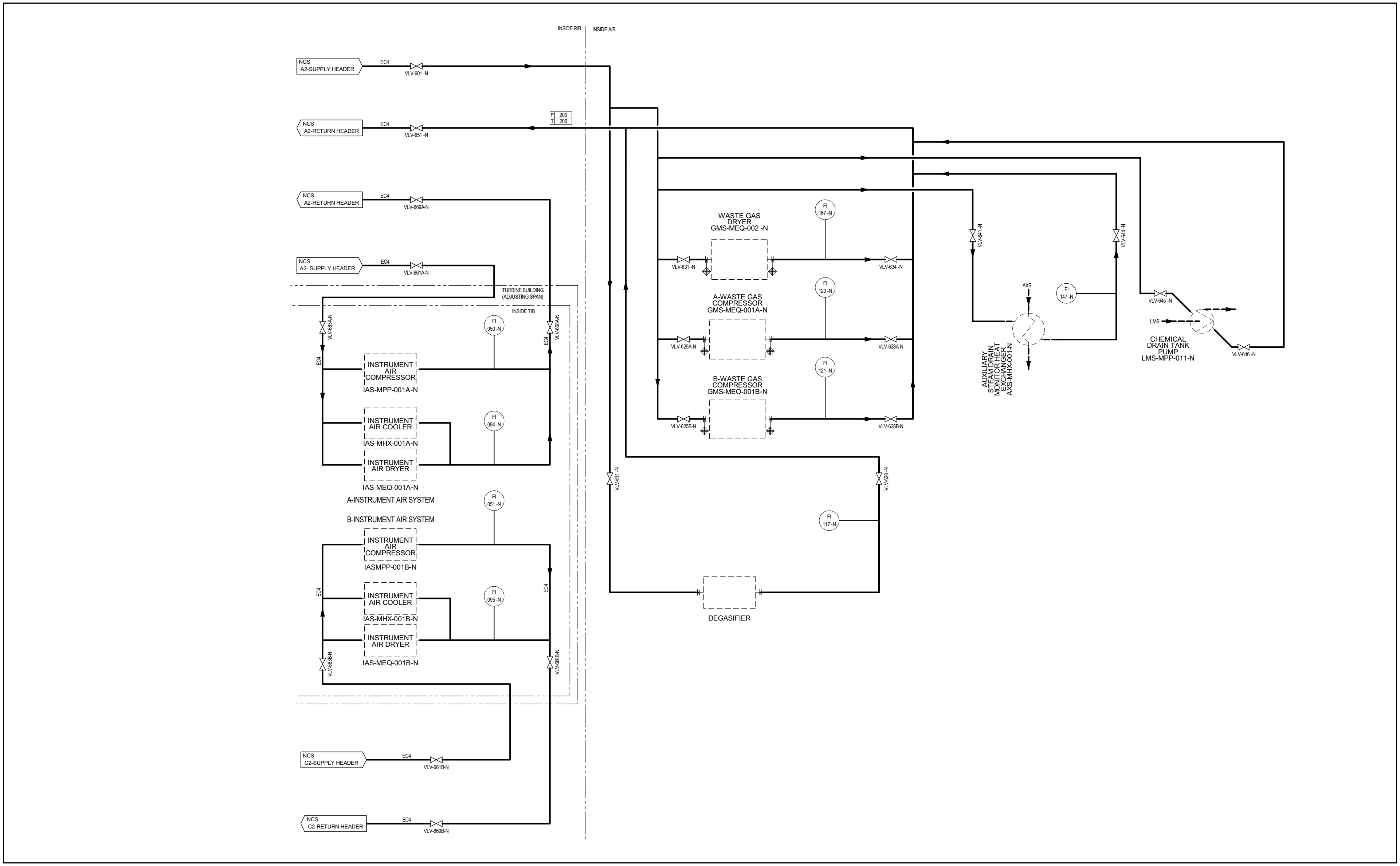
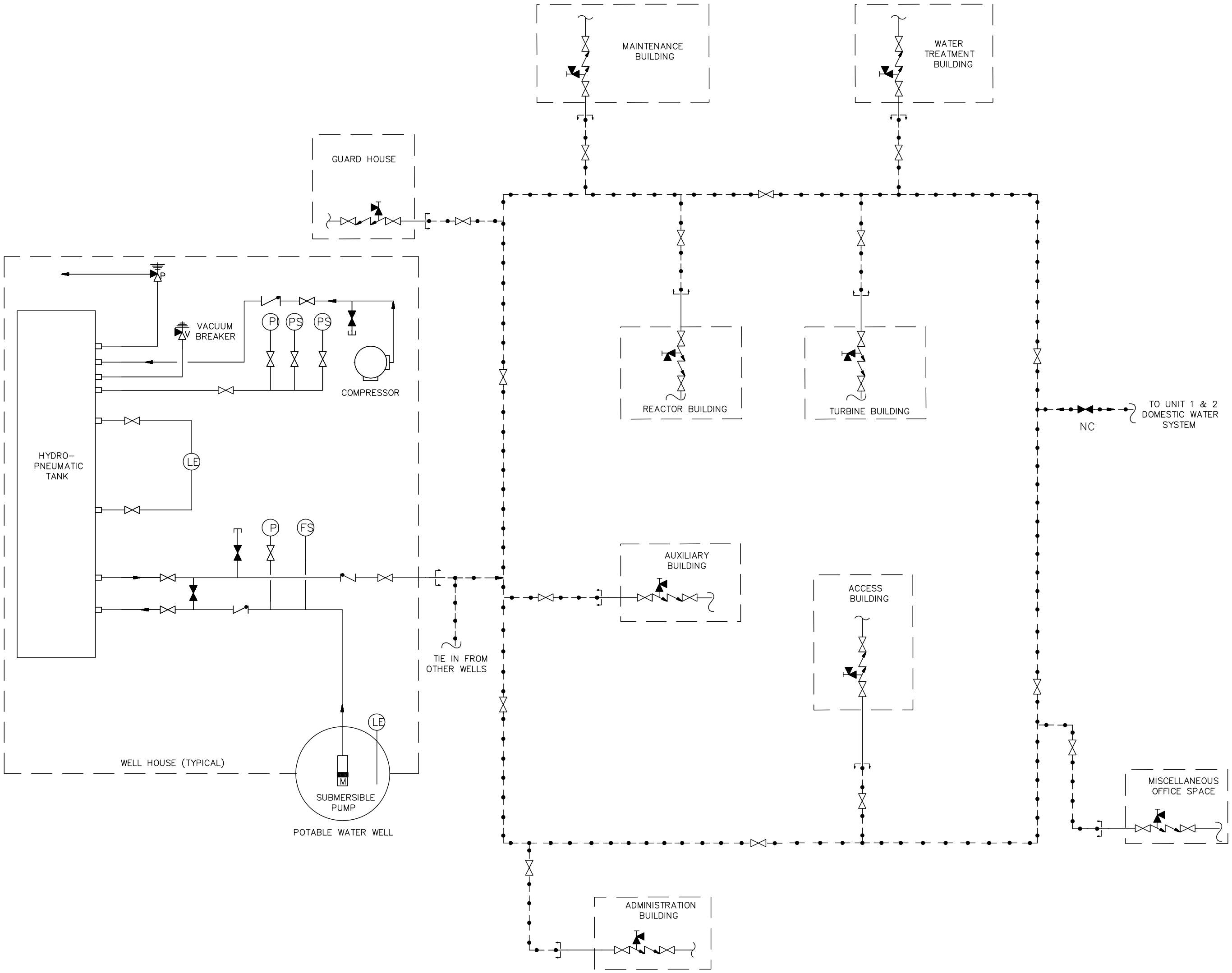


Figure 9.2.2-1R Component Cooling Water System Piping and Instrumentation Diagram (Sheet 9 of 9)



NAPS COL 9.2(9) **Figure 9.2.4-1R Potable and Sanitary Water System Flow Diagram (Sheet 1 of 2)**

NAPS COL 9.2(11)
NAPS CDI



NAPS COL 9.2(12) Figure 9.2.4-1R Potable and Sanitary Water System Flow Diagram (Sheet 2 of 2)

NAPS COL 9.2(17)

NAPS CDI

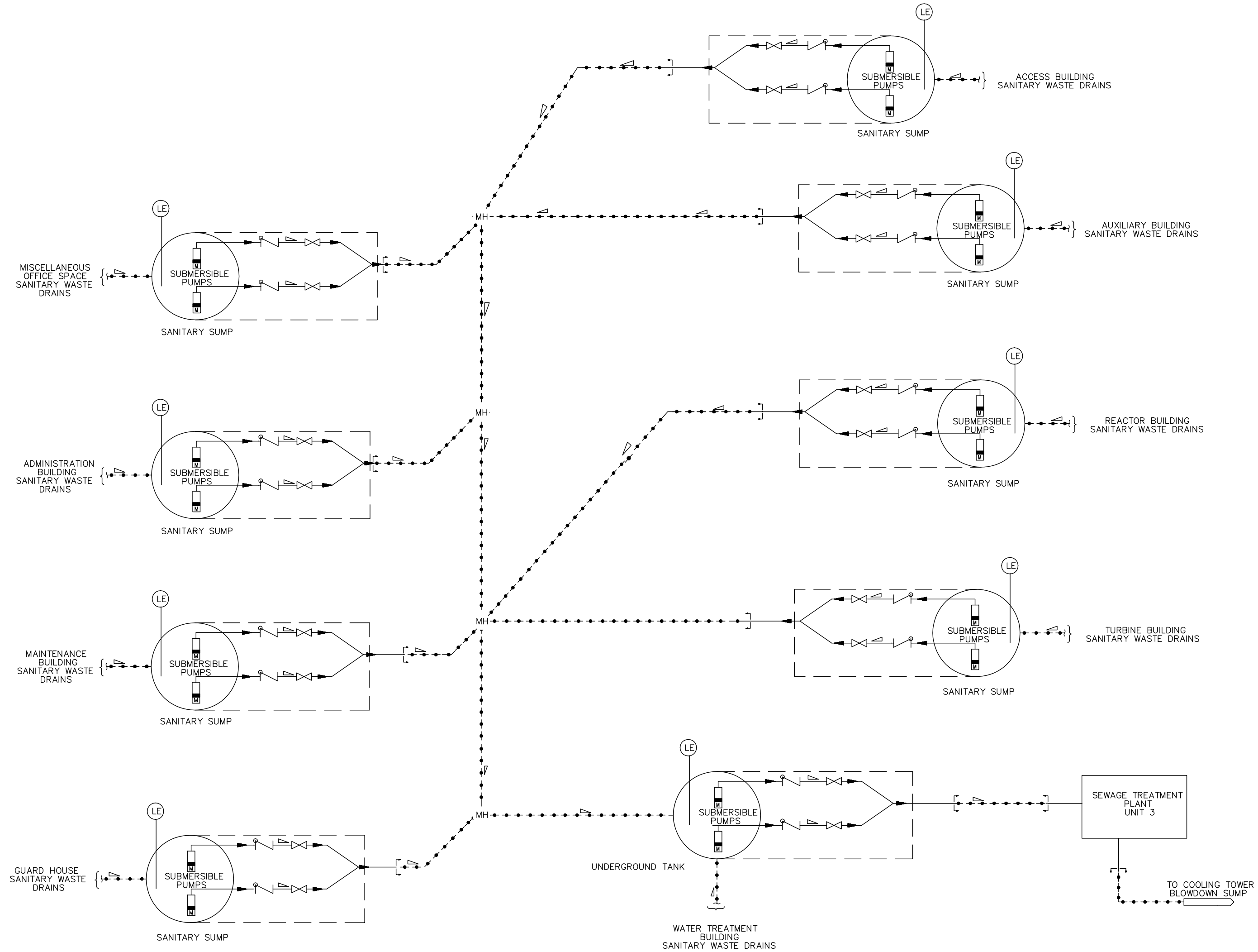


Figure 9.2.5-1R Ultimate Heat Sink System Piping and Instrumentation Diagram (Sheet 1 of 2)

NAPS CDI

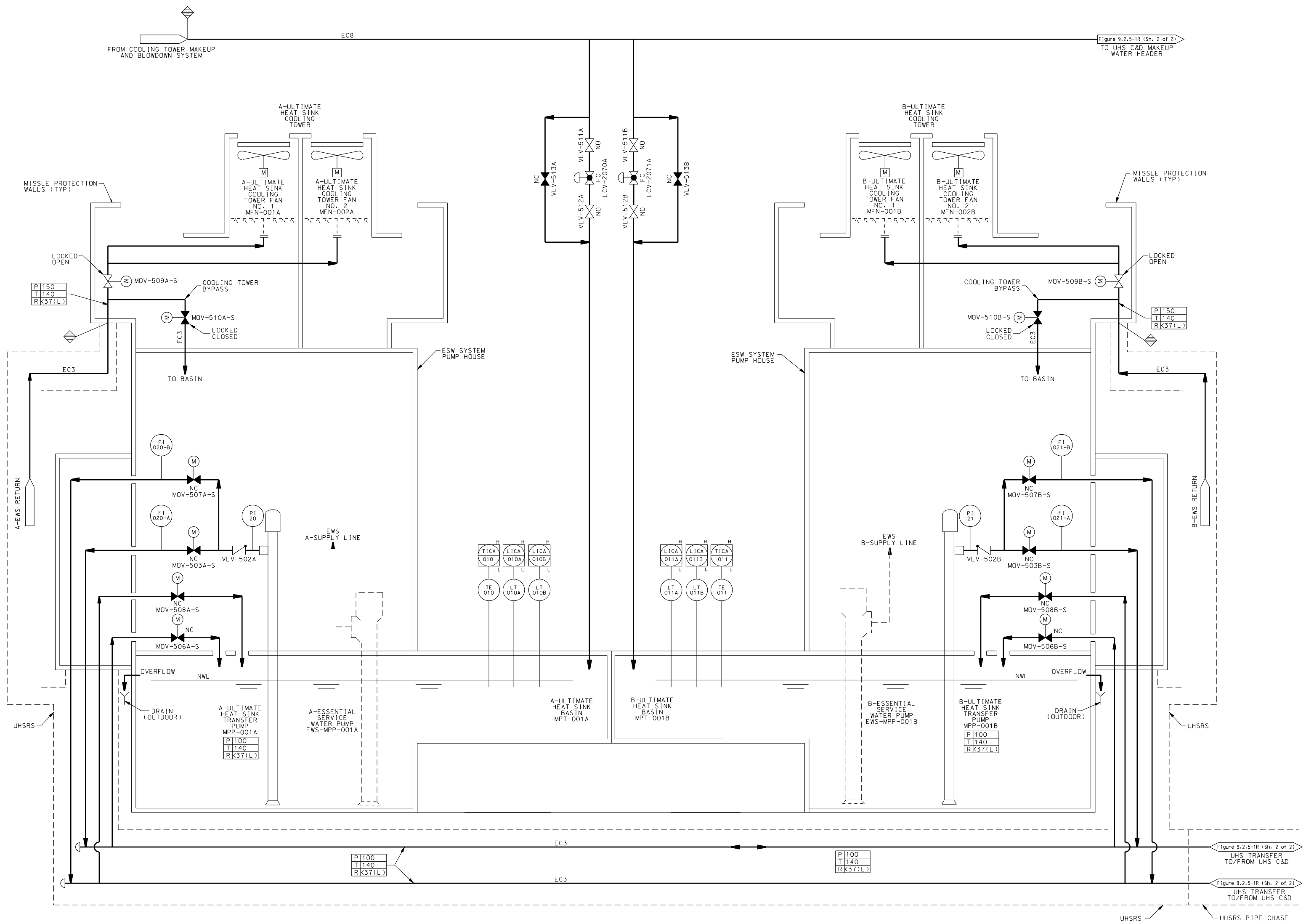
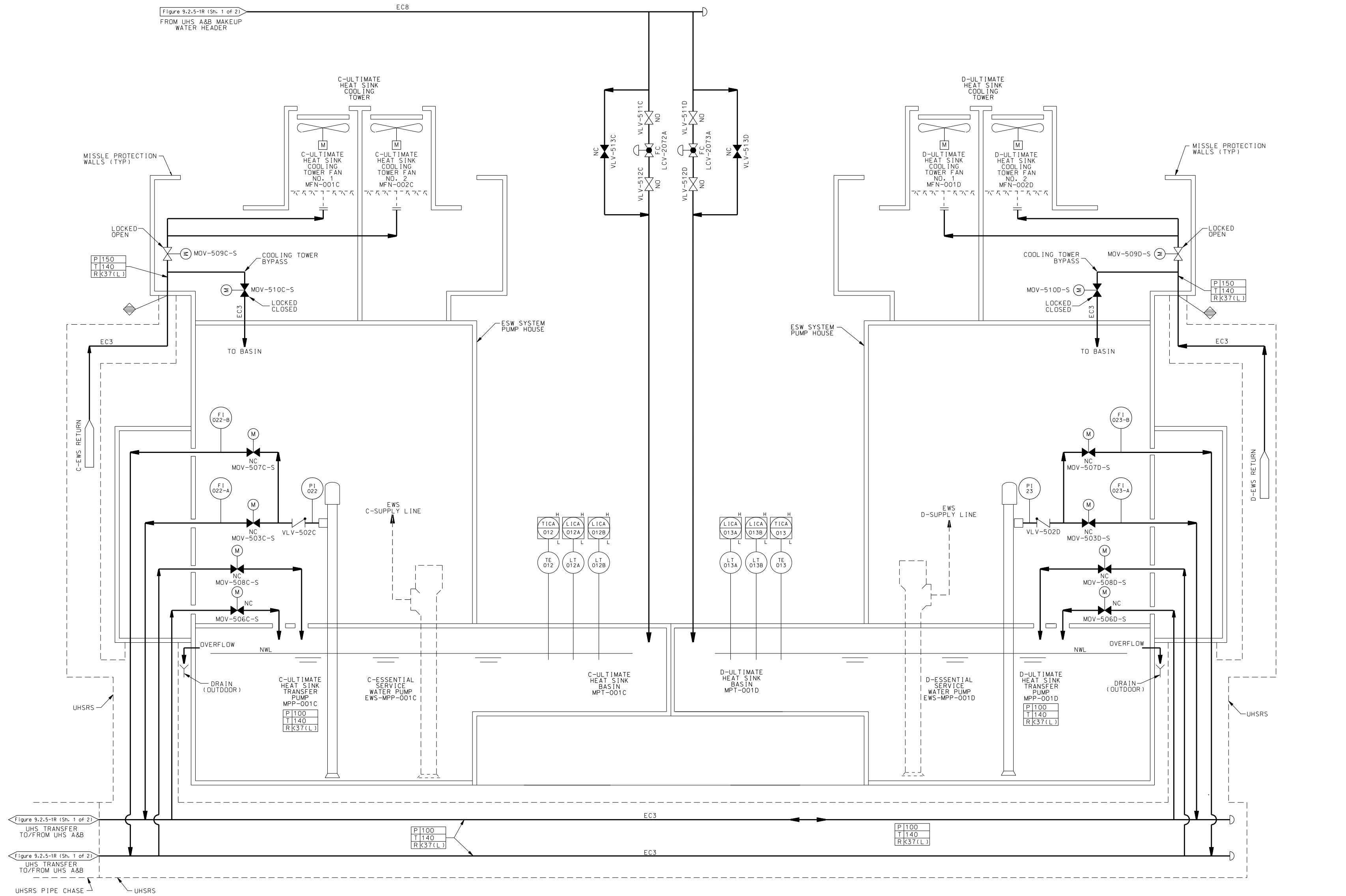


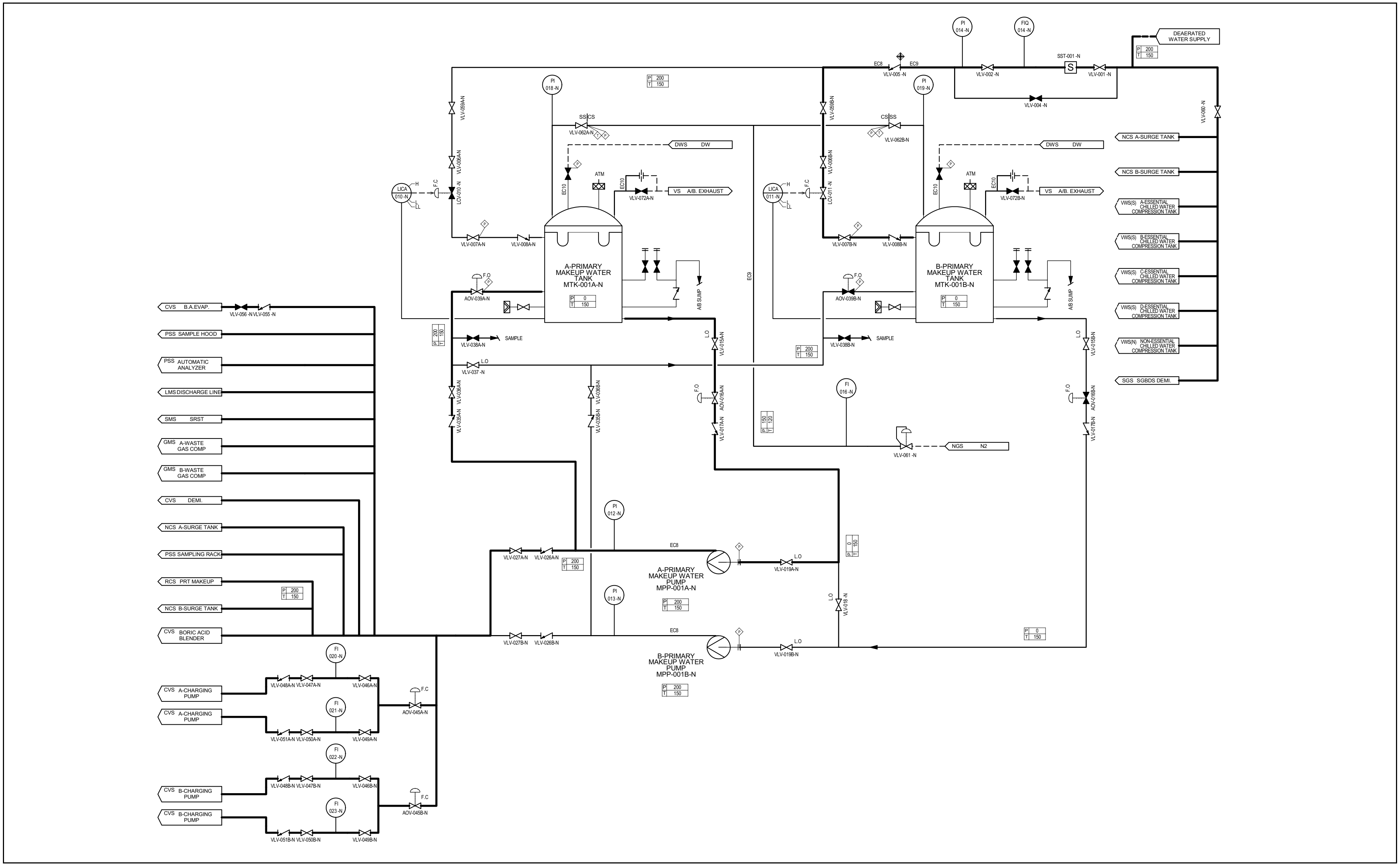
Figure 9.2.5-1R Ultimate Heat Sink System Piping and Instrumentation Diagram (Sheet 2 of 2)

NAPS CDI



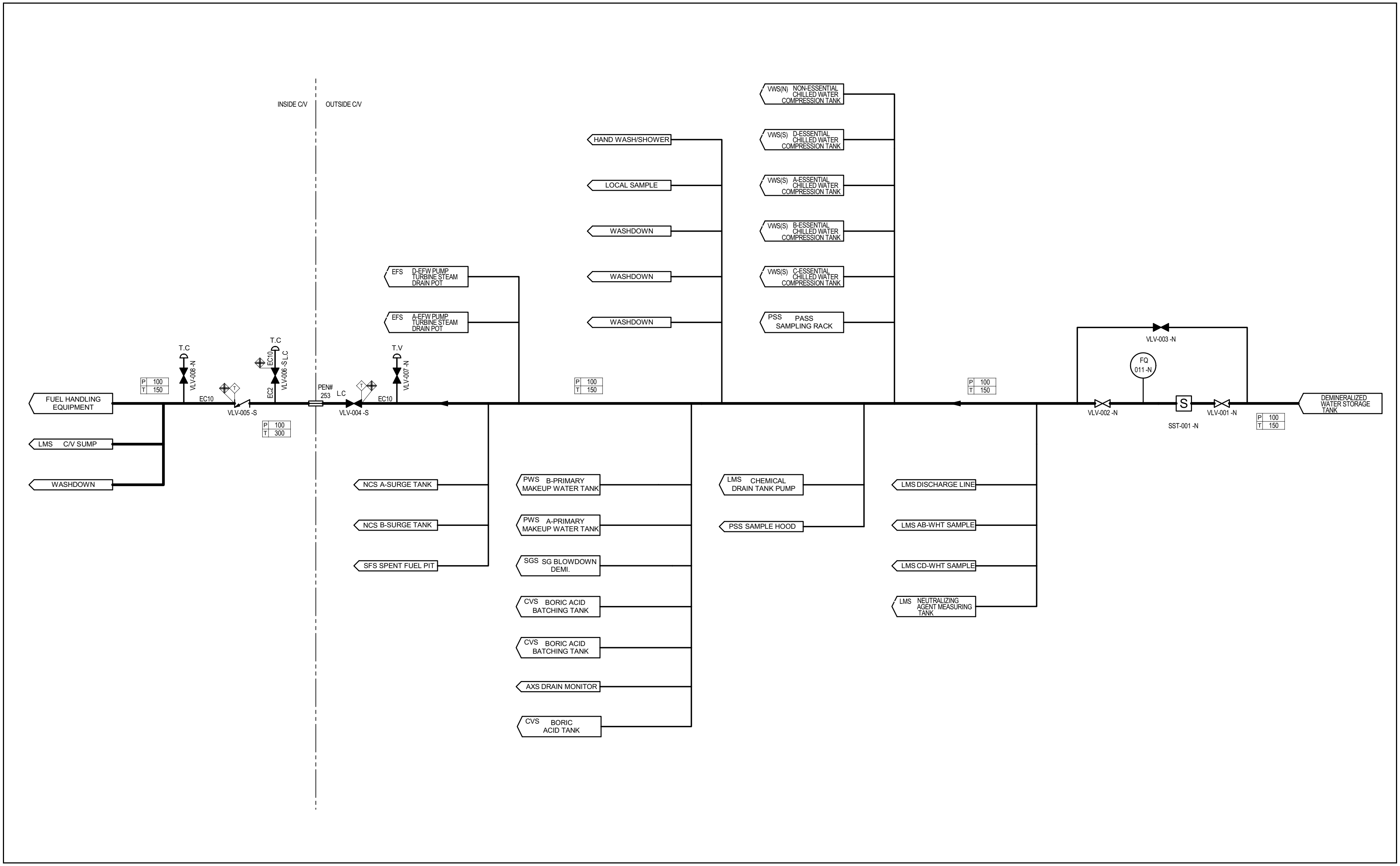
NAPS DEP 9.2(1)

Figure 9.2.6-2R Primary Makeup Water System Flow Diagram



NAPS DEP 9.2(1)

Figure 9.2.6-3R Demineralized Water System Flow Diagram



9.3 Process Auxiliaries

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

9.3.1.2.1.3 Compressed Gas System

NAPS COL 9.3(1)

Delete the phrase "provided by the Combined License (COL) Applicant" from the second paragraph in DCD Subsection 9.3.1.2.1.3.

Delete the phrase "provided by the COL Applicant" from the third and fourth paragraphs in DCD Subsection 9.3.1.2.1.3.

Replace the fifth paragraph in DCD Subsection 9.3.1.2.1.3 with the following.

The nitrogen bulk storage tube trailer is the nitrogen gas permanent supply source and is in the gas farm building. A mobile nitrogen gas tanker re-fill connection is supplied to permit periodic recharging of the bulk storage tube trailer. The bulk storage tube trailer may also be replaced periodically.

The bulk nitrogen gas supply is comprised of the bulk nitrogen storage tube trailer and associated distribution piping and pressure reducing valves. The bulk nitrogen gas system delivers gas to the high-pressure header and to the low-pressure header through pressure reducing valves. The high-pressure nitrogen gas header supplies the SIS accumulators and the main turbine electro-hydraulic governor accumulator. The low-pressure nitrogen header supplies the four steam generators during shutdown conditions, and other low-pressure nitrogen users.

The hydrogen gas supply consists of hydrogen gas cylinders, hydrogen gas headers, and distribution piping. The hydrogen gas cylinders deliver hydrogen gas to two separate headers. One header provides hydrogen gas to the primary system users while the other header provides hydrogen to the secondary system users. The hydrogen gas cylinders are located in the compressed gas farm building, away from any ignition sources.

The carbon dioxide gas is supplied from the carbon dioxide gas cylinders located close to the equipment if practical or in the compressed gas farm.

Other gases for the oxygen gas analyzer and the automatic gas analyzers are supplied from gas cylinders located close to the analyzers.

Figure 9.3.1-201 shows the Hydrogen and Nitrogen Gas Supply Configuration.

9.3.1.2.2.3 Compressed Gas System

STD COL 9.3(1) Replace the content of DCD Subsection 9.3.1.2.2.3 with the following.

The compressed gas system consists of gas sources as described in Subsection 9.3.1.2.1.3 and the distribution headers, distribution piping, and the associated valves and instrumentation.

NAPS DEP 9.2(1) Replace the title and content of DCD Subsection 9.3.4.2.5 with the following.

9.3.4.2.5 Degasifier Subsystem

The CVCS includes a degasifier subsystem. After heat removal and purification in the CVCS, the reactor coolant is transferred to the holdup tanks where dissolved hydrogen and gaseous fission product are released into the holdup tank cover gas that is filled with nitrogen. The nitrogen cover gas is displaced by the reactor coolant hydrogen and gaseous fission product release gases. The displaced nitrogen is routed to the waste gas surge tank through the waste gas compressor. The holdup tank is operated under a slight positive pressure, and its vent header operates in conjunction with the GWMS. The maximum pressure of the vent header is determined by the pressure control system located at the inlet of the waste gas compressor.

Makeup cover gas to the holdup tank is provided by reusing the gas from the surge tank. If necessary, makeup nitrogen can be supplied through the nitrogen supply manifold.

The reactor coolant in the holdup tanks is pumped into the degasifier subsystem through the degasifier feed demineralizer and degasifier feed filter for degasification and ultimately processing through the LWMS. After degasification, the degasifier effluent is transferred into the LWMS for further treatment and release. The degasifier subsystem consists of a degasifier column and associated components (heater, cooler and pump, which is part of the Degasifier Package). The degasifier feed is heated by auxiliary steam, and is flashed into the degasifier column above the

packing. The degasifier heater uses auxiliary steam to provide indirect heating to minimize the generation of liquid effluent. The degasifier effluent is sent to the waste holdup tanks in the LWMS for further treatment and is released as treated effluent. The degasifier vent/off gas is cooled to condense and separate the moisture, and is transferred to the gas surge tanks in the GWMS for further treatment and release.

NAPS DEP 9.2(1) Replace the title and the first paragraph in DCD Subsection 9.3.4.2.6.3 with the following.

9.3.4.2.6.3 **Holdup Tank Pumps**

Two centrifugal holdup tank pumps are provided. The pumps transfer the liquid in the holdup tanks to the degasifier subsystem by first passing through the degasifier feed demineralizer.

9.3.4.2.6.10 **Holdup Tanks**

NAPS DEP 9.2(1) Replace the second paragraph in DCD Subsection 9.3.4.2.6.10 with the following.

Normally, one tank receives the reactor coolant, the second tank is utilized for processing through the degasifier and sampling, and a third tank is kept on standby.

NAPS DEP 9.2(1) Replace the title and first paragraph in DCD Subsection 9.3.4.2.6.17 with the following.

9.3.4.2.6.17 **Degasifier Feed Demineralizer**

One degasifier feed demineralizer is utilized to remove lithium and ionic impurities in the reactor coolant feed to the degasifier.

NAPS DEP 9.2(1) Replace the title and content of DCD Subsection 9.3.4.2.6.24 with the following.

9.3.4.2.6.24 **Degasifier**

A degasifier is provided to separate and remove hydrogen and residual gaseous fission products from the reactor coolant letdown and drains. The degasifier column is the primary component in the degasifier subsystem. The degasifier column is a stainless steel column (pressure vessel) that is partially filled with packing to facilitate liquid distribution into thin film for dissolved gases to disengage from the liquid. The column

is designed to have a liquid distribution header above the packing, a top section to collect off-gases, and a bottom section below the packing to collect liquid effluent. Xenon and krypton have excellent gas partitioning coefficients and the use of auxiliary steam to provide indirect heat medium further enhances gas separation and removal.

The degasifier column is supported by two holdup tank pumps for degasifier feed, a degasifier feed demineralizer, a degasifier feed filter, a degasifier heater at the inlet, a vent/off gas cooler/condenser for the offgas, a degasifier effluent pump, a degassed effluent cooler for the liquid (part of the Degasifier Package), and associated instrumentation (temperatures, pressure, and liquid level) and controls for automated degasification operation. All equipment items are in shielded cubicles inside the Auxiliary Building.

NAPS DEP 9.2(1)

Replace the title and content of DCD Subsection 9.3.4.5.2.14 with the following.

9.3.4.5.2.14 **Degasifier Feed Demineralizer Inlet Temperature**

Instrumentation is provided to locally indicate the boric acid water temperature at the degasifier feed demineralizer inlet. The high alarm is provided in the MCR.

9.3.4.5.3.3 Demineralizer and Filter Differential Pressure

NAPS DEP 9.2(1)

Replace the fifth bullet In DCD Subsection 9.3.4.5.3.3 with the following.

- Degasifier feed filter

NAPS DEP 9.2(1)

Replace the ninth bullet in DCD Subsection 9.3.4.5.3.3 with the following.

- Degasifier feed demineralizer

9.3.4.5.3.4 Pumps Discharge Pressure

NAPS DEP 9.2(1)

Replace the third bullet in DCD Subsection 9.3.4.5.3.4 with the following.

- Holdup tank pump

9.3.6 Combined License Information

Replace the content of DCD Subsection 9.3.6 with the following.

STD COL 9.3(1)
NAPS COL 9.3(1)

9.3(1) ***Compressed Gas System***

This COL item is addressed in Subsection 9.3.1.2.1.3, 9.3.1.2.2.3, 9.5.8.3 and Figure 9.3.1-201.

9.3(2) ***Deleted from the DCD.***

9.3(3) ***Deleted from the DCD.***

9.3(4) ***Deleted from the DCD.***

9.3(5) ***Deleted from the DCD.***

9.3(6) ***Deleted from the DCD.***

9.3(7) ***Deleted from the DCD.***

Table 9.3.1-1R Safety-Related Air-Operated Valves (Sheet 3 of 5)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Main Feed Water System (Nuclear system)	4	Feedwater control	NO	Closed	FC
Main Feed Water System (Nuclear system)	4	Feedwater bypass control	NC	Closed	FC
Main Feed Water System (Nuclear system)	4	Steam generator filling water control	NC	Closed	FC
Main Steam System (Nuclear system)	4	Main steam relief line isolation	NC	Closed	FC
Main Steam System (Nuclear system)	4	Main steam isolation	NO	Closed	FC
Main Steam System (Nuclear system)	4	Main steam isolation valve bypass line isolation	NC	Closed	FC
Component Cooling Water System	2	Nitrogen supply line isolation	NC	Closed	FC
Component Cooling Water System	2	Deaerated water and Demineralized water supply line isolation	NC	Closed	FC
Component Cooling Water System	2	Component cooling water surge tank relief	NC	Closed	FC
Component Cooling Water System	1	Letdown heat exchanger outlet temperature control	NO	Open	FO
Component Cooling Water System	1	Excess letdown heat exchanger supply line containment isolation	NO	Closed	FC
Component Cooling Water System	1	Excess letdown heat exchanger return line containment isolation	NC	Closed	FC
Component Cooling Water System	2	1st instrument air compressor package supply line isolation	NO	Closed	FC

Table 9.3.1-1R Safety-Related Air-Operated Valves (Sheet 3 of 5) *(continued)*

	System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
	Component Cooling Water System	2	2nd instrument air compressor package supply line isolation	NO	Closed	FC
NAPS DEP 9.2(1)	Component Cooling Water System	1	1st ~~boric acid evaporator package~~ degasifier supply line isolation	NO	Closed	FC

Table 9.3.1-1R Safety-Related Air-Operated Valves (Sheet 4 of 5)

NAPS DEP 9.2(1)

System	Quantity	Function	Normal Position	Safe Position	Failure Mode on Loss of Air Supply
Component Cooling Water System	1	2nd ~~boric acid evaporator package~~ degasifier supply line isolation	NO	Closed	FC
Liquid Radiation Waste Management System	1	Nitrogen supply containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Nitrogen supply containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Vent header line containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Waste Management System gas analyzer line containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	Waste Management System gas analyzer containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	C/V reactor coolant drain pump outlet containment isolation inside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	C/V reactor coolant drain pump outlet containment isolation outside containment	NO	Closed	FC
Liquid Radiation Waste Management System	1	C/V sump pump outlet containment isolation inside containment	NC	Closed	FC
Liquid Radiation Waste Management System	1	C/V sump pump outlet containment isolation outside containment	NC	Closed	FC
Process and Post Accident	1	Pressurizer gas phase sampling containment isolation inside containment	NC	Closed	FC
Process and Post Accident	4	Accumulator sampling containment isolation inside containment	NC	Closed	FC
Process and Post Accident	1	Accumulator sampling containment isolation outside containment	NO	Closed	FC

Table 9.3.2-6R Process Grab Sample Points[(a)] (Sheet 1 of 3)

Sample Point No.	Sample Point Name	Analysis	Pressure[(b)] (psig)	Temperature[(b)] (°F)
Auxiliary and Reactor Building				
1	Boric Acid Blender Discharge	Boron	115	105
2	Boric Acid Tank Discharge	Boron, halogens SiO_2, acid soluble iron and SO_4	115	105
3	Boric Acid Batching Tank	Boron	Atmospheric	105
4	A-Accumulator	Boron, halogens	640	120
5	B-Accumulator	Boron, halogens	640	120
6	C-Accumulator	Boron, halogens	640	120
7	D-Accumulator	Boron, halogens	640	120
8	Refueling Water Storage Pit	Boron, halogens	90	120
9	A-Safety Injection Pump Discharge	Boron, halogens	715	120
10	B-Safety Injection Pump Discharge	Boron, halogens	715	120
11	C-Safety Injection Pump Discharge	Boron, halogens	715	120
12	D-Safety Injection Pump Discharge	Boron, halogens	715	120
13	A-CS/RHR Pump Discharge	Boron, halogens	575	360
14	B-CS/RHR Pump Discharge	Boron, halogens	575	360
15	C-CS/RHR Pump Discharge	Boron, halogens	575	360
16	D-CS/RHR Pump Discharge	Boron, halogens	575	360
NAPS DEP 9.2(1) 17	~~A-B.A Evaporator Feed Pump Discharge~~ A-Holdup Tank Pump Discharge	Boron, halogen, SiO_2 and acid soluble iron	115	105

Table 9.3.2-6R Process Grab Sample Points[a] (Sheet 1 of 3) *(continued)*

	Sample Point No.	Sample Point Name	Analysis	Pressure[b] (psig)	Temperature[b] (°F)
NAPS DEP 9.2(1)	18	~~B-B.A Evaporator Feed Pump Discharge~~ B-Holdup Tank Pump Discharge	Boron, halogen, SiO_2 and acid soluble iron	115	105
NAPS DEP 9.2(1)	19	~~B.A Evaporator Package, Concentrates Sample~~ Degasifier Inlet	~~Boron, halogen, SiO_2 and acid soluble iron~~ pH, dissolved gases	~~140~~ 115	~~176~~ 105
NAPS DEP 9.2(1)	20	~~B.A Evaporator Package, Distillate Sample~~ Degasifier Outlet	~~Boron, radioactivity, halogens, pH, and conductivity, dissolved oxygen~~ pH, dissolved gases	140	~~126~~ 105
	21	A-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
	22	B-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
	23	C-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
	24	D-Component Cooling Water Pump Suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
	25	A, B-Component Cooling Water Pump Tie Line suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107

Table 9.3.2-6R Process Grab Sample Points[a] (Sheet 2 of 3)

Sample Point No.	Sample Point Name	Analysis	Pressure[b] (psig)	Temperature[b] (°F)
26	C, D-Component Cooling Water Pump Tie Line suction	Conductivity, halogens, dissolved oxygen and N_2H_4	50	107
27	A-Component Cooling Water surge Tank Outlet	Conductivity, halogens, dissolved oxygen and N_2H_4	80	100
28	B-Component Cooling Water surge Tank Outlet	Conductivity, halogens, dissolved oxygen and N_2H_4	80	100
29	A,B-Spent Fuel Pit Filter Outlet	Boron, Halogens, radioactivity, pH and conductivity	100	120
30	A,B-Spent Fuel Pit Demineralizer Inlet	Boron, Halogens, radioactivity, pH and conductivity	100	120
31	Non-radeoactive Drain Sump Pump Discharge	Radioactivity	145	140
32	A-SG Blowdown Cation Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
33	B-SG Blowdown Cation Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
34	A-SG Blowdown Mix Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
35	B-SG Blowdown Mix Bed Demineralizer Outlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113

Table 9.3.2-6R Process Grab Sample Points[a] (Sheet 2 of 3) *(continued)*

Sample Point No.	Sample Point Name	Analysis	Pressure[b] (psig)	Temperature[b] (°F)
36	Steam Generator blowdown demineralizers inlet filters inlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
37	Steam Generator blowdown demineralizers inlet	Radioactivity, Specific conductivity, Cation conductivity, sodium ion, chloride ion,SO_4 and pH	145	113
38	A-,B-,C-,D-Componenet Cooling Water Heat Exchanger Essential Service Water Side Discharge	Radioactivity	150	140
Yard Area				
1	External Water Makeup	pH, conductivity	Atmospheric	Ambient
2	Waste Water Effluent (from sump)	pH, conductivity	Atmospheric	Ambient
3	Sewage and Industrial waste Effluent	pH, conductivity	Atmospheric	Ambient
NAPS DEP 9.2(1) 4	Primary Makeup Water Tank outlet	Dissolved oxygen, ~~radioactivity,~~ halogens, conductivity, pH	155	Ambient
5	Refueling Water Storage Auxiliary Tank outlet	Boron, halogens	Atmospheric	Ambient

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 1 of 6)

Charging Pumps	
Number of units	2
Design flow rate	275 gpm
Type	Multistage horizontal centrifugal
Design pressure	3,185 psig
Design temperature	200°F
Fluid	Reactor coolant
Material	Stainless steel

B.A. Transfer Pumps	
Number of units	2
Type	Horizontal centrifugal
Design flow	130 gpm
Design pressure	200 psig
Design temperature	200°F
Fluid	Boric acid water (approximately 7,000 ppmB)
Material	Stainless steel

NAPS DEP 9.2(1)

~~B.A. Evaporator Feed Pumps~~ Holdup Tank Pumps	
Number of units	2
Type	Horizontal centrifugal
Design flow (process operation)	45 gpm
Design flow (circulation operation)	130 gpm
Design pressure	200 psig
Design temperature	200°F
Fluid	Reactor coolant
Material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 1 of 6) *(continued)*

Regenerative Heat Exchanger

Number of units	1	
Heat Transfer rate	27.4×10^6 BTU/h	
Type	Shell and tube type	
	Shell Side (Letdown)	Tube Side (Charging)
Design pressure	2485 psig	3185 psig
Design temperature	650°F	650°F
Design Flow rate	8.95×10^4 lb/h	7.98×10^4 lb/h
Design Inlet temperature	552.6°F	130.0°F
Design Outlet temperature	271.0°F	464.0°F
Material	Stainless steel	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 3 of 6)

Mixed Bed Demineralizer	
Number of units	2
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	300 psig
Design temperature	150°F
Design flow	180 gpm
Material	Stainless steel
Cation Bed Demineralizer	
Number of units	1
Type	Vertical cylindrical
Resin volume	30 ft^3
Vessel capacity	45 ft^3
Design pressure	300 psig
Design temperature	150°F
Design flow	110 gpm
Material	Stainless steel
Deborating Demineralizer	
Number of units	2
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	300 psig
Design temperature	150°F
Design flow	180 gpm
Material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 3 of 6) *(continued)*

NAPS DEP 9.2(1)

~~B.A. Evaporator Feed Demineralizer~~ Degasifier Feed Demineralizer

Number of units	1
Type	Vertical cylindrical
Resin volume	70 ft^3
Vessel capacity	100 ft^3
Design pressure	200 psig
Design temperature	200°F
Design flow	45 gpm
Vessel material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 4 of 6)

NAPS DEP 9.2(1)

B.A. Evaporator Degasifier	
Number of units	1
Capacity	30 gpm
Material	Stainless steel
B.A. Blender	
Number of units	1
Fluid	Boric acid water (approximately 7,000 ppmB)
Design pressure	200 psig
Design temperature	200°F
Material	Stainless steel
Volume Control Tank	
Number of units	1
Capacity	670 ft^3
Type	Vertical cylindrical
Design pressure (internal)	75 psig
Design pressure (external)	15 psig
Design temperature	200°F
Material	Stainless steel
Boric Acid Tanks	
Number of units	2
Type	Vertical cylindrical
Capacity	66,000 gal
Design pressure	7 psig
Design temperature	200°F
Fluid	Boric acid water (approximately 7,000 ppmB)
Material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 4 of 6) *(continued)*

Holdup Tanks

Number of units	3
Type	Vertical cylindrical type
Capacity	16,000 ft^3 (0 to approximately 100% level)
Design pressure	15 psig
Design temperature	200°F
Fluid	Reactor coolant drain
Material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 6 of 6)

Reactor Coolant Filter	
Number of units	2
Type	Disposable cartridge [250 gpm type]
Design pressure	300 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel
Seal Water Injection Filter	
Number of units	2
Type	Vertical cylinder cartridge [80 gpm type]
Design pressure	3,185 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel
Mixed Bed Demineralizer Filter	
Number of units	3
Type	Vertical cylinder cartridge [250 gpm type]
Design pressure	300 psig
Design temperature	150° F
Filter element material	Polypropylene
Vessel material	Stainless steel
Boric Acid Filter	
Number of units	1
Type	Vertical cylinder cartridge [250gpm type]
Design pressure	200 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel

Table 9.3.4-3R Chemical and Volume Control System Equipment Design Parameters (Sheet 6 of 6) *(continued)*

NAPS DEP 9.2(1)

~~B.A. Evaporator Feed Demineralizer Filter~~ Degasifier Feed Filter

Number of units	1
Type	Vertical cylinder cartridge [150gpm type]
Design pressure	200 psig
Design temperature	200° F
Filter element material	Polypropylene
Vessel material	Stainless steel

NAPS COL 9.3(1) **Figure 9.3.1-201 Hydrogen and Nitrogen Gas Supply Configuration**

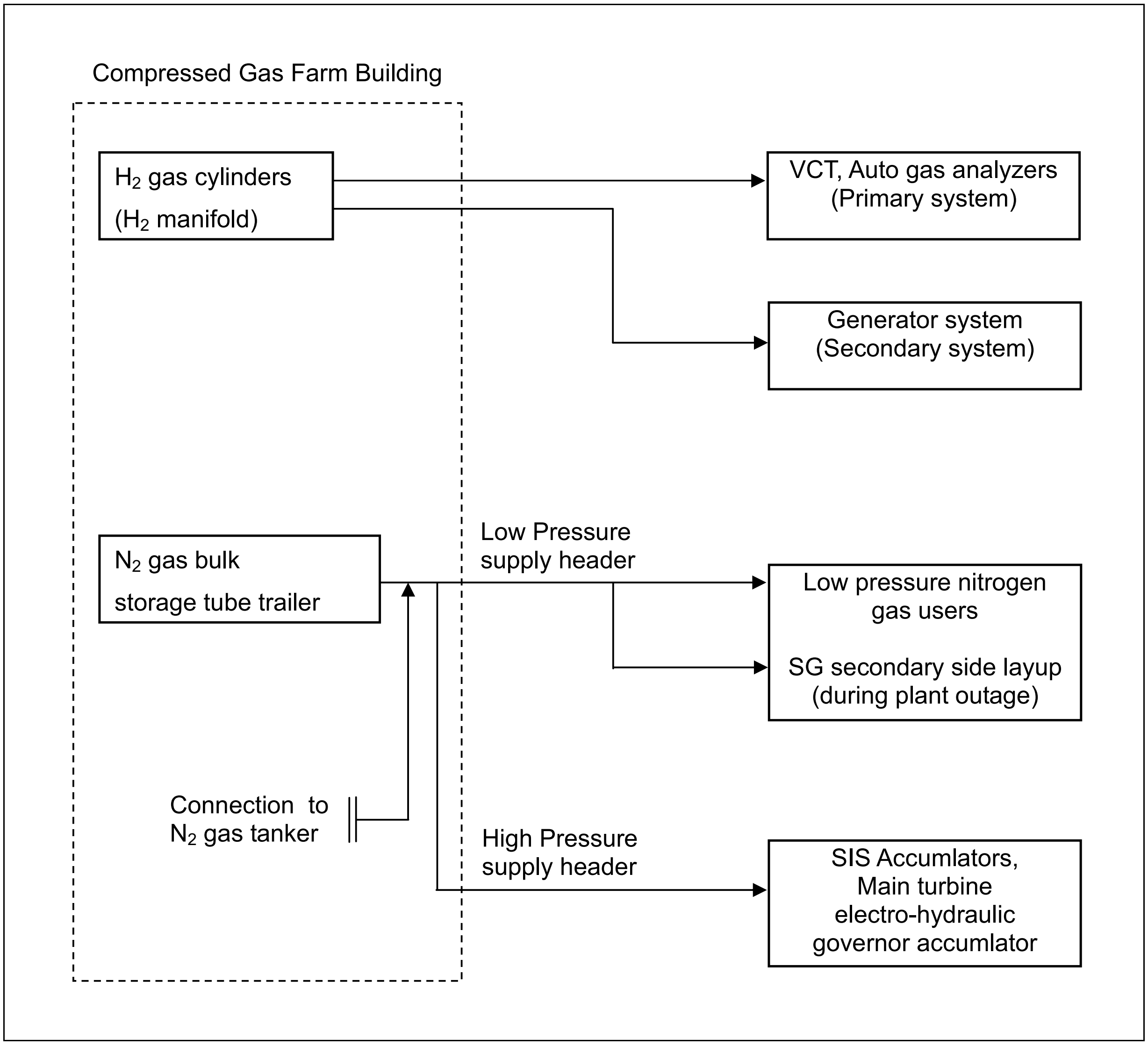


Figure 9.3.4-1R Chemical and Volume Control System Flow Diagram (Sheet 3 of 7)

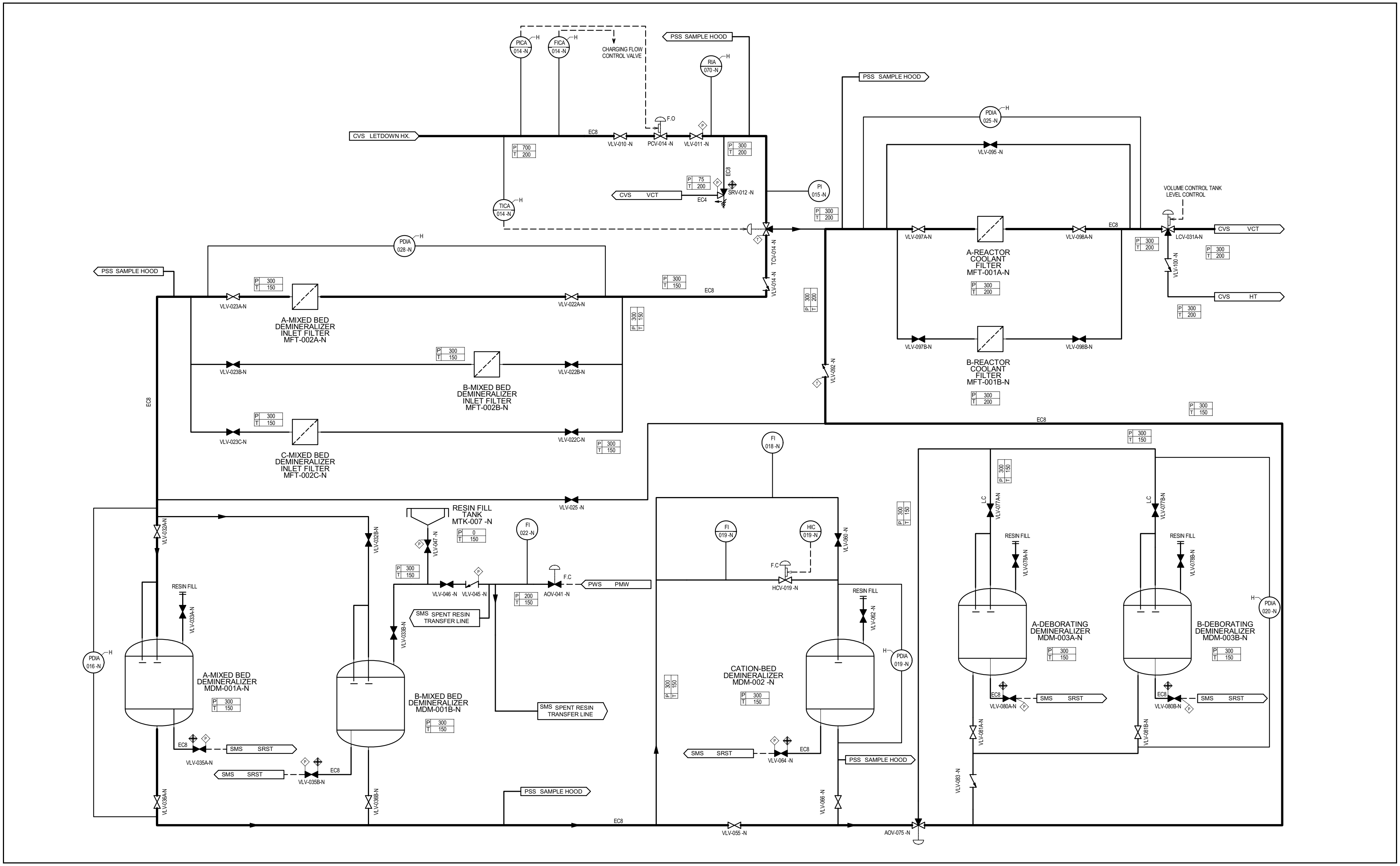


Figure 9.3.4-1R Chemical and Volume Control System Flow Diagram (Sheet 4 of 7)

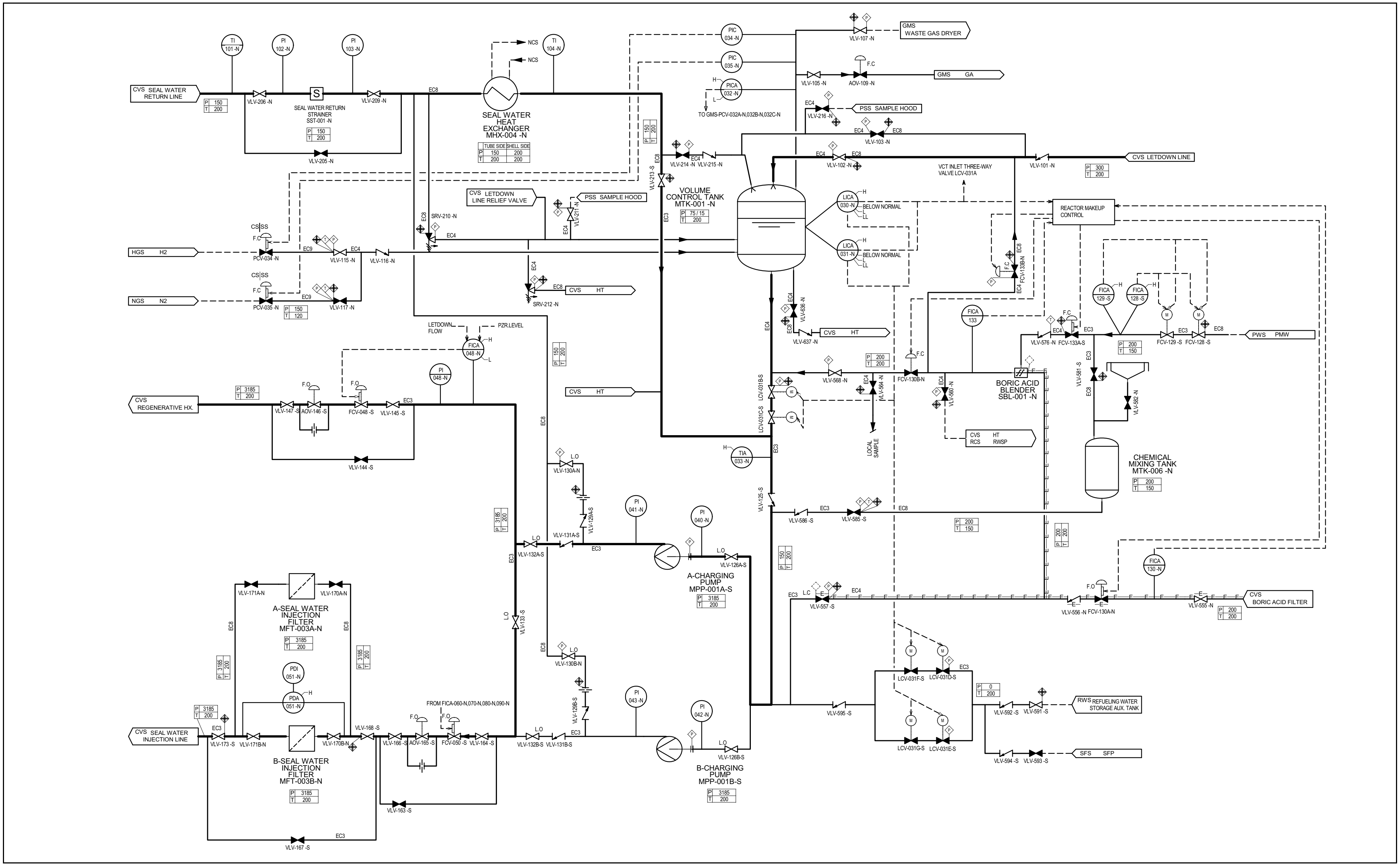


Figure 9.3.4-1R Chemical and Volume Control System Flow Diagram (Sheet 5 of 7)

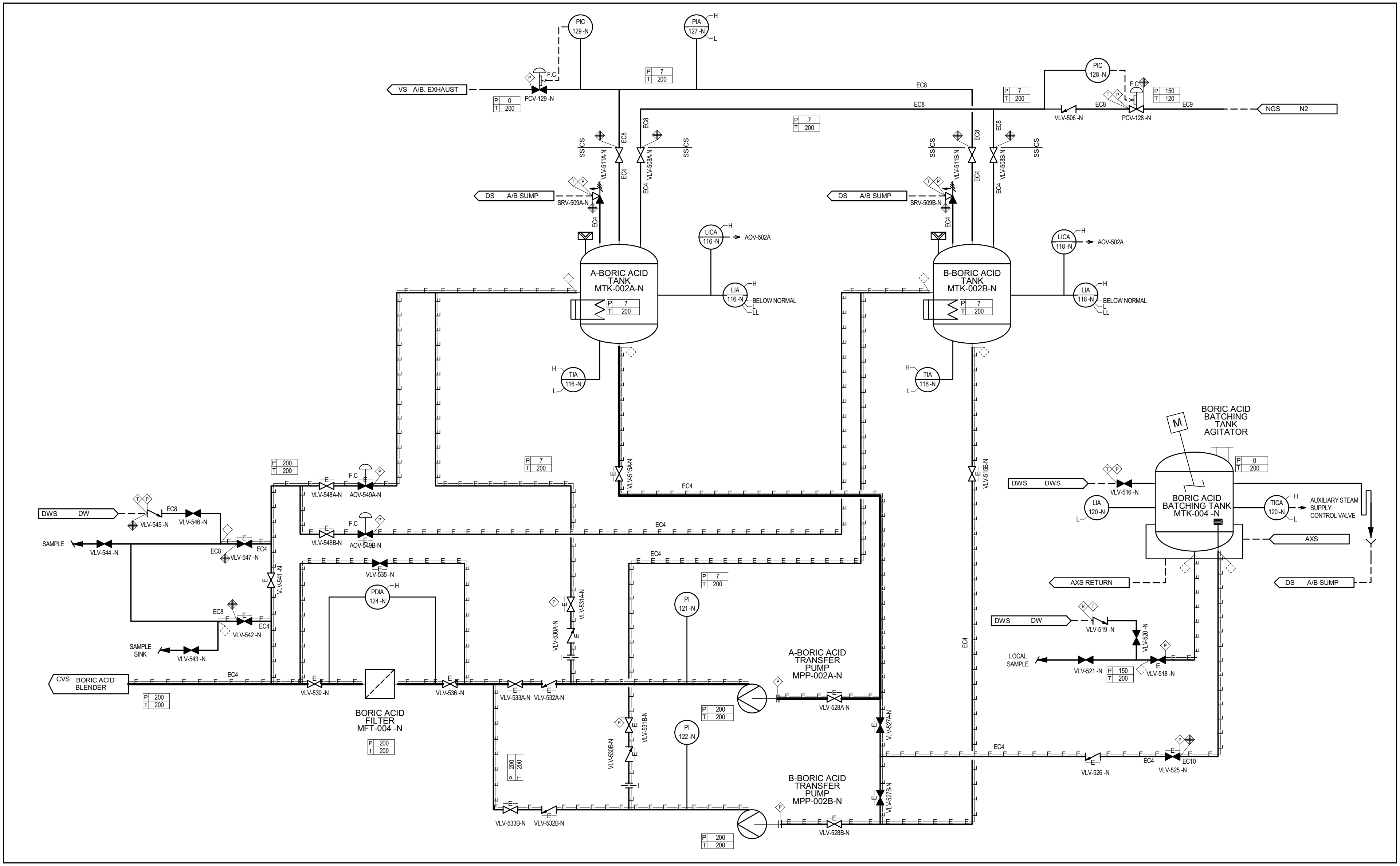


Figure 9.3.4-1R Chemical and Volume Control System Flow Diagram (Sheet 6 of 7)

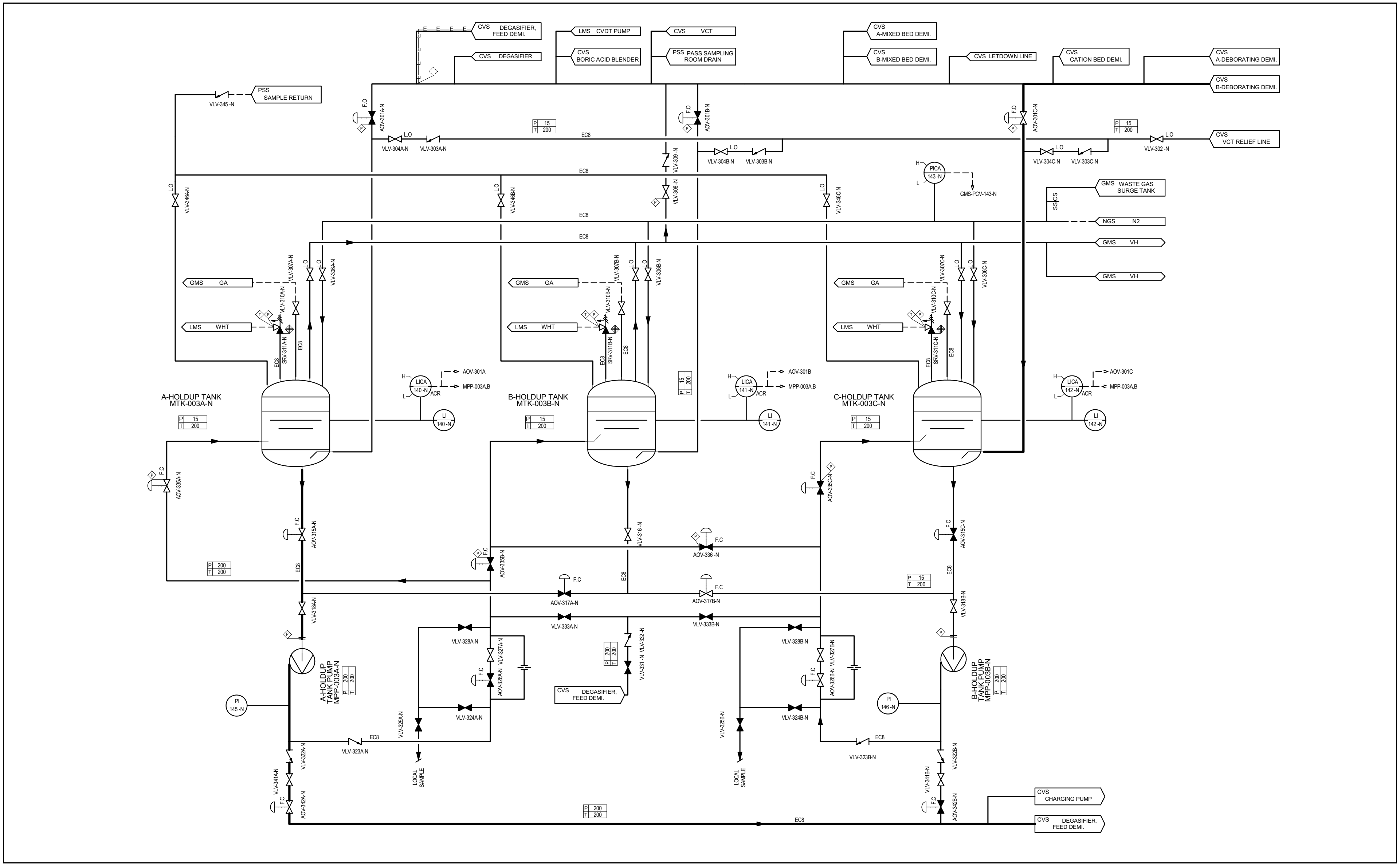
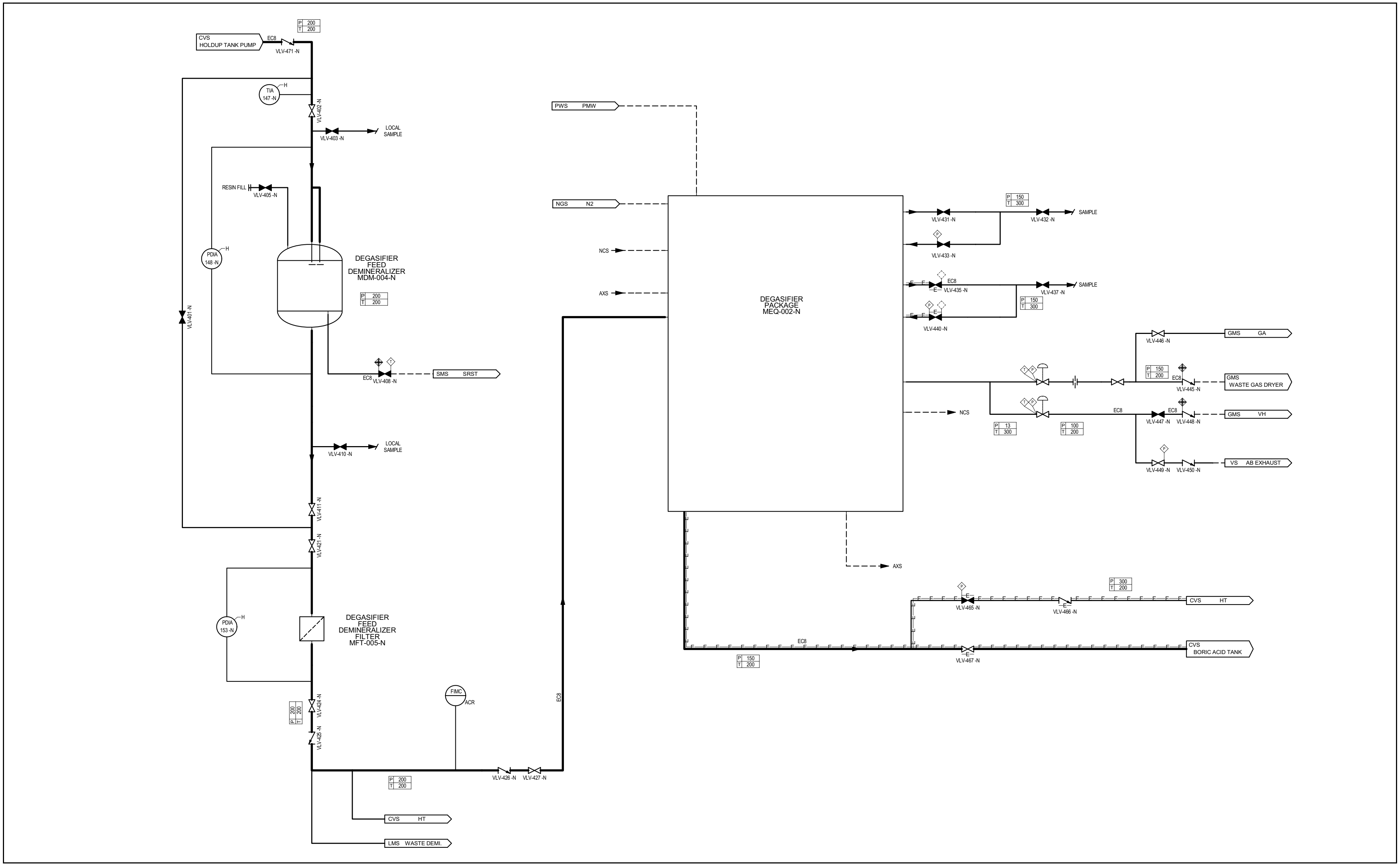


Figure 9.3.4-1R Chemical and Volume Control System Flow Diagram (Sheet 7 of 7)



9.4 Air-Conditioning, Heating, Cooling, and Ventilation Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS SUP 11.4(1) Add the following at the end of the section.

The HVAC for the IRSF is described in Appendix 11AA.

9.4.1.2 System Description

NAPS COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.1.2 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

Add the following after the second sentence of the first paragraph in DCD Subsection 9.4.1.2.

The MCR AHU heating coils are sized to maintain the minimum design temperature specified in DCD Table 9.4-1, considering the heat loss from the rooms and the heating requirement for the outside makeup air at the site-specific minimum design outside air temperature specified in Table 2.0-201.

9.4.3.2.1 Auxiliary Building HVAC System

STD COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.1 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.3.2.2 Non-Class 1E Electrical Room HVAC System

NAPS COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.2 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.3.2.3 Main Steam/Feedwater Piping Area HVAC System

STD COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.3 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.3.2.4 Technical Support Center HVAC System

STD COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.4 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5 Engineered Safety Feature Ventilation System

NAPS SUP 9.5(1)

Add the following after the third paragraph in DCD Subsection 9.4.5.

The ESF ventilation system AHU heating coils are sized to maintain the respective area minimum design temperature specified in DCD Table 9.4-1, considering the heat loss from the area and the heating requirement for the outside makeup air (where used) at the site-specific minimum design outside air temperature specified in Table 2.0-201.

NAPS COL 9.4(6)

Delete the fifth paragraph and insert the following text to the end of the list of ESF ventilation systems in first paragraph of DCD Subsection 9.4.5.

- UHS ESW Pump House Ventilation System

NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.1.1.5.

9.4.5.1.1.6 UHS ESW Pump House Ventilation System

The UHS ESW pump house ventilation system provides and maintains the proper environmental conditions within the required temperature range (40°F–120°F) to support the operation of the I&C equipment and components in the individual UHS ESW pump houses during a design basis accident and LOOP. The ventilation system is designed based on the outside ambient design temperature conditions (–21°F to 109°F) using 0 percent annual exceedance temperature values.

9.4.5.2.2 Class 1E Electrical Room HVAC System

NAPS COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.5.2.2 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.3 Safeguard Component Area HVAC System

NAPS COL 9.4(4)

Replace the third sentence of the third paragraph in DCD Subsection 9.4.5.2.3 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.4 Emergency Feedwater Pump Area HVAC System

STD* COL 9.4(4)

Replace the fourth sentence of the second paragraph in DCD Subsection 9.4.5.2.4 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.5 Safety Related Component Area HVAC System

NAPS COL 9.4(4)

Replace the second sentence of the fourth paragraph in DCD Subsection 9.4.5.2.5 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.2.5.

9.4.5.2.6 UHS ESW Pump House Ventilation System

Each of the four independent UHS structures consists of a UHS ESW pump house and a water basin with a cooling tower. The UHS ESW pump house contains two separate rooms: the ESW pump room and the transfer pump room. Each pump room has an independent ventilation system and each pump room is in a different fire area separated by three-hour fire barriers.

The ESW pump room ventilation has an exhaust fan for cooling and two unit heaters for heating. The transfer pump room has an exhaust fan and

one unit heater. The ventilation systems are classified as safety-related equipment Class 3, Seismic Category I, and are capable of performing their safety function during a design basis accident coincident with a LOOP.

The UHS ESW pump house ventilation systems are shown in Figure 9.4-201 and the UHS ESW pump house layout arrangement is shown in Figures 1.2-201 through 1.2-210. The UHS ESW pump house ventilation equipment design data is presented in Table 9.4-202.

The UHS ESW pump houses do not contain quantities of airborne radioactive contamination and are not provided with filtering or radiation monitoring capability. The pump house room ventilation systems exhaust directly to the atmosphere.

The ESW pump room ventilation system is powered by the same Class 1E power train that supplies the associated ESW pump in the same room. The transfer pump and transfer pump room ventilation system in the same UHS ESW pump house are supplied by a Class 1E power train different from the one supplying the ESW pump. This is to ensure that the transfer pump is available to transfer UHS basin water to another UHS basin if the ESW pump were to fail. Each Class 1E power train in the UHS ESW pump house is located in a different fire area separated by a three-hour fire barrier.

The UHS ESW pump house ventilation systems contain no ductwork. In each pump room, a backdraft damper is mounted in each exhaust air opening downstream of the exhaust fan. They are mounted on the Seismic Category I outside wall. A backdraft damper is also installed in each fresh air intake wall opening. The backdraft dampers are safety-related equipment Class 3 and Seismic Category I. The safety functions of the backdraft (gravity) damper are to open in the direction of airflow and close by counterbalance when no airflow is present.

The ceiling height of the UHS ESW pump house is 16 feet above the pump house floor. The bottom of the fresh air intake for the ESW Pump Room is located 10 feet above the pump house floor and 42 feet above grade (Elevation 290 ft). The air is not filtered. The fresh air intake for the Transfer Pump Room is located 14 feet above the pump house floor and 46 feet above grade. The air is not filtered. All the electrical and instrument enclosures in the UHS ESW pump houses are NEMA Type 12 (dust tight and drip tight - for indoor use) and any louvered vents on the

enclosures are provided with filters to minimize the intake of dust, dirt, and grit. The NEMA Type 12 enclosures alone prevent the entry of dust, dirt and grit into electrical and instrument enclosures. The height of the air intake above grade is an additional measure that helps to minimize the level of dust, dirt and grit entering the pump house. Also, based on the location of the UHS ESW pump houses fresh air intakes, there is no source of hazardous contaminant that could enter through the outside air openings. The UHS ESW pump houses do not harbor any potential sources of explosive gas or fuel-vapor mixtures on a continuous basis.

The ESW pump room exhaust fan and the transfer pump room exhaust fan provide 100 percent of the ventilation required for their associated rooms during normal and emergency plant operations. The ventilation system is thermostatically controlled by the Protection and Safety Monitoring System (PSMS) to cycle the exhaust fans off and on to maintain design temperatures during the summer and winter. These exhaust fans, mounted in exterior walls, each have independent gravity type backdraft dampers which discharge to the outdoors. Make-up supply air is drawn into each pump room through wall openings with gravity type backdraft dampers mounted in the walls. In the event of the presence of smoke, the exhaust fans may be actuated to purge the smoke.

The unit heaters in each pump room maintain minimum room temperatures during normal and emergency plant operations to prevent freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station. The unit heaters are controlled by the PSMS. When the temperature drops below the setpoint, the heating element and fan will be energized. When the temperature rises above the setpoint, the heating element will de-energize. The ESW pump room and the transfer pump room unit heater elements and fans are designed such that they do not exceed a specified allowable watt density for the unit heater coils. The fan will continue to run, circulating air through the unit until the fan is de-energized by a time delay relay.

Temperature sensors are provided in the ESW and transfer pump rooms, which alarm in the MCR to notify operators of either high or low temperature conditions in these areas. These alarms are an indication of a loss of ventilation or a loss of heating.

The UHS ESW pump houses each contain a wet-pipe sprinkler system, hose station and smoke detection system. These fire protection components are classified as non-safety-related. The wet-pipe sprinkler

system and smoke detection system are Seismic Category II. Their failure during a design basis seismic event will not damage any of the safety-related equipment in the areas. The standpipe systems supplying hose stations are Seismic Category I and will remain functional under safe shutdown earthquake loadings for manual fire suppression in areas containing equipment required for safe-shutdown.

NAPS COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.3.5

9.4.5.3.6 UHS ESW Pump House Ventilation System

The ESW pump room ventilation system and the transfer pump room ventilation system located in each UHS ESW pump house are each powered by a different Class 1E bus.

The transfer pump and the ESW pump in each UHS ESW pump house are powered from different Class 1E power supplies and are located in different fire areas separated by three-hour fire barriers. The two Class 1E power supply trains in a UHS ESW pump house are physically separated by a three-hour fire barrier.

The safety function of the UHS ESW pump house ventilation system is assured by the physical separation provided by the four separate and independent UHS ESW pump houses. All ventilation system components are classified as equipment Class 3, Seismic Category I.

The ESW pump room ventilation system and the transfer pump room ventilation system are capable of performing their safety function under all associated design basis accidents coincident with a LOOP.

The ESW pump room exhaust fans and transfer pump room exhaust fans are capable of performing required safety functions under all postulated internal flooding events as described in Section 3.4.1.3. While not a flood barrier, the 3-hour fire rated doors and walls that separate the UHS ESW pump and transfer pump rooms will reduce the flow of water between the rooms in the event of internal flooding, allowing the floor drain in the unaffected room to maintain the water below the flood level.

As shown in Table 9.4-203, failure of a single active component in one of the UHS ESW pump house ventilation system does not result in a loss of the system's safety function.

The UHS ESW pump house ventilation system components are protected from tornado generated missiles by their location inside a Seismic Category I structure.

Backdraft dampers are designed to be capable of withstanding the effects of tornado wind and atmospheric differential pressure loading.

The UHS ESW pump house air intakes and air outlets are protected from tornado missiles as described in Section 3.8.4.1.3.2.

STD COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.4.5.

9.4.5.4.6 UHS ESW Pump House Ventilation System

In addition to the general requirements in DCD Subsection 9.4.5.4, the backdraft dampers are factory tested to demonstrate their capability to withstand the tornado wind effects and atmospheric differential pressure loading.

The general requirements in Subsection 9.4.5.4 apply.

STD COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.5.5.

9.4.5.5.6 UHS ESW Pump House Ventilation System

The following instrumentation serving the UHS ESW pump houses includes:

- Alarm on low airflow for ESW pump room or UHS transfer pump room.
- Indication of the status of the exhaust fans.
- Alarm on high room temperature in ESW pump room or UHS transfer pump room.
- Alarm on low room temperature in ESW pump room or UHS transfer pump room.
- Temperature switches for control of ESW pump room and UHS transfer pump room exhaust fans and heaters.

9.4.6.2.4.1 Containment Low Volume Purge System

STD COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.6.2.4.1 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.6.2.4.2 Containment High Volume Purge System

STD COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.6.2.4.2 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.7 Combined License Information

Replace the content of DCD Subsection 9.4.7 with the following.

9.4(1) ***Deleted from the DCD.***

9.4(2) ***Deleted from the DCD.***

9.4(3) ***Deleted from the DCD.***

STD COL 9.4(4)
NAPS COL 9.4(4)

9.4(4) ***Capacity of cooling and heating coils that are affected by site specific conditions***

This COL item is addressed in Subsections 9.4.1.2, 9.4.3.2.1, 9.4.3.2.2, 9.4.3.2.3, 9.4.3.2.4, 9.4.5.2.2, 9.4.5.2.3, 9.4.5.2.4, 9.4.5.2.5, 9.4.6.2.4.1, 9.4.6.2.4.2 and Table 9.4-201.

9.4(5) ***Deleted from the DCD.***

STD COL 9.4(6)
NAPS COL 9.4(6)

9.4(6) ***Information of UHS ESW pump house ventilation system***

This COL item is addressed in Subsections 9.4.5, 9.4.5.1.1.6, 9.4.5.2.6, 9.4.5.3.6, 9.4.5.4.6, 9.4.5.5.6, Tables 9.4-202 and 9.4-203, and Figure 9.4-201.

NAPS COL 9.4(4)

Table 9.4-201 Equipment Design Data

MCR Air Handling Unit	
Heating Coil Capacity	45 kW
Auxiliary Building Air Handling Unit	
Cooling Coil Capacity	9,200,000 Btu/hr
Heating Coil Capacity	5,600,000 Btu/hr (Steam)
Non-Class 1E Electrical Room Air Handling Unit	
Cooling Coil Capacity	1,330,000 Btu/hr
Heating Coil Capacity	Non heating
Main Steam/Feedwater Piping Area Air Handling Unit	
Cooling Coil Capacity	450,000 Btu/hr
Heating Coil Capacity	11 kW
Technical Support Center Air Handling Unit	
Cooling Coil Capacity	550,000 Btu/hr
Heating Coil Capacity	35 kW
Class 1E Electrical Room Air Handling unit	
Heating Coil Capacity	65 kW - Train A, B 95 kW - Train C, D
Class 1E I&C Room In-duct Heater Capacity	18.3 kW - Train A, D 16.6 kW - Train B, C
MCR/Class 1E Electrical HVAC Equipment Room In-duct Heater Capacity	0.7 kW - Train A, D 4.0 kW - train B, C
Remote Shutdown Console Room In-duct Heater Capacity	11.7 kW
Class 1E Battery Room In-duct Heater Capacity	3.8 kW
Safeguard Component Area Air Handling Unit	
Heating Coil Capacity	32 kW
Emergency Feedwater Pump (M/D) Area Air Handling Unit	
Heating Coil Capacity	3 kW
Emergency Feedwater Pump (T/D) Area Air Handling Unit	
Heating Coil Capacity	7 kW
Safety Related Component Area Air Handling Unit	
Penetration Area Air Handling Unit Heating Coil Capacity	42 kW

NAPS COL 9.4(4)

Table 9.4-201 Equipment Design Data

Annulus Emergency Filtration Unit Area Air Handling Unit Heating Coil Capacity	14 kW
Charging Pump Area Air Handling Unit Heating Coil Capacity	6 kW
CCW Pump Area Air Handling Unit Heating Coil Capacity	5 kW
Essential Chiller Unit Area Air Handling Unit Heating Coil Capacity	7 kW
SF Pump Area Air Handling Unit Heating Coil Capacity	6 kW
Containment Low Volume Purge Air Handling Unit	
Cooling Coil Capacity	190,000 Btu/hr
Heating Coil Capacity	35 kW
Containment High Volume Purge Air Handling Unit	
Cooling Coil Capacity	2,820,000 Btu/hr
Heating Coil Capacity	515 kW

NAPS COL 9.4(6)

Table 9.4-202 UHS ESW Pump House Ventilation System Equipment Design Data

ESW Pump Room Exhaust Fan	
Number of Fans	4
Equipment Class	3
Seismic Category	I
Airflow Capacity	40,000 cfm
Fan Type	Propeller

UHS Transfer Pump Room Exhaust Fan	
Number of Fans	4
Equipment Class	3
Seismic Category	I
Airflow Capacity	2,180 cfm]
Fan Type	Propeller

ESW Pump Room Unit Heater	
Number of Units	8 (2 per pump room)
Equipment Class	3
Seismic Category	I
Capacity	20 kW

UHS Transfer Pump Room Unit Heater	
Number of Units	4
Equipment Class	3
Seismic Category	I
Capacity	7.5 kW

NAPS COL 9.4(6)

Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 1 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
ESW Pump Room Exhaust Fans VRS-MFN-601A,B,C,D	Draws outside air through ESW Pump Room to provide cooling	All	Fails to start on t'sat command	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	One Train out due to maintenance does not affect safety function, because a minimum of two ESW pumps and two transfer pumps are required.
			Fails to stop on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Air Intake Gravity Type Backdraft Dampers VRS-OTD-601A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Air Discharge Gravity Type Backdraft Dampers VRS-OTD-602A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	

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Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 2 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
ESW Pump Room Unit Heaters VRS-MEH-601A,B,C,D	Provides heating to ESW Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Unit Heaters VRS-MEH-602A,B,C,D	Provides heating to ESW Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	

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Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 3 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
Transfer Pump Room Exhaust Fans VRS-MFN-602A,B,C,D	Draws outside air through Transfer Pump Room to provide cooling	All	Fails to start on t'sat command	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to stop on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Room Air Intake Gravity Type Backdraft Dampers VRS-OTD-603A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Air Discharge Gravity Type Backdraft Dampers VRS-OTD-604A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	

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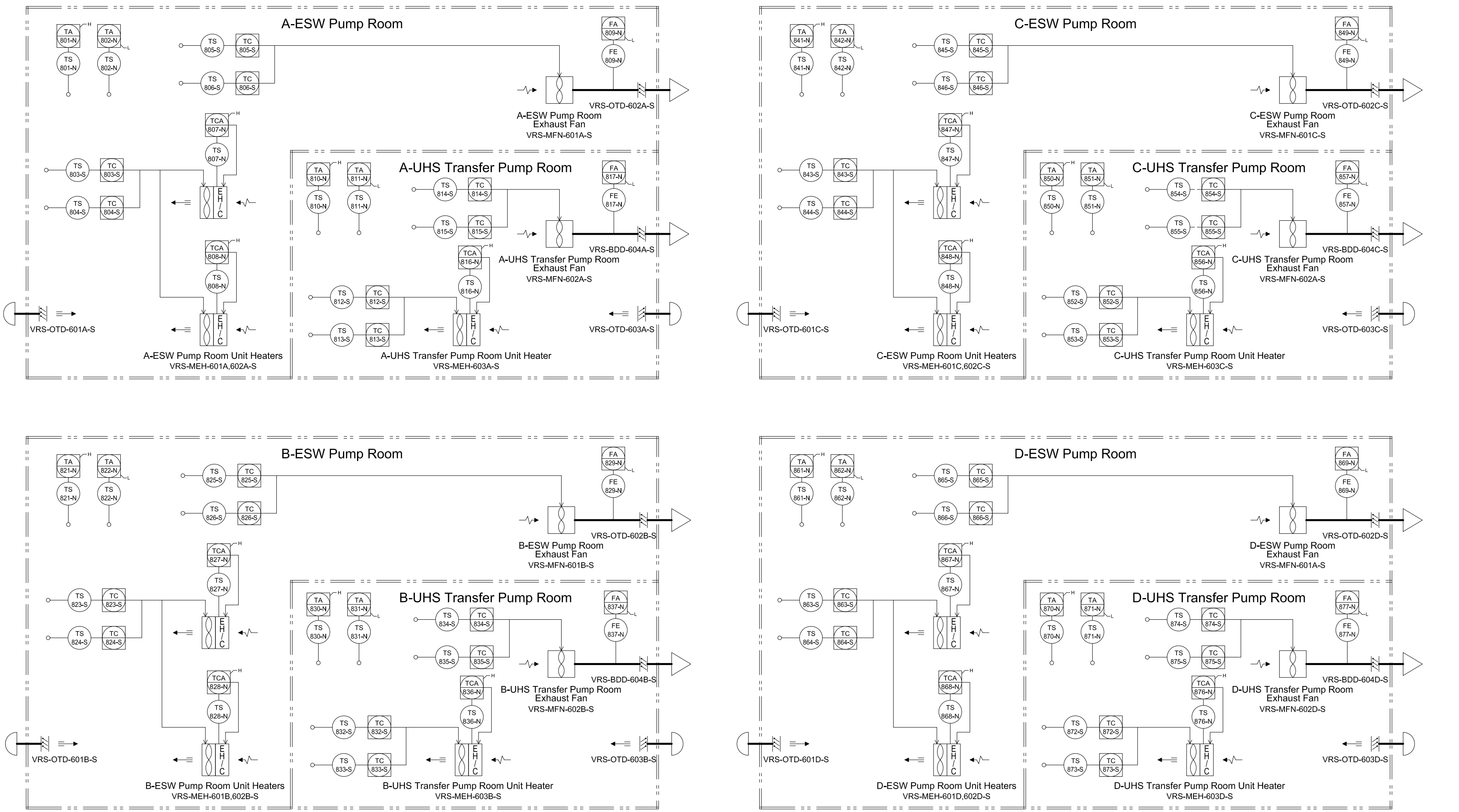
Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 4 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
Transfer Pump Unit Heaters VRS-MEH-603A,B,C,D	Provides heating to Transfer Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Temperature Switch VRS-TS-803,804,805,806 VRS-TS-823,824,825,826 VRS-TS-843,844,845,846 VRS-TS-863,864,865,866	Provides input signal to temperature controller for the starting and stopping of the unit heaters and exhaust fan	All	Fails to send input signal to temperature controller for the unit heaters and exhaust fan	Room low temperature alarm in MCR Room high temperature alarm in MCR Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Room Temperature Switch VRS-TS-812,813,814,815 VRS-TS-832,833,834,835 VRS-TS-852,853,854,855 VRS-TS-872,873,874,875	Provides input signal to temperature controller for the starting and stopping of the unit heaters and exhaust fan	All	Fails to sent input signal to temperature controller for the unit heaters and exhaust fan	Room low temperature alarm in MCR Room high temperature alarm in MCR Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	

Figure 9.4-201 UHS ESW Pump House Ventilation System Flow Diagram



NOTES
1. ALL FANS, DAMPERS AND HEATERS IN THIS SHEET ARE DESIGNATED IN ACCORDANCE WITH SEISMIC CATEGORY 1.
2. BACKDRAFT DAMPERS ARE MOUNTED IN THE WALL OPENING.
3. NO SYSTEM DUCTWORK IS INSTALLED.
4. EXHAUST FANS ARE WALL-MOUNTED.

9.5 Other Auxiliary Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

9.5.1 Fire Protection System

STD COL 9.5(1)

Replace the third sentence of the second paragraph in DCD Subsection 9.5.1 with the following.

The fire protection program (FPP) and implementation of FPP elements are presented in Subsection 9.5.1.6.

9.5.1.2 System Description

STD COL 9.5(1)

Replace the fourth paragraph in DCD Subsection 9.5.1.2 with the following.

Table 9.5.1-1R is a point-by-point comparison of the conformance of the fire protection program with the guidelines of RG 1.189. Table 9.5.1-2R is a point-by-point comparison of the conformance of the fire protection program with the guidelines of NFPA 804 (Reference 9.5.1-14).

9.5.1.2.1 Facility Features for Fire Protection

NAPS COL 9.5(2)

Insert the following paragraph as the last paragraph under sub-heading “Architectural and Structural Features” in Subsection 9.5.1.2.1.

The IRSF is equipped with appropriate fire protection features. See Chapter 11, Appendix 11AA for details.

Replace the eighteenth paragraph in DCD Subsection 9.5.1.2.1 with the following.

Outdoor oil-filled transformers are separated from the T/B by at least 50 feet. A 2-hour fire rated barrier is located between each transformer. Each of the MTs, unit auxiliary transformers, RATs and main generator excitation transformer is protected with a thermally activated automatic water spray system. The transformer arrangement follows the guidance of RG 1.189 and NFPA 804. Provision for drainage and oil spill containment is in accordance with NFPA 804 and IEEE 980 (Reference 9.5.1-204).

9.5.1.2.2 Fire Protection Water Supply System

NAPS COL 9.5(2) Replace the third paragraph in DCD Subsection 9.5.1.2.2 with the following.

The FSS is depicted in Figures 9.5.1-201 through 9.5.1-204. The fire protection water supply source for Unit 3 is Lake Anna. Lake Anna is approximately 13,000 surface acres and can provide well over 600,000 gallons of water to support operation of the Unit 3 FPSs. There is sufficient water supply available to ensure well over two hours of operation of the largest flow requirement for the Unit 3 FPS plus a 500 gpm hose allowance. Lake Anna as a water supply source meets the guidance of RG 1.189, position 3.2.1.e.

The two 100 percent design capacity fire pumps are installed in accordance with NFPA 20 (Reference 9.5.1-216) in the Station Water Intake/Fire Pump House and draw water from two separate intake locations. The lake water can be injected with sodium hypochlorite downstream of the fire pumps in the Station Water Intake/Fire Pump House to preclude biofouling or microbiologically induced corrosion. Filtering is not required because of the small amount of total suspended solids in the lake water.

Sampling and monitoring is performed, as required, to ensure an acceptable level of quality fire water. Periodic system flushes and flow tests are performed to maintain and verify firewater supply system capability.

Fire department connections on all major buildings allow a fire department pumper truck to pump water into the FPS as an additional fire protection water supply source.

9.5.1.2.3 Fire Water Supply Piping, Yard Piping, and Yard Hydrants

NAPS COL 9.5(2) Replace the seventh paragraph in DCD Subsection 9.5.1.2.3 with the following.

The yard main loop is shown in Figures 9.5.1-201 and 9.5.1-204. The underground yard piping is 12-inch diameter high-density polyethylene piping that meets the requirements of AWWA C906 (Reference 9.5.1-215) and is very resistant to corrosion and biofouling. A minimum of 6-inch diameter piping supplies each hydrant and is provided

with an isolation valve for hydrant servicing. Building feeds have a minimum 8-inch diameter. Threads compatible with those used by local offsite fire departments are provided on all hydrants, hose couplings, and standpipe risers; or the local fire departments are provided with adapters that allow interconnection between plant equipment and the fire department equipment.

9.5.1.2.4 Manual Suppression Means

STD COL 9.5(2)

Replace the second and third sentences of third paragraph in DCD Subsection 9.5.1.2.4 with the following.

That standpipe can be isolated from the normal fire protection water source after a SSE and the standpipe can be aligned to the ESWS for water supply of at least two hose streams of 75 gpm each. To support two hours operation of these hose streams, the ESWS is designed to supply at least 18,000 gallons for this need.

9.5.1.3 Safety Evaluation

STD COL 9.5(1)

Replace the eighth paragraph in DCD Subsection 9.5.1.3 with the following.

The Final FHA and safe-shutdown evaluation based on the final plant cable routing, fire barrier ratings, fire loading, ignition sources, purchased equipment and equipment arrangement will be performed. The final FHA and safe-shutdown evaluation will include a review against the assumptions and requirements stated in the initial FHA and safe-shutdown evaluation. The final FHA and safe-shutdown evaluation will also include a detailed post-fire safe-shutdown circuit analysis performed and documented using a methodology similar to that described in NEI 00-01, “Guide for Post-Fire Safe-Shutdown Circuit Analysis,” using as-built data. The final FHA will be implemented as part of the Fire Protection Program in accordance with the milestones in Table 13.4-201.

9.5.1.5 Instrumentation Requirements

NAPS COL 9.5(2)

Replace the third paragraph in DCD Subsection 9.5.1.5 with the following:

The diesel-driven fire pump fuel storage tank is monitored for level.

NAPS COL 9.5(1) Add the following new subsections after DCD Subsection 9.5.1.5.

9.5.1.6 Fire Protection Program

The Unit 3 FPP is established to ensure that a fire will not prevent safe shutdown of the plant and will not endanger the health and safety of the public. Fire protection at the plant uses a defense-in-depth concept that includes fire prevention, detection, control and extinguishing systems and equipment, administrative controls, procedures, trained personnel and the shutdown capability. The vice president North Anna 3 has overall responsibility for the FPP. During construction, a site construction FPP is in place that addresses the requirements of Chapter 11, NFPA 804. The ultimate responsibility for this initial FPP is assigned to the vice president North Anna 3 per Section 13.1.1.2. The elements of the FPP necessary to support receipt and storage of fuel onsite for buildings storing new fuel and adjacent fire areas that could affect the fuel storage area are fully operational prior to receipt of new fuel. Other required elements of the FPP described in this section are fully operational prior to initial fuel loading per Section 13.4.

The FPP includes fire prevention element reviews of proposed plant modifications which potentially have an impact on plant fire safety. A fire protection engineer (assisted by others as necessary) reviews these proposed plant modifications to ensure the following: fixed fire loads are not adversely increased beyond that accounted for in the fire hazards analysis, suitable fire protection features are available in the affected area, and the fire hazards analysis is updated accordingly.

9.5.1.6.1 Organization

The FPP organization and responsibilities are described in Section 13.1.

9.5.1.6.2 Fire Protection Training

Each nuclear plant employee has a responsibility to prevent, detect, report and suppress fires if trained to do so. General site employee training introduces all personnel to the elements of the site's FPP, including responsibilities of the fire protection staff. Training includes information on the types of fires and related extinguishing agents, specific fire hazards at the site, and actions in the event of a fire

suppression system actuation. Fire protection staff training consists of training of personnel in three specific categories:

- Employees assigned to be members of the station fire brigade;
- Employees assigned to the fire protection staff; and
- Offsite fire departments.

Specific training requirements for each of these three categories of personnel are described in the following sections.

9.5.1.6.2.1 **Fire Brigade Training**

Implementation of the fire brigade will be in accordance with the milestones in Section 13.4 for the FPP.

The fire brigade organization, qualifications, and conduct of operations are described in Section 13.1.2.1.5.

Personnel assigned as fire brigade members receive formal training prior to assuming brigade duties. The course subject matter is selected to satisfy the requirements of RG 1.189. In addition, course material selection also includes guidance from NFPA standards 600 and 1500 (References 9.5.1-209, 9.5.1-213, respectively) as appropriate. Additional training may also include material selection from NFPA 1404 and 1451. (References 9.5.1-211, 9.5.1-212)

Course material includes the following classroom instruction:

- Chemistry of fire;
- Classification of fires and principles of extinguishment;
- Fire prevention and inspection techniques;
- FPSs;
- Radiological safety aspects of fires at nuclear facilities;
- Indoctrination of plant personnel regarding firefighting plans with specific identification of individual responsibilities;
- Identification of the type and location of fire hazards and associated types of fires that could occur in the plant;
- The toxic and corrosive characteristics of expected products of combustion;
- Identification of the location of firefighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes;

- The proper use of available firefighting equipment and the correct method of fighting each type of fire including: fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modifications (welding), and record file fires;
- The proper use of communication, lighting, ventilation, and emergency breathing equipment;
- The proper method for fighting fires inside buildings and confined spaces;
- The direction and coordination of firefighting activities (fire brigade leaders only); and
- Detailed review of firefighting strategies and procedures.

Field exercises are conducted to reinforce the classroom training and provide an opportunity to practice the skills learned. These exercises include:

- Fighting small fires with portable fire extinguishers;
- Fighting interior fires using breathing apparatus;
- Controlling incidents involving flammable gases or pressurized liquid fuels;
- Fighting large flammable liquid fires using hose lines or foam; and
- Fighting flammable liquid fires inside building.

The classroom instruction and field exercises are provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur and in using the types of equipment available at the power station.

To qualify as a member of the fire brigade, an individual must also meet the following criteria:

- Is available to answer fire alarms; and

- Has passed an annual physical exam which includes an annual physical examination to determine their ability to perform strenuous firefighting activities.

9.5.1.6.2.2 Fire Protection Staff Training

The Fire Protection Engineer responsible for the formulation and implementation of the FPP meets the qualification requirements provided in RG 1.189, Regulatory Position 1.6.1.a (reference Table 9.5.1-1R).

The station fire protection staff receives training in:

- Design and maintenance of fire detection, suppression, and extinguishing systems;
- Fire prevention techniques and procedures;
- Firefighting techniques and procedures for plant personnel and the fire brigades; and
- Hazardous material identification and handling.

Specific courses to achieve the above training objectives are provided for the personnel assigned to the fire protection staff if they are not fully trained when hired. Other training organizations may be used to provide this training on a case-by-case basis.

9.5.1.6.2.3 Fire Watch Training

Specific fire watch training includes instruction on fire watch duties, responsibilities, and required actions for both one hour roving and continuous fire watches. The training includes hands on training on a practice fire with the extinguishing equipment to be used while on fire watch. Fire watch personnel who are trained to provide compensatory action fire watches are provided training in recordkeeping requirements.

9.5.1.6.2.4 Offsite Fire Department Training

Training for offsite fire departments that have agreed to assist during a major onsite fire is provided to make members aware of the need for radiological protection of personnel, the special hazards and operational precautions associated with fire fighting at a nuclear power plant. The course is provided annually and includes instruction in the following:

- Basic radiation protection, including the use of personal dosimetry devices;
- Plant familiarization, including hazards, available fire fighting equipment, and FPSs;

- Firefighting procedures; and
- Security procedures, including entry to and exit from the plant.

Local offsite fire department personnel who provide back up for manual fire fighting resources have the following:

- Trained personnel and equipment with capacities consistent with those assumed in the fire hazards analysis and pre-fire plans
- Hose threads or adapters to connect with onsite hydrants, hose couplings, and standpipe risers

9.5.1.6.2.5 **Fire Brigade Retraining**

Classroom

Regular planned meetings are held at least once each calendar quarter for brigade members to review changes in the FPP and other subjects as necessary. Periodic refresher training sessions are held to repeat the classroom instruction program for brigade members over any 2-year period. These sessions may be concurrent with the regular planned meetings.

Practice

Practice sessions are held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in firefighting. These practice sessions are provided at least once per year to each fire brigade member.

Drills

Fire brigade drills are conducted in various plant areas, especially in those areas identified by the fire hazards analysis to be critical to plant operation and to contain significant fire hazards. Fire brigade drills are performed in the plant so that the fire brigade can practice as a team.

Unannounced drills are in full dress. Regularly scheduled drills are also in full dress. Full dress includes helmet, coat, boots, gloves, and emergency breathing apparatus. Donning of face mask and use of emergency air is not mandatory during drills. Drills are performed at least once each calendar quarter for each shift fire brigade.

The offsite local fire department is invited to participate in at least one drill per year. Each fire brigade participates in at least two drills per year. Critiques are conducted upon completion of each drill to evaluate the effectiveness of brigade performance and incorporate lessons learned into future drill evolutions. Drills include reviews of the latest plant modifications and corresponding changes in firefighting plans.

9.5.1.6.2.6 Fire Brigade Records

Individual records of training provided to each fire brigade member, including drill critiques, are maintained as part of the permanent plant files for at least 3 years to ensure that each member receives training in all parts of the training program. Retraining or broadened training for firefighting within buildings is scheduled for all those brigade members whose performance records show deficiencies. A system to document drills including critiques and corrective actions has been developed. Fire brigade training review and individual performance programs also have been developed.

NAPS COL 9.5(1)
NAPS COL 9.5(3)

9.5.1.6.3 Fire Brigade Equipment

The members of the fire brigade receive the appropriate equipment to enable them to perform the required response duties. The selection of equipment includes the consideration of the nature of the hazards in the facility and the required fire response actions. Storage space for the fire brigade equipment is such that ready accessibility to the fire fighting equipment exists. A written equipment list that the industrial fire brigade is expected to use is maintained onsite, reviewed annually, and updated as necessary. This list includes the location of the equipment and procedures for obtaining the equipment when needed.

The fire brigade equipment includes thermal protective clothing and protective equipment in sufficient quantities and sizes to fit each fire brigade member expected to respond to a fire event. The protective clothing including helmets, gloves, and footwear is in accordance with NFPA 1971, "Standard on Protective Ensemble for Structural Fire Fighting" (Reference 9.5.1-201). All fire brigade members responding to a fire event use self-contained breathing apparatus and personal alert safety systems devices in accordance with NFPA 1982, "Standard on Personal Alert Safety Systems" (Reference 9.5.1-203) and with NFPA 1981, "Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services" (Reference 9.5.1-202).

Self-contained breathing apparatus are approved by the National Institute for Occupational Health and Safety and Mine Safety and Health Administration with minimum service duration of 30 minutes and operate in the positive pressure mode only. At least 10 masks are readily available for fire brigade personnel. Also, a 1-hour supply of breathing air in extra bottles is located at the plant for each self-contained breathing apparatus. In addition, an onsite 6-hour supply of reserve air is provided for fire brigade personnel and is arranged to permit quick and complete replenishment of exhausted air supply bottles as they are returned.

All fire brigade equipment undergoes inspection and maintenance at least annually. Operation and maintenance manuals and maintenance reports for the fire brigade equipment are retained on file and available to the fire brigade. Thermal protective clothing and protective equipment are used and maintained in accordance with manufacturer's instructions and subject to a maintenance and inspection program.

Fire brigade members using self-contained breathing apparatus operate in teams of two or more who are in communication with each other through visual, audible, physical, safety guide rope, electronic, or other means to coordinate their activities and are in close proximity to each other to provide assistance in case of an emergency.

In addition to the appropriate protective clothing, fire brigade equipment provided includes fire hoses, the appropriate fire hose nozzles for electric plant usage, portable fire extinguishers, wheeled fire extinguishers, portable exhaust fans, portable emergency communication equipment, portable lighting, and fire fighting foam carts suitable for responding to fires involving hydrocarbon lube oil.

9.5.1.6.4 **Administrative Controls**

Administrative controls for the FPP are implemented through plant administrative procedures. These procedures are available for review and inspection prior to implementation of the program.

These controls establish procedures to:

- Identify actions to be taken by an individual discovering a fire, such as notification to the Control Room, attempting to extinguish the fire, and actuation of local fire suppression systems;

- Define actions to be taken by the Control Room operator, such as sounding fire alarms, and notifying the Shift Supervisor of the type, size and location of the fire;
- Identify actions to be taken by the fire brigade after notification of a fire, including location to assemble, directions given by the fire brigade leader, the responsibilities of brigade members such as selection of fire fighting and protective equipment and use of preplanned strategies for fighting fires in specific areas;
- Identify actions to be taken by the Security force upon notification of a fire;
- Define the strategies established for fighting fires in safety-related areas and areas presenting a hazard to safety-related equipment, including the designation of the:
  - Fire hazards in each plant zone covered by a fire fighting procedure;
  - Fire extinguishers best suited for controlling fires with the combustible loadings of the zone and the nearest location of these extinguishers;
  - Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station of elevation for fighting the fire. All access and egress routes that involve locked doors are specifically identified in the procedure with the appropriate precautions and methods for access specified;
  - Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical system in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards);
  - Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling are designated;
  - Potential radiological and toxic hazards in fire zones;

  - Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operations;
  - Operations requiring Control Room and Operating Supervisor coordination or authorization; and
  - Instructions for plant operators and general plant personnel during a fire.
- Organize the fire brigade and assign special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command and control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishing agent to the fire, communication with the Control Room, and coordination with outside fire departments.
- Implement compensatory measures such as fire watches, temporary fire barriers, and backup suppression capability as required.
- Report fire events and fire protection deficiencies that meet the criteria of 10 CFR 50.72 and 10 CFR 50.73 to the NRC in accordance with the requirements of these regulations.
- Maintain records of FPP-related changes in the facility, changes in procedures, and tests and experiments that will not require prior NRC approval. These records will include the written evaluations that provide the bases for the determinations that the changes do not adversely affect safe-shutdown capability. The FPP and its revisions will be retained until the license is terminated. Each superseded revision of the procedures will be retained for three years from the date it was superseded.

9.5.1.6.5 Control of Combustible Materials, Hazardous Materials and Ignition Sources

The control of combustible materials is defined by administrative procedures. These procedures impose the following controls:

- Prohibit the storage of combustible materials (including unused ion exchange resins) in areas that contain or expose safety-related equipment or establish designated storage areas with appropriate fire protection;

- Govern the handling of and limit transient fire loads such as flammable liquids, wood and plastic materials;
- Assign responsibility to the appropriate supervisor for reviewing work activities to identify transient fire loads;
- Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, grinding, brazing and soldering operations, and temporary electrical power cables. A separate permit is issued for each area where such work is done. If work continues over more than one shift, the permit is valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown per NFPA 51B (Reference 9.5.1-206) and 241 (Reference 9.5.1-208);
- Minimize waste, debris, scrap, and oil spills or other combustibles resulting from a work activity while work is in progress and remove the same upon completion of the activity or at the end of each work shift;
- Govern periodic inspections for accumulation of combustibles and to ensure continued compliance with these administrative controls;
- Prohibit the storage of acetylene-oxygen and other compressed gasses in areas that contain or expose safety-related equipment or the FPS that serves those areas. The handling, use and storage of flammable and combustible liquids complies with the provisions of NFPA 30 (Reference 9.5.1-205). The amounts of these materials are controlled and the materials are handled using approved containers. The storage, use and handling of compressed gases comply with the provisions of NFPA-55 (Reference 9.5.1-207). A permit system is required to use this equipment;
- Govern the use and storage of hazardous chemicals;
- Govern the use of specific combustibles; Wood smaller than 152 mm x 152 mm (6 in. x 6 in.) used during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding) is treated with a flame retardant as described in RG 1.189 Position 2.1.1.c. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in the power block if required for valid operating reasons. However, all combustible materials are removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, is not left unattended during lunch

breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting is placed in metal containers with tight-fitting self-closing metal covers. Only noncombustible panels or flame-retardant tarpaulins or approved materials of equivalent fire retardant characteristics are used. Any other fabrics or plastic films used are certified to conform to the large-scale fire test described in NFPA 701. (Reference 9.5.1-205)

- Govern the control of electrical appliances in areas that contain or expose safety-related equipment.
- In rooms adjacent to the MCR complex and in computer rooms that are not part of the control room complex:
  - Transient combustible materials are not left unattended during lunch breaks, shift changes, or similar periods unless stored in approved containers.
  - Electrical appliances and other potential ignition sources are controlled.
- Prohibit the storage of transient combustibles below the raised floor in the MCR complex; and
- Prohibit the storage of hazardous chemicals in areas that contain or expose equipment important to safety.

9.5.1.6.6 **Control of Radioactive Materials**

As stated in the Fire Hazards Analysis (FHA) the primary objectives of an FPP are to minimize both the probability of occurrence and the consequences of a fire. To meet these objectives, the FPP provides reasonable assurance, through defense-in-depth, that a fire does not prevent the performance of necessary safe shutdown functions and that radioactive releases to the environment in the event of a fire are minimized. Materials that collect or contain radioactivity such as spent resins and filters are protected and stored in accordance with the guidance of RG 1.189 (Ref. 9.5.1-12). See Appendix 9A for detailed analysis.

9.5.1.6.7 **Testing and Inspection**

The FPS is initially tested in accordance with Section 14.2. Testing and inspection requirements are implemented through administrative

procedures. Post maintenance or modifications testing to the FPS is subject to review to ensure conformance to design requirements.

Installation of portions of the system where performance cannot be verified through post modification tests, such as penetration seals, fire retardant coatings, cable routing, and fire barriers is inspected. Inspections are performed by individuals knowledgeable of fire protection design and installation requirements.

Open flame or combustion generated smoke are not to be used for leak testing or similar procedures such as air flow determination. Inspection and testing procedures address the identification of items to be tested or inspected, responsible organizations for the activity, acceptance criteria, documentation requirements and signoff requirements.

The FPS, including fire detection system, auto suppression system, and manual suppression equipment, is periodically inspected. In addition, systems which support firefighting, such as emergency breathing and auxiliary equipment, emergency lighting and communication equipment, are periodically inspected.

Fire Protection materials subject to degradation, such as fire stops, seals, and fire retardant coatings are visually inspected periodically to ensure they are not degraded or damaged. Fire hoses are hydrostatically tested in accordance with NFPA-1962 (Reference 9.5.1-214). Hoses stored in outside hose stations are tested annually and interior standpipe hoses are tested every three years.

The FPS is periodically tested in accordance with plant procedures. Fire protection equipment, emergency lighting, and communication equipment are tested periodically to ensure that the equipment functions properly and continues to meet the design criteria. Testing includes periodic operational tests and visual verification of damper and valve positions.

Fire doors and their closing and latching mechanisms are also included in these procedures. Fire doors separating areas containing safety-related equipment are self-closing or provided with closing mechanisms and are inspected semiannually to verify that the automatic hold open, release and closing mechanisms and latches are operable. Watertight and missile resistant doors are not provided with closing mechanisms. Fire doors with automatic hold open and release mechanisms are inspected daily to verify that the doorways are free of obstructions.

Fire doors separating fire areas are normally closed and latched. Fire doors that are locked closed are inspected weekly to verify position. Fire doors that are closed and latched are inspected daily to assure that they are in the closed position. However, fire doors that are closed and electrically supervised at a continuously manned location are not inspected.

9.5.1.6.8 Quality Assurance

QA controls are applied to the activities involved in the design, procurement, installation, and testing and the administrative controls of FPSs, in accordance with the programs outlined in Chapter 17.

For the operational FPP, the QAP implements the requirements of RG 1.189 through site-specific administrative controls procedures. The procedures will be developed six months prior to fuel receipt and will be fully implemented prior to fuel receipt.

9.5.1.6.9 Emergency Planning

Emergency planning is described in Section 13.3.

9.5.2 Communication Systems

STD COL 9.5(4)

Replace the first sentence of the second paragraph in DCD Subsection 9.5.2 with the following.

The intra-plant communications systems consist of a public address/page party line system, intra-plant telephone system, intra-plant sound powered telephone system, plant radio transmitter and receiver system, broadband (internet) communications, and offsite radio systems. The offsite communications systems include telephone, radio frequency system, privately-owned microwave and fiber optic systems, broadband (internet), and personal cell phone.

9.5.2.2.2 Private Automatic Branch Telephone Exchange (PABX)

STD COL 9.5(4)
STD COL 9.5(5)

Replace the third sentence in DCD Subsection 9.5.2.2.2 with the following.

Access to commercial facilities such as central office trunk, utility's private network, and other offsite connections are provided though redundant and diverse routes as discussed in Subsection 9.5.2.2.2.2 and 9.5.2.2.5.1.

9.5.2.2.2.2 Emergency Telephones

NAPS COL 9.5(4)
NAPS COL 9.5(5)

Add the following paragraphs to the end of the DCD Subsection 9.5.2.2.2.2.

Direct communications links (direct telephone) are provided to the NRC Operations Center, the State Emergency Operations Center, risk jurisdiction authorities, and the Central Emergency Operations Center. A crisis management radio system is provided which meets the intent of NUREG 0654 and is discussed in Subsection 9.5.2.2.5.2.

The North Anna Emergency Notification System (ENS) is provided in the plant Emergency Plan. The ENS phone lines are routed directly to the local telephone company central office via fiber-optic phone lines through a telephone utility switch in the on-site telephone equipment building. The normal power for this device is non-safety related station power. The telephone system will lose its normal power supply during a LOOP; however, the phone system is battery backed for approximately eight hours. This design ensures that the ENS at the site is fully operable from the site in the event of a LOOP at the site and complies with the requirements of NRC Bulletin 80-15 for the ENS. Automatic Ringdown Circuits (ARD) (described in the plant Emergency Plan) connect the plant to the local and state emergency offices, and are normally powered from the non-safety related station power and backed with approximately eight hours of battery backup power. In addition to the connections to the local telephone company, a separate Company-owned and maintained fiber-optic network exists which provides communication between the station, the system operations center, and the NRC. This Company network is also capable of external long distant and local telephone calls.

The primary method for notification of State and local authorities is the Insta-phone, which is accessible from the Control Room, TSC, and EOF. The Insta-phone is described in the Emergency Plan.

Voice communications with the grid operator are provided via a Company-owned and -maintained fiber optic transmission system that allows telephone communications with the entire Corporate System. Access to this mode of transmission is made via the plant telephone system. A dedicated handset is provided between the Control Room and the power system operator.

9.5.2.2.5.1 General

NAPS COL 9.5(4)

Replace the first and second sentence of the first paragraph in DCD Subsection 9.5.2.2.5.1 with the following.

Plant specific redundant external communication links include.

- Fiber optic telephone circuits
- Fiber optic data links
- Emergency radio communication links
- Direct telephone links to utility operations centers, the NRC, and State and Local Emergency Operations facilities
- Personal cell phone links (no credit is taken but these links provide alternate links which allow for additional communication paths)

9.5.2.2.5.2 Emergency Communications

STD COL 9.5(6)
STD COL 9.5(7)
STD COL 9.5(8)
STD COL 9.5(9)

Replace the second and third sentence of the second paragraph in DCD Subsection 9.5.2.2.5.2 with the following.

The effectiveness of the overall emergency response plan is in conformance with the requirements of 10 CFR 50.47(b)(8). Adequate communications equipment are provided and maintained to allow the control room to communicate with offsite personnel and organizations. Pursuant to the emergency response plan, the following equipment is tested.

- An inspection and test is performed of the TSC voice communication equipment.
- An inspection and test is performed of the operation support center voice communication equipment.
- An inspection and test is performed of the EOF voice communication equipment.
- A test is performed of the means for warning or advising onsite individuals of an emergency.

A continuously manned alarm station as required by 10 CFR 73.46(e)(5) is provided.

Communication subsystems are provided as required by 10 CFR 73.46(e)(5). Each guard, watchman, or armed responder on duty

maintains continuous communication with each continuously manned alarm station. The individual in the alarm station is capable of calling for assistance from other guards, watchmen, armed responders, and from law enforcement authorities.

Communication network and equipments for rapid and accurate transmission of routine security information to onsite personnel are provided for assessment of a contingency and response to a contingency and for rapid transmission of information to offsite assessment team. This is in conformance to the requirements of 10 CFR 73.45(g)(4)(i) and (ii).

Each alarm station required by 10 CFR 73.46(e)(5) of the regulation has both conventional telephone service and radio or microwave transmitted two-way voice communication, either directly or through an intermediary, for the capability of communication with the law enforcement authorities.

The offsite communications systems within the onsite Technical Support Center provide for emergency response following a design basis accident. During emergencies, the TSC is the primary onsite communication center for the communications to the control room, the operations support center and the NRC.

The Operations Support Center (OSC) is equipped with a PABX system similar to that provided for the TSC and the EOF. This PABX telephone system is connected to the offsite commercial telephone system and provides voice and facsimile communications capability for normal and emergency communications between the MCR, TSC, EOF, OSC, Corporate Offices, NRC, State agencies and county Sheriff's offices. In addition to the PABX system, the plant communication systems for the OSC also include the public address system / plant page – party system, the plant radio system and the sound powered telephone system.

In addition, provisions for communication with state and local operations centers are provided in the onsite TSC to initiate early notification and recommendations to offsite authorities prior to activation of the EOF. This is in accordance with the requirements of 10 CFR 50 Appendix E, Part IV.E.9.

STD COL 9.5(5)
STD COL 9.5(6)
STD COL 9.5(9)

Replace sixth paragraph in DCD Subsection 9.5.2.2.5.2 with the following.

The emergency offsite communication system serves as an alternate means of communication to notify local authorities of an emergency at

the nuclear plant. Radios are provided for communications with the main control room, TSC, EOF, and local authorities.

This emergency radio communications system connects onsite and offsite monitoring teams with the operation support center and EOF respectively.

The plant is provided with separate telephone systems for operations and for security pursuant to 10 CFR 73.55(f). Data Communications is discussed in Section 7.9. Fire brigade communications is covered in Subsection 9.5.1.

The emergency plan and security plan are described in Sections 13.3 and 13.6, respectively. These plans require testing of offsite communications links.

9.5.2.3 Safety Evaluation

STD COL 9.5(7)

Add the following paragraph after the first paragraph in DCD Subsection 9.5.2.3.

Plant specific safety evaluations and procedures are established by the plant operator to prevent any unauthorized access to secure locations and or unconfirmed removal of strategic special nuclear material in accordance with 10 CFR 73.45(e)(2)(iii).

9.5.4.2.2.1 Fuel Oil Storage Tanks and Piping

NAPS COL 9.5(12)

Delete the second sentence and replace the last sentence of the tenth paragraph in DCD Subsection 9.5.4.2.2.1 with the following.

The other side of the access tunnel is considered a part of the PSFSV and has the same conditions of the vault area. Unit heaters are provided to maintain fuel oil temperature within specification when the access tunnel temperature may drop below 35°F.

9.5.4.3 Safety Evaluation

NAPS COL 9.5(11)

Replace the second sentence of the seventh paragraph in DCD Subsection 9.5.4.3 with the following.

Fuel oil is normally transported to the NAPS site by tanker trucks. Dominion maintains an off-site central inventory of fuel oil to supply needs throughout its system capable of supplying Unit 3 with fuel oil within seven days.

9.5.8.3 Safety Evaluation

NAPS COL 9.3(1)

Replace the third paragraph of DCD Subsection 9.5.8.3 with the following.

The site plan, Figure 1.2-1R, shows the physical relationship of the PS/B to those plant features that could affect the system. The PS/B is not near any bulk gas storage facilities. Bulk storage facilities for carbon dioxide, hydrogen, and nitrogen are in the gas tank farm.

9.5.9 Combined License Information

Replace the content of DCD Subsection 9.5.9 with the following.

STD COL 9.5(1)
NAPS COL 9.5(1)

9.5(1) ***Fire protection program, fire fighting procedures, and quality assurance***

This COL item is addressed in Subsections 9.5.1, 9.5.1.2, 9.5.1.3, 9.5.1.6, Table 9.5.1-1R and Table 9.5.1-2R.

STD COL 9.5(2)
NAPS COL 9.5(2)

9.5(2) ***Site specific fire protection aspects***

This COL item is addressed in Subsections 9.2.1.2.1, 9.5.1.2.1, 9.5.1.2.2, 9.5.1.2.3, 9.5.1.2.4, 9.5.1.5, Tables 9.5.1-1R and 9.5.1-2R, Figures 9.5.1-201 thru 9.5.1-204, Appendix 9A, and Appendix 11AA.

STD COL 9.5(3)
NAPS COL 9.5(3)

9.5(3) ***Apparatus for plant personnel and fire brigades***

This COL item is addressed in Subsection 9.5.1.6.3 and Table 9.5.1-2R.

STD COL 9.5(4)
NAPS COL 9.5(4)

9.5(4) ***Communication system interfaces external to the plant (offsite locations)***

This COL item is addressed in Subsection 9.5.2, 9.5.2.2.2, 9.5.2.2.2.2 and 9.5.2.2.5.1.

STD COL 9.5(5)
NAPS COL 9.5(5)

9.5(5) ***The emergency offsite communications***

This COL item is addressed in Subsection 9.5.2.2.2, 9.5.2.2.2.2 and 9.5.2.2.5.2.

STD COL 9.5(6)

9.5(6) ***Connections to the Technical Support Center***

This COL item is addressed in Subsection 9.5.2.2.5.2

STD COL 9.5(7)

9.5(7) ***Continuously manned alarm station***

This COL item is addressed in Subsection 9.5.2.2.5.2. and 9.5.2.3.

STD COL 9.5(8)

9.5(8) ***Offsite communications for the onsite operations support center.***

This COL item is addressed in Subsection 9.5.2.2.5.2

STD COL 9.5(9)

9.5(9) ***Emergency communication system***

This COL item is addressed in Subsection 9.5.2.2.5.2.

9.5(10) ***Deleted from the DCD.***

NAPS COL 9.5(11)

9.5(11) ***Fuel oil recharging***

This COL item is addressed in Subsection 9.5.4.3.

NAPS COL 9.5(12)

9.5(12) ***PSFSV heating requirements***

This COL item is addressed in Subsection 9.5.4.2.2.1.

9.5.10 References

Add the following references after the last reference in DCD Subsection 9.5.10.

9.5.1-201 NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2007 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-202 NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2007 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-203 NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*, 2007 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-204 IEEE Std 980-1994, *IEEE Guide for Containment and Control of Oil Spills in Substations*, Institute of Electrical and Electronics Engineers, New York, NY.

9.5.1-205 NFPA 30, *Flammable and Combustible Liquids Code*, 2008 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-206 NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2009 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-207 NFPA 55, *Compressed Gasses and Cryogenic Fluids Code*, 2010 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-208 NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2009 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-209 NFPA 600, *Standard on Industrial Fire Brigades*, 2010 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-210 NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, 2010 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-211 NFPA 1404, *Standard for Fire Service Respiratory Protection Training*, 2006 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-212 NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program*, 2007 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-213 NFPA 1500, *Standard on Fire Department Operation Safety and Health Program*, 2007 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-214 NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*, 2008 Edition, National Fire Protection Association, Quincy, MA.

9.5.1-215 AWWA C906, *Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In.(1,600 mm), for Water Distribution and Transmission*, January 2007, American Water Works Association.

9.5.1-216 NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection Code*, 2007 Edition, National Fire Protection Association, Quincy MA.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 1 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	In accordance with 10 CFR 50.48, each operating nuclear power plant must have a fire protection plan. The plan should establish the fire protection policy for the protection of SSCs important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.	1.	Conform	See Subsection 9.5.1.6.
NAPS COL 9.5(1)	The fire protection program should describe the organizational structure and responsibilities for its establishment and implementation. These responsibilities include fire protection program policy; program management (including program development, maintenance, updating, and compliance verification), fire protection staffing and qualifications; engineering and modification, inspection, testing, and maintenance of FPSs, features, and equipment, fire prevention, emergency response (e.g., fire brigades and offsite mutual aid), and general employee, operator, and fire brigade training.	1.1	~~Conform~~ See Remarks	~~See Subsection 9.5.1.6.~~ Conforms with the following exception. Section C.1.1.c states that during construction, on sites with an operating unit, the superintendent of the operating plant should have overall responsibility for fire protection. However, due to physical and administrative separation of Unit 3 from the operating units, the on-site executive in charge of construction will have overall responsibility for Unit 3 fire protection during construction.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 1 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(2)	A fire hazards analysis should be performed to demonstrate that the plant will maintain the ability to perform safe-shutdown functions and minimize radioactive material releases to the environment in the event of a fire. This analysis should be revised as necessary to reflect plant design and operational changes.	1.2	Conform	FHA is included as Appendix 9A
	In accordance with 10 CFR 50.48, each operating nuclear power plant must provide the means to limit fire damage to SSCs important to safety so that the capability to safely shut down the reactor is ensured.	1.3	Conform	4 safety trains are provided which are completely separated by 3-hour fire rated barriers. Any two trains can achieve safe-shutdown.
	The licensee should evaluate fire reports and data (e.g., fire barrier testing results and cable derating data) that are used to demonstrate compliance with NRC fire protection requirements to ensure that the information is applicable and representative of the conditions for which the information is being applied.	1.4	Conform	The US-APWR employs the use of limited applications of cable fire barriers, which have been qualified in accordance with GL 86-10 supplement 1.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 2 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	Temporary changes to specific fire protection features that may be necessary to accomplish maintenance or modifications are acceptable, provided interim compensatory measures, such as fire watches, temporary fire barriers, or backup suppression capability, are implemented. For common types of deficiencies, the technical specifications or the NRC-approved fire protection program generally note the specific compensatory measures. For unique situations or for measures that the approved fire protection program does not include, the licensee may determine appropriate compensatory measures. A licensee may opt to implement an alternative compensatory measure, or combination of measures, to the one stated in its fire protection program.	1.5	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire protection program should be under the direction of an individual who has available staff personnel knowledgeable in both fire protection and nuclear safety. Plant personnel should be adequately trained in the administrative procedures that implement the fire protection program and the emergency procedures relative to fire protection.	1.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire protection staff should meet the following qualifications: a. The formulation and assurance of the fire protection program and its implementation should be the responsibility of personnel prepared by training and experience in fire protection and in nuclear plant safety to provide a comprehensive approach in directing the fire protection program for the nuclear power plant. A fire protection engineer (or a consultant) who is a graduate of an engineering curriculum of accepted standing and satisfies the eligibility requirements as a Member in the Society of Fire Protection Engineers should be a member of the organization responsible for the formulation and implementation of the fire protection program.	1.6.1.a	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	b. The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity and the fire brigade training as described in Regulatory Position 1.6.4.	1.6.1.b	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 3 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	c. The personnel responsible for the maintenance and testing of the fire protection systems should be qualified by training and experience for such work.	1.6.1.c	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	d. The personnel responsible for the training of the fire brigade should be qualified by knowledge, suitable training, and experience for such work.	1.6.1.d	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Each nuclear plant employee has a responsibility to prevent, detect, and suppress fires. General site employee training should introduce all personnel to the elements of the site's fire protection program, including the responsibilities of the fire protection staff. Training should also include information on the types of fires and related extinguishing agents, specific fire hazards at the site, and actions in the event of a fire suppression system actuation.	1.6.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire watches provide for observation and control of fire hazards associated with hot work, and they may act as compensatory measures for degraded fire protection systems and features. Specific fire watch training should provide instruction on fire watch duties, responsibilities, and required actions for both 1-hour roving and continuous fire watches. Fire watch qualifications should include hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch. If fire watches are to be used as compensatory actions, the fire watch training should include recordkeeping requirements.	1.6.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire brigade training program should establish and maintain the capability to fight credible and challenging fires. The program should consist of initial classroom instruction followed by periodic classroom instruction, firefighting practice, and fire drills. (See Regulatory Position 3.5.1.4 for drill guidance.)	1.6.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 4 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(1)	The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader should be competent to assess the potential safety consequences of a fire and advise MCR personnel. Such competence by the brigade leader may be evidenced by possession of an operator’s license or equivalent knowledge of plant systems. Nuclear power plants staffed with a dedicated professional fire department may utilize a fire team advisor to assess the potential safety consequences of a fire and advise the MCR and incident commander. The fire team advisor should possess an operator’s license or equivalent knowledge of plant systems and be dedicated to supporting the fire incident commander during fire emergency events.	1.6.4.1	Conform	See ~~9.5.1.6.~~ Subsection 13.1.2.1.5.
STD COL 9.5(1)	Instruction should be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant. The licensee should provide instruction to all fire brigade members and fire brigade leaders.	1.6.4.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should hold practice sessions for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions should provide brigade members with experience in actual fire extinguishment and the use of self-contained breathing apparatuses under the strenuous conditions encountered in firefighting. The licensee should provide these practice sessions at least once per year for each fire brigade member.	1.6.4.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should maintain individual records of training provided to each fire brigade member, including drill critiques, for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training should be available for NRC review.	1.6.4.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 5 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	The overall plant QA plan should include the QA program for fire protection. For fire protection systems, the licensee should have and maintain a QA program that provides assurance that the fire protection systems are designed, fabricated, erected, tested, maintained, and operated so that they will function as intended. Fire protection systems are not "safety-related" and, therefore, are not within the scope of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR 50, unless the licensee has committed to include these systems under the plant's Appendix B program.	1.7	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish measures to include the guidance presented in this RG in its design and procurement documents.	1.7.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Documented instructions, procedures, or drawings should prescribe inspections, tests, administrative controls, fire drills, and training that govern the fire protection program.	1.7.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish the following measures to ensure that purchased material, equipment, and services conform to the procurement documents: a. provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor, inspections at suppliers, or receipt inspections b. source or receipt inspection, at a minimum, for those items that, once installed, cannot have their quality verified.	1.7.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish and execute a program for independent inspection of activities affecting fire protection that allows the organization performing the activity to verify conformance to documented installation drawings and test procedures.	1.7.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish and implement a test program to ensure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and corrective actions taken as necessary.	1.7.5	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 6 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	The licensee should establish measures to provide for the documentation or identification of items that have satisfactorily passed required tests and inspections. These measures should include provisions for identification by means of tags, labels, or similar temporary markings to indicate completion of required inspections and tests and operating status.	1.7.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish measures to control items that do not conform to specified requirements to prevent inadvertent use or installation.	1.7.7	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish measures to ensure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible materials, and nonconformances, are promptly identified, reported, and corrected.	1.7.8	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should prepare and maintain records to furnish evidence that the plant is meeting the criteria enumerated above for activities affecting the fire protection program.	1.7.9	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should conduct and document audits to verify compliance with the fire protection program.	1.7.10	Conform	See Subsection 9.5.1.6.
STD COL 9.5(2)	For those licensees who have relocated audit requirements from their technical specifications to the QA program, annual fire protection audits may be changed to a “maximum interval of 24 months” by implementation of a performance-based schedule, if justified by performance reviews, provided that the maximum audit interval does not exceed the interval specified in American National Standards Institute/American Nuclear Society (ANSI/ANS) 3.2-1994, “Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants.”	1.7.10.1	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 7 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD* COL 9.5(1)	The 24-month audit of the fire protection program and implementing procedures should ensure that the requirements for design, procurement, fabrication, installation, testing, maintenance, and administrative controls for the respective programs are included in the plant QA program for fire protection and meet the criteria of the QA/QC program established by the licensee, consistent with this guide. Personnel from the licensee's QA organization, who do not have direct responsibility for the program being evaluated, should perform these audits.	1.7.10.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The triennial audit is basically the same as the annual audit; the difference lies in the source of the auditors. Qualified utility personnel who are not directly responsible for the site fire protection program or an outside independent fire protection consultant may perform the annual audit. However, an outside independent fire protection consultant should perform the triennial audit. These audits would normally encompass an evaluation of existing documents (other than those addressed under the 24-month audit) and an inspection of fire protection system operability, inspection of the integrity of fire barriers, and witnessing the performance of procedures to verify that the licensee has fully implemented the fire protection program and that the plan is adequate for the objects protected.	1.7.10.3	Conform	See Subsection 9.5.1.6.
	This section provides guidance relative to the regulatory mechanisms for addressing changes, deviations, exemptions, and other issues affecting compliance with fire protection regulatory requirements. Risk-informed, performance-based methodologies may be used to evaluate the acceptability of fire protection program changes; however, the licensee should use NRC reviewed and approved methodologies and acceptance criteria for this approach.	1.8	Information Statement	No compliance action, this is an informational statement.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 8 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	If an existing plant licensee has adopted the standard license condition for fire protection and incorporated the fire protection program in the final safety analysis report (FSAR), the licensee may make changes to the approved fire protection program without the Commission's prior approval only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire as documented in a safety evaluation.	1.8.1	N/A	The US-APWR is a new plant that will be subject to current licensing requirements of the US NRC at the time of COL application.
	If the fire protection program committed to by the licensee is required by a specific license condition and is not part of the FSAR for the facility, the licensee may be required to submit amendment requests even for relatively minor changes to the fire protection program.	1.8.1.1	N/A	The US-APWR is a new plant that will be licensed under current regulations at the time of COL application.
	The NRC transmitted the standard license condition for fire protection to licensees in April 1986 as part of GL 86-10 with information on its applicability to specific plants.	1.8.1.2	Information Statement	No compliance applicable, informational statement.
NAPS COL 9.5(1)	If a proposed change alters compliance with a rule then an exemption from the rule is required in accordance with 10 CFR 50.12. If a proposed change alters a license condition or technical specification that was used to satisfy NRC requirements, the licensee should submit a license amendment request. When a change that falls within the scope of the changes allowed under the standard fire protection license condition is planned, the licensee's evaluation should be made in conformance with the standard fire protection license condition to determine whether the change would adversely affect the ability to achieve and maintain safe shutdown.	1.8.1.3	~~Conform~~ N/A	~~See Subsection 9.5.1.6.~~ This position is applicable to existing licensed nuclear plants. Changes to the US-APWR after initial operation will be evaluated under a change process applicable for plants licensed under 10 CFR 50.52.
STD COL 9.5(1)	In addition to an evaluation of planned changes, an evaluation may also be required for nonconforming conditions. In the case of a degraded or nonconforming condition, an evaluation depends on the licensee's compensatory and corrective actions. Three potential conditions exist for determining the need for an evaluation. These conditions are (1) the use of interim compensatory actions, (2) corrective actions that result in a change, or (3) corrective actions that restore the nonconforming or degraded condition to the previous condition.	1.8.1.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 9 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	The licensee should maintain records of fire protection program-related changes in the facility, changes in procedures, and tests and experiments made in accordance with the standard fire protection license condition. These records should include a written evaluation that provides the bases for the determination that the change does not adversely affect safe-shutdown capability.	1.8.1.5	Conform	See Subsection 9.5.1.6.
	For plants licensed before January 1, 1979, the NRC requires requests for exemption from the requirements of Appendix R for modifications or conditions that do not comply with the applicable sections of Appendix R. The exclusion of the applicability of sections of Appendix R other than Sections III.G, III.J, and III.O (and Section III.L as applicable) is limited to those features accepted by the NRC staff as satisfying the provisions of Appendix A to BTP APCSB 9.5-1 reflected in staff fire protection safety evaluation reports issued before the effective date of the rule. For these previously approved features, an exemption request is not required except for proposed modifications that would alter previously approved features used to satisfy NRC requirements.	1.8.2	N/A	The US-APWR is a new plant that satisfy the requirement applicable to advanced light water reactors.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 9 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(1)	The NRC interpretations of certain Appendix R requirements allow a licensee to choose not to seek prior NRC review and approval of, for example, a fire area boundary, in which case a fire protection engineer (assisted by others as needed) should perform an evaluation, which should be retained for a future NRC audit.	1.8.3	~~Conform~~ N/A	~~See Subsection 9.5.1.6.~~ Appendix R applies to plants licensed prior to 1979. Appendix R equivalency evaluations are not applicable for a plant licensed under rules for an advanced light water reactor.
	Plants licensed after January 1, 1979, that have committed to meet the requirements of Sections III.G, III.J, and III.O of Appendix R to 10 CFR 50 or other NRC guidance (e.g., CMEB 9.5-1), and are required to do so as a license condition, do not need to request exemptions for alternative configurations. However, the FSAR or fire hazards analysis should identify and justify deviations from the requirements of Sections III.G, III.J, and III.O or other applicable requirements or guidance, and these deviations may require a license amendment to change the license condition.	1.8.4	Conform	The US-APWR is a new plant that does not involve unapproved deviations from regulatory requirements.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 10 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	The requirements of 10 CFR 50.72 and 10 CFR 50.73 apply to reporting certain events and conditions related to fire protection at nuclear power plants. Licensees should report fire events or fire protection deficiencies that meet the criteria of 10 CFR 50.72 and 10 CFR 50.73 to the NRC as appropriate and in accordance with the requirements of these regulations.	1.8.5	Conform	See Subsection 9.5.1.6.
NAPS COL 9.5(2)	For those fire protection SSCs installed to satisfy the NRC requirements and designed to NFPA codes and standards, the code of record is the code edition in force at the time of the design or at the time the commitment is made to the NRC for a fire protection feature. The FSAR or the fire hazards analysis should identify and justify deviations from the codes. Deviations should not degrade the performance of fire protection systems or features. The standards of record related to the design and installation of fire protection systems and features required to satisfy NRC requirements in all new reactor designs are those NFPA codes and standards in effect 180 days prior to the submittal of the application under 10 CFR 50 or 10 CFR 52.	1.8.6	~~Conform~~ See Remarks	~~See Subsection 9.5.1.1.~~ To retain consistency with the DCD, Section 9.5.1, the fire protection equipment design and program requirements are in accordance with RG 1.189, Rev. 1 and NFPA 804-2006.
NAPS COL 9.5(1)	Where the evaluation of an fire protection program change is based on fire modeling, licensees should document that the fire models and methods used meet the NRC requirements. The licensee should also document that the models and methods used in the analyses were used within their limitations and with the rigor required by the nature and scope of the analyses. These analyses may use simple hand calculations or more complex computer models, depending on the specific conditions of the scenario being evaluated.	1.8.7	Conform	See Subsection 9.5.1.6.
	Fire prevention is the first line of defense-in-depth for fire protection. The fire prevention attributes of the program are directly related to the fire protection objective to minimize the potential for fire to occur. These attributes involve design and administrative measures that provide a reasonable level of assurance that fire hazards are adequately protected and managed and that fire consequences will be limited for those fires that do occur.	2.	Information Statement	Compliance statement not appropriate since this is an informational statement only.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 11 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	Fire prevention administrative controls should include procedures to control handling and use of combustibles, prohibit storage of combustibles in plant areas important to safety, establish designated storage areas with appropriate fire protection, and control use of specific combustibles (e.g., wood) in plant areas important to safety.	2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Bulk storage of combustible materials should be prohibited inside or adjacent to buildings or systems important to safety during all modes of plant operation. Procedures should govern the handling of and limit transient fire hazards such as combustible and flammable liquids, wood and plastic products, high-efficiency particulate air (HEPA) and charcoal filters, dry ion exchange resins, or other combustible materials in buildings containing systems or equipment important to safety during all phases of operation, particularly during maintenance, modification, or refueling operations.	2.1.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire prevention elements of the fire protection program should be maintained when plant modifications are made. The modification procedures should contain provisions that evaluate the impacts of modifications on the fire prevention design features and programs. The licensee should follow the guidelines of Regulatory Position4.1.1 in the design of plant modifications. Personnel in the fire protection organization should review modifications of SSCs to ensure that fixed fire loadings are not increased beyond those accounted for in the fire hazards analysis, or if increased, suitable protection is provided and the fire hazards analysis is revised accordingly.	2.1.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Flammable and combustible liquids and gases are potentially significant fire hazards and procedures should clearly define the use, handling, and storage of these hazards. The handling, use, and storage of flammable and combustible liquids should, as a minimum, comply with the provisions of NFPA 30, "Flammable and Combustible Liquids Code."	2.1.3	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 12 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(2)	When an SSC important to safety is near installations such as flammable liquid or gas storage, the licensee should evaluate the risk of exposure fires (originating in such installations) to the SSCs and take appropriate protective measures. NFPA 80A, “Recommended Practice for Protection of Buildings from Exterior Fire Exposures,” provides guidance on such exposure protection. NFPA 30 provides guidance relative to minimum separation distances from flammable and combustible liquid storage tanks. NFPA 55, “Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks,” provides separation distances for gaseous and liquefied hydrogen. (See Regulatory Position 7.5 of this guide.) NFPA 58, “Liquefied Petroleum Gas Code,” provides guidance for liquefied petroleum gas.	2.1.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Electrical equipment (permanent and temporary), hot work activities (e.g., open flame, welding, cutting and grinding), high-temperature equipment and surfaces, heating equipment (permanent and temporary installation), reactive chemicals, static electricity, and smoking are all potential ignition sources. Design, installation, modification, maintenance, and operational procedures and practices should control potential ignition sources.	2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.	2.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The use of temporary services at power reactor facilities is routine, especially to support maintenance and other activities during outages. In view of the magnitude and complexity of some temporary services, proper engineering and, once installed, maintenance of the design basis become significant. Plant administrative controls should provide for engineering review of temporary installations. These reviews should ensure that appropriate precautions, limitations, and maintenance practices are established for the term of such installations.	2.2.2	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 13 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	Leak testing and similar procedures such as airflow determination should not use open flames or combustion-generated smoke. Procedures and practices should provide for control of temporary heating devices. Use of space heaters and maintenance equipment (e.g., tar kettles for roofing operations) in plant areas should be strictly controlled and reviewed by the plant's fire protection staff.	2.2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish administrative controls to minimize fire hazards in areas containing SSCs important to safety. These controls should govern removal of waste, debris, scrap, oil spills, and other combustibles after completion of a work activity or at the end of the shift. Administrative controls should also include procedures for performing and maintaining periodic housekeeping inspections to ensure continued compliance with fire protection controls.	2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The licensee should establish fire protection administrative controls to address the following: a. Fire protection features should be maintained and tested by qualified personnel. a. Impairments to fire barriers, fire detection, and fire suppression systems should be controlled by a permit system. b. Successful fire protection requires inspection, testing, and maintenance of the fire protection equipment. c. Fire barriers, including dampers, doors, and penetration seals, should be routinely inspected.	2.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 13 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
In general, the fire hazards analysis and regulatory requirements determine the scope of fire detection and suppression in the plant, whereas the applicable industry codes and standards (generally NFPA codes, standards, and recommended practices) determine the design, installation, and testing requirements of the systems and components. The design of fire detection systems should minimize the adverse effects of fires on SSCs important to safety. Automatic fire detection systems should be installed in all areas of the plant that contain or present an exposure fire hazard to SSCs important to safety. These fire detection systems should be capable of operating with or without offsite power.	3.1	Conform	The FHA (Appendix 9A), NRC regulations and NFPA codes and standards are used in the development of fire protection features for US-APWR.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 14 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	The fire detection and alarm system should be designed with objectives detailed in the RG.	3.1.1	Conform	RG 1.189, Rev. 1 followed extensively in the implementation of the fire protection program for the US-APWR plant.
NAPS COL 9.5(2)	NFPA 22, "Standard for Water Tanks for Private Fire Protection," and NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," provide guidance for fire protection water supplies	3.2.1	Conform	~~See Subsection 9.5.1.2.2.~~ Unit 3 complies with Position 3.2.1.e by using Lake Anna as the sole source for fire protection water.
STD COL 9.5(2)	Fire pump installations should conform to NFPA 20.	3.2.2	Conform	See Subsection 9.5.1.2.2.
	An underground yard fire main loop should be installed to furnish anticipated water requirements. NFPA 24 provides appropriate guidance for such installation.	3.2.3	Conform	See Subsection 9.5.1.2.3.
	Automatic suppression should be installed as determined by the fire hazards analysis and as necessary to protect redundant systems or components necessary for safe shutdown and SSCs important to safety.	3.3	Conform	See Appendix 9A for areas where automatic suppression as determined by the FHA is to be installed.
	Equipment important to safety that does not itself require protection by water-based suppression systems, but is subject to unacceptable damage if wetted by suppression system discharge, should be appropriately protected (e.g., water shields or baffles). Drains should be provided as required to protect equipment important to safety from flooding damage.	3.3.1	Conform	Floor drains and raised equipment pedestals are used as well as spray shields where necessary to protect equipment that can suffer unacceptable damage from wetting.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 14 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
Water sprinkler and spray suppression systems are the most widely used means of implementing automatic water-based fire suppression. Sprinkler and spray systems should, at a minimum, conform to requirements of appropriate standards such as NFPA 13 and NFPA 15.	3.3.1.1	Conform	Sprinkler systems are designed per NFPA 13 and spray systems designed per NFPA 15.
Water mist suppression systems may be useful in specialized situations, particularly in those areas where the application of water needs to be restricted. Water mist systems should conform to appropriate standards such as NFPA 750, "Standard on Water Mist Fire Protection Systems."	3.3.1.2	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 15 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to the use of foam sprinkler and spray systems. Foam sprinkler and spray systems should conform to appropriate standards such as NFPA 16, "Standard for the Installation of Deluge Foam-Water Sprinkler and Foam-Water Spray Systems," and NFPA 11, "Standard for Low-, Medium-, and High-Expansion Foam."	3.3.1.3	N/A	No foam sprinkler or spray systems are used for the US-APWR plant.
	Gaseous systems should be evaluated for potential impacts on the habitability of areas containing equipment important to safety where operations personnel perform safe-shutdown actions or where firefighting activities may become necessary. Where gas suppression systems are installed, openings in the area should be adequately sealed or the suppression system should be sized to compensate for the loss of the suppression agent through floor drains and other openings.	3.3.2	The US-APWR plant uses an environmentally friendly clean gaseous fire suppression agent that does not pose a hazard to operations personnel.	See Appendix 9A.
NAPS COL 9.5(2)	Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12. Where automatic carbon dioxide systems are used, they should be equipped with a predischarge alarm system and a discharge delay to permit personnel egress. Provisions for locally disarming automatic carbon dioxide systems should be key locked and under strict administrative control.	3.3.2.1	No carbon dioxide extinguishing systems are used for the US-APWR plant.	
	Halon fire extinguishing systems should comply with the requirements of NFPA 12A. Where automatic Halon systems are used, they should be equipped with a predischarge alarm and a discharge delay to permit personnel egress. Provisions for locally disarming automatic Halon systems should be key locked and under strict administrative control.	3.3.2.2	No Halon fire extinguishing systems are used for the US-APWR plant.	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 15 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
Halon alternative (or "clean agent") fire extinguishing systems should comply with applicable standards such as NFPA 2001. Only listed or approved agents should be used. Provisions for locally disarming automatic systems should be key locked and under strict administrative control.	3.3.2.3	Conform	Clean agent fire suppression systems conform with applicable NFPA 2001 guidance.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 16 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	The licensee should provide a manual firefighting capability throughout the plant to limit the extent of fire damage. Standpipes, hydrants, and portable equipment consisting of hoses, nozzles, and extinguishers should be provided for use by properly trained firefighting personnel.	3.4	Conform	Adequate manual hose stations and portable fire extinguishers installed through the US-APWR.
	Interior manual hose installations should be able to reach any location that contains, or could present a fire exposure hazard to, equipment important to safety with at least one effective hose stream. To accomplish this, standpipes with hose connections equipped with a maximum of 30.5 m (100 ft) of 38-mm (1.5-in.) woven-jacket, lined fire hose and suitable nozzles should be provided in all buildings on all floors. These systems should conform to NFPA 14, "Standard for the Installation of Standpipe and Hose Systems," for sizing, spacing, and pipe support requirements for Class III standpipes. Water supply calculations should demonstrate that the water supply system can meet the standpipe pressure and flow requirements of NFPA 14	3.4.1	Conform	See Appendix 9A.
STD COL 9.5(2)	Outside manual hose installations should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize equipment important to safety. Hydrants should be installed approximately every 76 m (250 ft) on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24 should be provided as needed, but at least every 305 m (1,000 ft).	3.4.2	Conform	See Subsection 9.5.1.2.3.
STD COL 9.5(1)	For flammable and combustible liquid fire hazards, consideration should be given to the use of foam systems for manual fire suppression protection. These systems should comply with the requirements of NFPA 11.	3.4.3	N/A	Based on the FHA (Appendix 9A), no installed foam systems are proposed for the US-APWR. The plant fire brigade has foam carts available for manual fire fighting efforts.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 17 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Fire extinguishers should be provided in areas that contain or could present a fire exposure hazard to equipment important to safety. Extinguishers should be installed with due consideration given to possible adverse effects on equipment important to safety installed in the area. NFPA 10, "Standard for Portable Fire Extinguishers," provides guidance on the installation (including location and spacing) and the use and application of fire extinguishers.	3.4.4	Conform	See Appendix 9A.
	Some fixed fire suppression systems may be manually actuated (e.g., fixed suppression systems provided in accordance with Section III.G.3 of Appendix R to 10 CFR 50). Manual actuation is generally limited to water spray systems and should not be used for gaseous suppression systems except when the system provides backup to an automatic water suppression system.	3.4.5	N/A	The US-APWR is an advanced light water reactor plant and complies with applicable regulations for an advanced plant. Manually actuated water spray systems in the US-APWR are only used for charcoal filter bed protection.
NAPS COL 9.5(1)	A site fire brigade trained and equipped for firefighting should be established and should be on site at all times to ensure adequate manual firefighting capability for all areas of the plant containing SSCs important to safety. The fire brigade leader should have ready access to keys for any locked doors.	3.5.1	Conform	See ~~Subsection 9.5.1.6.1.6.~~ Subsection 13.1.2.1.5 and Subsection 9.5.1.6.2.1.
NAPS COL 9.5(1)	The equipment provided for the brigade should consist of personal protective equipment such as turnout coats, bunker pants, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatuses using full-face positive-pressure masks approved by the National Institute for Occupational Safety and Health (approval formerly given by the U.S. Bureau of Mines) should be provided for fire brigade, damage control, and MCR personnel.	3.5.1.2	Conform	See ~~Subsection 9.5.1.6.1.8.~~ Subsection 9.5.1.6.3.
NAPS COL 9.5(1)	Procedures should be established to control actions by the fire brigade upon notification by the MCR of a fire and to define firefighting strategies.	3.5.1.3	Conform	See ~~Subsection 9.5.1.6.8.1.~~ Subsection 9.5.1.6.4.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 17 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(1)	Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team. Drills should be performed quarterly for each shift fire brigade. Each fire brigade member should participate in at least two drills annually.	3.5.1.4	Conform	See ~~Subsection 9.5.1.6.2.5~~ Subsection 9.5.1.6.2.5.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 18 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(1)	Onsite fire brigades typically fulfill the role of first responder, but may not have sufficient personnel, equipment, and capability to handle all possible fire events. Arrangements with offsite fire services may be necessary to augment onsite firefighting capabilities, consistent with the fire hazards analysis and prefire planning documents. The fire protection program should describe the capabilities (e.g., equipment compatibility, training, drills, and command control) of offsite responders.	3.5.2	Conform	See Subsection 9.5.1.6.1.7. Subsection 9.5.1.6.2.4.
NAPS COL 9.5(1)	The local offsite fire departments that provide back up manual firefighting resources should have the following capabilities: a. Personnel and equipment with capacities consistent with those assumed in the plant's fire hazards analysis and prefire plans. a. Hose threads or adapters to connect with onsite hydrants, hose couplings, and standpipe risers.	3.5.2.1	Conform	See Subsection 9.5.1.6.1.7. Subsection 9.5.1.6.2.4.
	Local offsite fire department personnel who provide back up manual firefighting resources should be trained.	3.5.2.2	Conform	See Subsection 9.5.1.6.1.7. Subsection 9.5.1.6.2.4.
NAPS COL 9.5(1)	The licensee should establish written mutual aid agreements between the utility and the offsite fire departments that are listed in the fire hazards analysis and prefire plans as providing a support response to a plant fire. These agreements should delineate fire protection authorities, responsibilities, and accountabilities with regard to responding to plant fire or emergency events, including the fire event command structure between the plant fire brigade and offsite responders.	3.5.2.3	Conform	See Subsection 9.5.1.6.1.7. Subsection 9.5.1.6.2.4.
	This section provides guidance on building layout (e.g., fire areas and zones), materials of construction, and building system design (e.g., electrical, HVAC, lighting, and communication systems) important to effective fire prevention and protection.	4.1	Information introduction to this section of RG 1.189	No compliance statement is appropriate for this Reg. guide section lead in.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 18 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
According to GDC 3, noncombustible and heat-resistant materials must be used wherever practical throughout the unit. Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. The fire hazards analysis should identify in situ combustible materials used in plant SSCs and specify suitable fire protection.	4.1.1	Conform	See Appendix 9A for the selection of fire areas, fire compartments, description of materials used for construction and fire protection provided.
Interior finishes should be noncombustible.	4.1.1.1	Conform	See below.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 19 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Interior finishes should be noncombustible (see the “Glossary” section of this guide) or listed by an approving laboratory.	4.1.1.2	Conform	US-APWR interior finishes conform to the items listed as acceptable without test in the text of this section of RG 1.189 or meet the acceptable industry testing listed.
In accordance with GDC 3, SSCs important to safety must be designed and located to minimize the probability and effect of fires and explosions. The concept of compartmentalization meets GDC 3, in part, by utilizing passive fire barriers to subdivide the plant into separate areas or zones.	4.1.2	Conform	See Appendix 9A for fire area and fire compartment selection for the US-APWR.
A fire area is defined as that portion of a building or plant that is separated from other areas by fire barriers, including components of construction such as beams, joists, columns, penetration seals or closures, fire doors, and fire dampers. Fire barriers that define the boundaries of a fire area should have a fire-resistance rating of 3 hours or more.	4.1.2.1	Conform	US-APWR fire area boundaries meet 3-hour fire resistance and are protected with appropriately rated fire dampers, penetration seals, and fire doors.
Fire zones are subdivisions of a fire area and are typically based on fire hazards analyses that demonstrate that the fire protection systems and features within the fire zone provide an appropriate level of protection for the associated hazards. Fire zone concepts may be used to establish zones within fire areas where further subdivision into additional fire areas is not practical on the basis of existing plant design and layout (e.g., inside containment).	4.1.2.2	Conform	Fire zones associated with selected fire areas are described in Appendix 9A.
The plant layout should provide adequate means of access to all plant areas for manual fire suppression. The plant layout should also allow for safe access and egress to areas for personnel performing safe-shutdown operations.	4.1.2.3	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 19 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
Electric cable construction should pass the flame test in IEEE Standard 383, "IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations," or IEEE Standard 1202, "IEEE Standard for Flame Testing of Cables for Use in Cable Trays in Industrial and Commercial Occupancies." (This does not imply that cables passing either test will not require additional fire protection.) New reactor fiber optic cable insulation and jacketing should also meet the fire and flame test requirements of IEEE 383 or IEEE 1202.	4.1.3.1	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 20 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material. Cable raceways should be used only for cables.	4.1.3.2	Conform	
Redundant cable systems important to safety outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety-related areas by fire barriers with a minimum fire rating of 3 hours to the extent feasible. Those fire areas that contain cable trays important to safety should be provided with fire detection. Cable trays should be accessible for manual firefighting and cables should be designed to allow wetting down with fire suppression water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided.	4.1.3.3	Conform	
Redundant systems used to mitigate the consequences of design-basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection should be provided so that a fire within only one such system will not damage the redundant system.	4.1.3.4	Conform	US-APWR design employs 4 redundant trains of safety systems used for mitigation of design basis accidents. Each train is completely separated by 3-hour rated fire barriers.
Transformers that present a fire hazard to equipment important to safety should be protected as described in Regulatory Position 7.3 of this guide.	4.1.3.5	Conform	See Regulatory Position 7.3.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 21 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Electrical cabinets present an ignition source for fires and a potential for explosive electrical faults that can result in damage not only to the cabinet of origin, but also to equipment, cables, and other electrical cabinets in the vicinity of the cabinet of origin. Fire protection systems and features provided for the general area containing the cabinet may not be adequate to prevent damage to adjacent equipment, cables, and cabinets following an energetic electrical fault. Energetic electrical faults are more of a concern with high-voltage electrical cabinets [i.e., 480 volts (V) and above]. High-voltage cabinets should be provided with adequate spatial separation or substantial physical barriers to minimize the potential for an energetic electrical fault to damage adjacent equipment, cables, or cabinets important to safety.	4.1.3.6	Conform	
Suitable design of the ventilation systems can limit the consequences of a fire by preventing the spread of the products of combustion to other fire areas. It is important that means be provided to ventilate, exhaust, or isolate the fire area as required and that consideration be given to the consequences of ventilation system failure caused by the fire, resulting in a loss of control for ventilating, exhausting, or isolating a given fire area.	4.1.4	Informational statement	See Appendix 9A for additional discussion on HVAC impact and smoke removal.
Filters for particulate and gaseous effluents may be fabricated of combustible media (e.g., HEPA and charcoal filters). The ignition and burning of these filters may result in a direct release of radioactive material to the environment or may provide an unfiltered pathway upon failure of the filter. Filter combustion may spread fire to other areas.	4.1.4.1	Informational statement	US-APWR design provides protection of HVAC filters and filter media from the damaging affects of a fire.
Smoke from fires can be toxic, corrosive, and may obscure visibility for emergency egress and access to plant areas. Smoke control and removal may be necessary to support manual suppression activities and safe-shutdown operations.	4.1.4.2	Informational statement	See Appendix 9A for a discussion of smoke removal for selected fire areas.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 22 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Protection of plant operations staff from the effects of fire and fire suppression (e.g., gaseous suppression agents) may be necessary to ensure safe shutdown of the plant. For MCR evacuation, egress pathways and remote control stations should also be habitable. Consideration should be given to protection of safe-shutdown areas from infiltration of gaseous suppression agents. The capability to ventilate, exhaust, or isolate is particularly important to ensure the habitability of rooms or spaces that should be attended in an emergency. In the design, provision should be made for personnel access to and escape routes from each fire area.	4.1.4.3	Conform	For the US-APWR, the gaseous suppression agent used in R/B areas is a safe clean agent that does not pose a safety concern for personnel.
Redundant safe-shutdown components may be separated by fire-resistant walls, floors, enclosures, or other types of barriers. For the fire barriers to be effective in limiting the propagation of fire, ventilation duct penetrations of fire barriers should be protected by means of fire dampers that are arranged to automatically close in the event of fire. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," provides additional guidance.	4.1.4.4	Conform	
Floor drains sized to remove expected firefighting water without flooding equipment important to safety should be provided in areas where fixed water fire suppression systems are installed. Floor drains should also be provided in other areas where hand hose lines may be used if such firefighting water could cause unacceptable damage to equipment important to safety in the area. Facility design should ensure that fire water discharge in one area does not impact equipment important to safety in adjacent areas.	4.1.5	Conform	
Emergency lighting should be provided throughout the plant as necessary to support fire suppression actions and safe-shutdown operations, including access and egress pathways to safe shutdown areas during a fire event.	4.1.6	Conform	
Emergency lighting should be provided in support of the emergency egress design guidelines in outlined in Regulatory Position 4.1.2.3 of this guide.	4.1.6.1	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 23 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Lighting is vital to post-fire safe-shutdown and emergency response in the event of fire. The licensee should provide suitable fixed and portable emergency lighting.	4.1.6.2	Conform	
STD COL 9.5(1)	The communication system design should provide effective communication between plant personnel in all vital areas during fire conditions under maximum potential noise levels.	4.1.7	Conform	In plant repeaters used where required.
STD COL 9.5(2)	In situ and transient explosion hazards should be identified and suitable protection provided. Transient explosion hazards that cannot be eliminated should be controlled and suitable protection provided.	4.1.8	Conform	US-APWR design addresses in situ explosion hazards and provides protection. See Subsection 9.5.1.6.
	Fire barriers are those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire. New reactor designs should be based on providing structural barriers between redundant safe shutdown success paths wherever feasible and should minimize the reliance on localized electrical raceway fire barrier systems, as described in Regulatory Position 4.2.3 of this guide. This approach is in accordance with the enhanced fire protection criteria for new reactors described in Regulatory Position 8.2 of this guide.	4.2.1	Conform	The US-APWR is a new reactor design and minimizes reliance on localized electrical raceway fire barrier systems. Where used, localized barriers are in accordance with Appendix C qualification requirements. See also Regulatory Position 8.2.
	Wall, floor, and ceiling construction should be noncombustible. (See Regulatory Position 4.1.1 of this guide.) NFPA 221, "Standard for High-Challenge Fire Walls and Fire Barrier Walls," can be used as guidance for construction of fire barrier walls. Materials of construction for walls, floors, and ceilings serving as fire barriers should be rated by approving laboratories in hours of resistance to fire.	4.2.1.1	Conform	The US-APWR uses construction methods that result in noncombustible wall, floor, and ceiling components in safety-related and important to safety areas.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 23 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
Building design should ensure that door openings are properly protected. These openings should be protected with fire doors that have been qualified by a fire test.	4.2.1.2	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 24 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Building design should ensure that ventilation openings are properly protected. These openings should be protected with fire dampers that have been fire tested. In addition, the construction and installation techniques for ventilation openings through fire barriers should be qualified by fire endurance tests. For ventilation ducts that penetrate or terminate at a fire wall, guidance in NFPA 90A indicates that ventilation fire dampers should be installed within the fire wall penetration for barriers with a fire rating greater than or equal to 2 hours. NFPA 90A requires that fire dampers be installed in all air transfer openings within a rated wall.	4.2.1.3	Conform	
Openings through fire barriers for pipe, conduit, and cable trays that separate fire areas should be sealed or closed to provide a fire-resistance rating at least equal to that required of the barrier itself. Openings inside conduit larger than 102 mm (4 in.) in diameter should be sealed at the fire barrier penetration. Openings inside conduit 102 mm (4 in.) or less in diameter should be sealed at the fire barrier unless the conduit extends at least 1.5 m (5 ft) on each side of the fire barrier and is sealed either at both ends or at the fire barrier with material to prevent the passage of smoke and hot gases. Fire barrier penetrations that maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.	4.2.1.4	Conform	
Structural fire barriers—The design adequacy of fire barrier walls, floors, ceilings, and enclosures should be verified by fire endurance testing. The NRC fire protection guidance refers to the guidance of NFPA 251 and ASTM E-119, “Standard Test Methods for Fire Tests of Building Construction and Materials,” as acceptable test methods for demonstrating fire endurance performance. The guidance of NFPA 251 and ASTM E-119 should be consulted with regard to construction, materials, workmanship, and details such as dimensions of parts and the size of the specimens to be tested. In addition, NFPA 251 and ASTM E-119 should be consulted with regard to the placement of thermocouples on the specimen.	4.2.1.5.a	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 25 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Penetration fire barriers—Penetration fire barriers should be qualified by tests conducted by an independent testing authority in accordance with the provisions of NFPA 251 or ASTM E-119. In addition, ASTM E-814, "Standard Test Method for Fire Tests of Through-Penetration Fire Stops," or IEEE Standard 634, "IEEE Standard Cable Penetration Fire Stop Qualification Test," could be used in the development of a standard fire test.	4.2.1.5.b	Conform	
The results of fire test programs that include a limited selection of test specimens that have been specifically designed to encompass or bound the entire population of in-plant penetration seal configurations may be acceptable.	4.2.1.6	Conform	
Structural steel forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that required of the barrier. Where the structural steel is not protected and has a lower fire rating than the required rating of the fire barrier, the fire hazards analysis should justify the configuration by demonstrating the temperature that the steel will reach during fire and the ability of the steel to carry the required loads at that temperature.	4.2.2	Conform	
Redundant cable systems important to safety should be separated from each other and from potential fire exposure hazards in accordance with the separation means of Regulatory Position 5.5.a–c of this guide.	4.2.3.1	Conform	
Licensees should request an exemption or deviation, as appropriate, when relying on fire-rated cables to meet NRC requirements for protection of safe-shutdown systems or components from the effects of fire. (See Regulatory Position 1.8 of this guide.)	4.2.3.2	N/A	No exemptions are requested as a result of relying on fire rated cables.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 26 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Fire stops should be installed every 6.1 m (20 ft) along horizontal cable routings in areas important to safety that are not protected by automatic water systems. Vertical cable routings should have fire stops installed at each floor-ceiling level. Between levels or in vertical cable chases, fire stops should be installed at the mid-height if the vertical run is 6.1 m (20 ft) or more, but less than 9.1 m (30 ft) or at 4.6-m (15-ft) intervals in vertical runs of 9.1 m (30 ft) or more unless such vertical cable routings are protected by automatic water systems directed on the cable trays. Individual fire stop designs should prevent the propagation of a fire for a minimum period of 30 minutes when tested for the largest number of cable routings and maximum cable density.	4.2.3.3	Conform	
Fire barriers relied upon to protect post-fire shutdown-related systems and to meet the separation means discussed in Regulatory Position 5.3 should have a fire rating of either 1 or 3 hours.	4.3.1	Conform	The US-APWR utilizes 3-hour fire rated barriers between redundant trains of safety-related equipment. Only safety-related equipment is relied upon for post fire shutdown.
The fire endurance qualification test for fire barrier materials applied directly to a raceway or component is considered to be successful if all three of the following conditions are met: a. The average unexposed side temperature of the fire barrier system, as measured on the exterior surface of the raceway or component, did not exceed 139°C (250°F) above its initial temperature. b. Irrespective of the unexposed side temperature rise during the fire test, if cables or components are included in the fire barrier test specimen, a visual inspection is performed. Cables should not show signs of degraded conditions resulting from the thermal effects of the fire exposure. c. The cable tray, raceway, or component fire barrier system remained intact during the fire exposure and water hose stream test without developing any openings through which the cable tray, raceway, or component (e.g., cables) is visible.	4.3.2	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 27 of 44)

Regulatory Position	Position Number	Conformance	Remarks
The following are acceptable placements of thermocouples for determining the thermal performance of raceway or cable tray fire barrier systems that contain cables during fire exposure: a. Conduits—The temperature rise on the unexposed surface of a fire barrier system installed on a conduit should be measured by placing the thermocouples every 152 mm (6 in.) on the exterior conduit surface underneath the fire barrier material. b. Cable trays—The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing the thermocouples on the exterior surface of the tray side rails between the cable tray side rail and the fire barrier material. c. Junction boxes—The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each junction box surface. d. Airdrops—The internal airdrop temperatures should be measured by thermocouples placed every 305 mm (12 in.) on the cables routed within the airdrop and by a stranded American Wire Gauge 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm (6 in.) along the length of the copper conductor.	4.3.2.1	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 28 of 44)

Regulatory Position	Position Number	Conformance	Remarks
The following are acceptable thermocouple placements for determining the thermal performance of raceway or cable tray fire barrier systems that do not contain cables. a. Conduits—The temperature rise of the unexposed surface of a fire barrier system installed on a conduit should be measured by placing thermocouples every 152 mm (6 in.) on the exterior conduit surface between the conduit and the unexposed surface of the fire barrier material. b. Cable trays—The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing thermocouples every 152 mm (6 in.) on the exterior surface of each tray's side rails between the side rail and the fire barrier material. c. Junction boxes—The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each junction box surface. d. Airdrops—The internal airdrop temperatures should be measured by a stranded AWG 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm (6 in.) along the length of the copper conductor.	4.3.2.2	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.
Temperature conditions on the unexposed surfaces of the fire barrier material during the fire test will be determined by averaging the temperatures measured by the thermocouples installed in or on the raceway. To determine these temperature conditions, the thermocouples measuring similar areas of the fire barrier should be averaged together. Acceptance will be based on the individual averages.	4.3.2.3	Conform	The US-APWR design minimizes the used of raceway and component fire barriers. In limited areas, where barriers are used, this qualification and Appendix C criteria are satisfied.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 28 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
NFPA 251 and ASTM E-119 allow flexibility in hose stream testing. The standards allow the hose stream test to be performed on a duplicate test specimen subjected to a fire endurance test for a period equal to one-half of that indicated as the fire-resistance rating, but not for more than 1 hour (e.g., 30-minute fire exposure to qualify a 1-hour fire-rated barrier).	4.3.3	N/A	Informational statement

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Regulatory Position	Position Number	Conformance	Remarks
During fire tests of raceway fire barrier systems, thermal damage to the cables has led to cable jacket and insulation degradation without the loss of circuit integrity as monitored using ANI criteria [applied voltage of 8–10V direct current (dc)]. Since cable voltages used for ANI circuit integrity tests do not replicate cable operating voltages, loss of cable insulation conditions can exist during the fire test without a dead short occurring. It is expected that if the cables were at rated power and current, a fault would propagate.	4.3.4	N/A	Informational statement.
Comparison of the fire barrier internal time-temperature profile measured during the fire endurance test to existing cable performance data, such as data from Environmental Qualification tests, could be proposed to the staff as a method for demonstrating cable functionality. Environmental Qualification testing is typically performed to rigorous conditions, including rated voltage and current. By correlating the Environmental Qualification test time-temperature profile to the fire test time-temperature profile, the Environmental Qualification test data would provide a viable mechanism to ensure cable functionality.	4.3.4.1	N/A	Informational statement.
The nuclear industry uses two principal materials as cable insulation and cable jackets, thermoplastics and thermosetting polymeric materials. A thermoplastic material can be softened and resoftened by heating and reheating. Conversely, thermosetting cable insulation materials cure by chemical reaction and do not soften when heated. Under excessive heating, thermosetting insulation becomes stiff and brittle. Electrical faults may be caused by softening and flowing of thermoplastic insulating materials at temperatures as low as 149°C (300°F). Thermosetting electrical conductor insulation materials usually retain their electrical properties under short-term exposures to temperatures as high as 260°C (500°F).	4.3.4.2	N/A	Informational statement.

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Regulatory Position	Position Number	Conformance	Remarks
Air oven tests can evaluate the functionality of cables for those cable tray or raceway fire barrier test specimens tested without cables. This testing method consists of exposing insulated wires and cables at rated voltage to elevated temperatures in a circulating air oven. The temperature profile for regulating the temperature in the air oven during this test is the temperature measured by the American Wire Gauge 8 bare copper conductor during the fire exposure of those cable tray or raceway test specimens that were tested without cables.	4.3.4.3	N/A	Informational statement.
The following analysis, which is based on determining whether a specific insulation material will maintain electrical integrity and operability within a raceway fire barrier system during and after an external fire exposure, is an acceptable method for evaluating cable functionality. To determine cable functionality, it is necessary to consider the operating cable temperatures within the fire barrier system at the onset of the fire exposure and the thermal exposure threshold temperature of the cable.	4.3.4.4	N/A	Informational statement.
When considering the consequences of a fire in a given fire area during the evaluation of safe shutdown capabilities of the plant, it should be demonstrated that one success path of equipment and electrical circuits that can be used to bring the reactor to hot shutdown/standby conditions, remains free of fire damage.	5.	N/A	The US-APWR is an evolutionary plant that complies with Position 8.2.
During post-fire shutdown, the reactor coolant system process variables must be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected, i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary. Licensees should ensure that fire protection features are provided for structures, systems, and components important to safe shutdown that are capable of limiting fire damage so that one success path of systems necessary to achieve and maintain hot shutdown conditions from either the MCR or emergency control station(s) is free of fire damage.	5.1	Conform	The US-APWR is an evolutionary plant that complies with Position 8.2.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 31 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	For normal safe shutdown, redundant systems necessary to achieve cold shutdown may be damaged by a single fire, but damage should be limited so that at least one success path can be repaired or made operable within 72 hours using onsite capability or within the time period required to achieve a safe-shutdown condition, if less than 72 hours.	5.2	N/A	The US-APWR as an evolutionary plant design must be able to achieve cold shutdown without equipment repairs being involved. Cold shutdown can be achieved as a normal course of action using two of the four redundant safety trains.
	Fire barriers or automatic suppression, or both, should be installed as necessary to protect redundant systems or components necessary for safe shutdown.	5.3	Conform	Fire barriers are installed to provide separation of redundant safety trains. Automatic suppression is installed to minimize damage to safety-related equipment where app.
STD COL 9.5(2)	The post-fire safe-shutdown analysis must ensure that one success path of shutdown SSCs remains free of fire damage for a single fire in any single plant fire area. The NRC acknowledges Chapter 3 of industry guidance document, NEI-00-01, Revision 1, in RIS 2005-30, as providing an acceptable deterministic methodology for analysis of post-fire safe-shutdown circuits, when applied in conjunction with the RIS.	5.3.1	Conform	See FHA (Appendix 9A.) See Subsection 9.5.1.3

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 31 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
The licensee should evaluate the circuits associated with Hi/Low pressure interfaces for the potential to adversely affect safe shutdown. For example, the residual heat removal (RHR) system is generally a low-pressure system that interfaces with the high-pressure primary coolant system. Thus, the interface most likely consists of two redundant and independent motor-operated valves. Both of these two motor-operated valves and their power and control cables may be subject to damage from a single fire. This single fire could cause the two valves to spuriously open, resulting in an interfacing system LOCA through the subject Hi/Low-pressure system interface.	5.3.2	Conform	The US-APWR design considers the impact of high/low pressure interfaces.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 32 of 44)

Regulatory Position	Position Number	Conformance	Remarks
The post-fire safe-shutdown analysis should describe the methodology necessary to accomplish safe shutdown, including any operator actions required. Manual actions may not be credited in lieu of providing the required protection of redundant systems located in the same fire area required by Section III.G.2 of Appendix R to 10 CFR 50, unless the NRC has reviewed and approved a specific operator manual action for a specific plant through the exemption process of 10 CFR 50.12.	5.3.3	Conform	Four redundant trains of safety-related equipment are individually separated with 3-hour fire rated barriers. Should MCR fire involvement prevent safe operation, a completely independent remote shutdown console is located in a separate fire area. No operator manual actions are required, except evacuation and switch transfer for the MCR fire event.
The post-fire safe-shutdown circuit analysis must address all possible fire-induced failures, including multiple spurious actuations. Although some licensees have based this analysis on the assumption that multiple spurious actuations will not occur simultaneously or in rapid succession, cable fire testing performed by the industry had demonstrated that multiple spurious actuations occurring in rapid succession (without sufficient time to mitigate the consequences) have a relatively high probability of occurring. The success path SSCs, including circuits, must be protected from fire damage that could prevent safe shutdown.	5.3.4	Conform	Conformance with this regulatory position is based on the criteria of RG 1.189, Rev. 1 not the one-at-a-time assumption used in NFPA 804 that is not endorsed by the NRC.
Appendix R to 10 CFR 50 defines alternative shutdown capability as being provided by rerouting, relocating, or modifying existing systems, whereas dedicated shutdown is defined as being provided by installing new structures and systems for the function of post-fire shutdown. Since post-fire repairs cannot be credited for achieving and maintaining hot shutdown, the licensee should implement the required rerouting, relocating, or modifying of the existing system for alternative shutdown capability in existing plants when the need for additional alternative shutdown capability is identified.	5.4.1	N/A	The US-APWR is an evolutionary plant that complies with Position 8.2.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 33 of 44)

Regulatory Position	Position Number	Conformance	Remarks
When alternative or dedicated shutdown systems are credited for achieving post-fire safe shutdown, a specific category of circuits has been defined (referred to as “associated circuits of concern”) and acceptable approaches to mitigating the consequences of fire-induced failure of these circuits have been identified. These circuits are nonsafety or safety circuits that could adversely affect the identified shutdown equipment by feeding back potentially disabling conditions (e.g., hot shorts or shorts to ground) to power supplies or control circuits of that equipment and should be evaluated. Such disabling conditions should be prevented to provide assurance that the identified safe-shutdown equipment will function as designed.	5.4.2	N/A	The US-APWR is an evolutionary plant that complies with Position 8.2.
The shutdown capability may be protected from the adverse effect of damage to associated circuits of concern by the separation and protection guidelines of Regulatory Position 5.3 of this guide or, alternatively, by the following methods as applied to each type of associated circuit of concern.	5.4.3	N/A	See Position 5.3.
A load fuse/breaker (i.e., interrupting devices) to feeder fuse/breaker coordination to prevent loss of the redundant or alternative shutdown power source may be necessary. IEEE Standard 242, “IEEE Recommended Practices for Protection and Coordination of Industrial and Commercial Power Systems,” provides detailed guidance on achieving proper coordination.	5.4.3.1	N/A	See Position 5.3.
Spurious operation is considered mitigated if one of the following criteria are met: a. A means to isolate the equipment and components from the fire area before the fire (i.e., remove power, open circuit breakers) is provided. b. Electrical isolation that prevents spurious operation is provided. Potential isolation devices include breakers, fuses, amplifiers, control switches, current transformers, fiber optic couplers, relays, and transducers. c. A means to detect spurious operations and develop procedures to mitigate the maloperation of equipment (e.g., closure of the block valve if a power-operated relief valve spuriously operates, opening of the breakers to remove spurious operation of safety injection) is provided.	5.4.3.2	N/A	See Position 5.3.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 34 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Common Enclosures. Appropriate measures to prevent propagation of the fire should be provided. Electrical protection (e.g., breakers, fuses, or similar devices) should also be provided.	5.4.3.3	N/A	See Position 5.3.
	The MCR fire area contains the controls and instruments for redundant shutdown systems in close proximity. (Separation is usually a few inches.) Remote shutdown capability for the MCR and its required circuits should be independent of the cables, systems, and components in the MCR fire area. The damage to systems in the MCR for a fire that causes evacuation of the MCR cannot be predicted. The licensee should conduct a bounding analysis to ensure that safe conditions can be maintained from outside the MCR.	5.4.4	Conform	The remote shutdown console located in a separate fire area form the MCR contains all controls necessary to safely achieve cold shutdown. When this remote console is used, MCR circuits are defeated so no adverse fire impact on safe-shutdown capability results.
STD COL 9.5(1)	Procedures for effecting safe shutdown should reflect the results and conclusions of the safe shutdown analysis. Implementation of the procedures should not further degrade plant safety functions. Time-critical operations for effecting safe shutdown identified in the safe-shutdown analysis and incorporated in post-fire procedures should be validated.	5.5	Conform	See Subsection 9.5.1.6.
	Post-fire safe-shutdown operating procedures should be developed for those areas where alternative or dedicated shutdown is required. For other areas of the plant, shutdown would normally be achieved using the normal operating procedures or plant emergency operating procedures.	5.5.1	N/A	The US-APWR is an evolutionary plant that complies with Position 8.2.
STD COL 9.5(1)	Procedures should be in effect that describe the tasks to implement remote shutdown capability when offsite power is available and when offsite power is not available for 72 hours. These procedures should also address necessary actions to compensate for spurious operations and high-impedance faults if such actions are necessary to effect safe shutdown.	5.5.2	Conform	See Subsection 9.5.1.6.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 34 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
The licensee should develop procedures for performance of repairs necessary to achieve and maintain cold shutdown conditions. For alternative shutdown, procedures should be in effect to accomplish repairs necessary to achieve and maintain cold shutdown within 72 hours. For plants that must proceed to cold shutdown prior to 72 hours, the procedures should support the required time for initiation of cold shutdown.	5.5.3	N/A	Repairs are not required to achieve cold shutdown. Cold shutdown is achieved through redundant safety trains of equipment through normal operating procedures.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 35 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(1)	Safe-shutdown requirements and objectives are focused on achieving shutdown conditions for fires occurring during normal at-power operations. During shutdown operations (i.e., maintenance or refueling outages), fire risk may increase significantly as a result of work activities. In addition, redundant systems important to safety may not be available as allowed by plant technical specifications and plant procedures. The fire protection program should be reviewed to verify that fire protection systems, features, and procedures will minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the unacceptable release of radioactive materials, under the differing conditions that may be present during shutdown operations.	5.6	Conform	See Subsection 9.5.1.6.
	Several areas within a nuclear power plant present unique hazards or design issues relative to fire protection and safe shutdown. This section provides guidance applicable to specific plant areas.	6.	N/A	Informational statement.
	Fire protection for the primary and secondary containment areas should be provided for the hazards identified in the fire hazards analysis. Under normal conditions, containment fire hazards may include lubricating oils, hydraulic fluids, cables, electrical penetrations, electrical cabinets, and charcoal filters. During refueling and maintenance operations, additional hazards may be introduced, including contamination control and decontamination materials and supplies, scaffolding, plastic sheathing, wood planking, chemicals, and hot work.	6.1.1	Conform	Containment standpipe supplied to support fire suppression during outages.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 36 of 44)

Regulatory Position	Position Number	Conformance	Remarks
For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Regulatory Position 4.1.3.3 of this guide. Inside non-inerted containments, one of the fire protection means specified in Regulatory Position 5.3, or one of the following, should be provided: a. Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 6.1 m (20 ft) with no intervening combustibles or fire hazards b. Installation of fire detectors and an automatic fire suppression system in the fire area c. Separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of 30 minutes, as demonstrated by testing or analysis	6.1.1.1	Conform	
The licensee should provide fire suppression systems on the basis of a fire hazards analysis. During normal operations, containment is generally inaccessible and, therefore, fire protection should be provided by automatic fixed systems. Automatic fire suppression capability need not be provided in primary containment atmospheres that are inerted during normal operations. However, inerted containments should have manual firefighting capability, including standpipes, hose stations, and portable extinguishers, to provide protection during refueling and maintenance operations.	6.1.1.2	Conform	See FHA (Appendix 9A).
Fire detection systems should alarm and annunciate in the MCR. In primary containment, fire detection systems should be provided for each fire hazard. For primary and secondary containment, the type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazards analysis.	6.1.1.3	Conform	See Appendix 9A for specific discussion on type of detection for specific areas. A general coverage fire detection system is provided in containment.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 37 of 44)

Regulatory Position	Position Number	Conformance	Remarks
The MCR complex (including galleys and office spaces) should be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roof having minimum fire-resistance ratings of 3 hours. Peripheral rooms in the MCR complex should have automatic water suppression and should be separated from the MCR by noncombustible construction with a fire-resistance rating of 1 hour. Ventilation system openings between the MCR and peripheral rooms should have automatic smoke dampers that close upon operation of the fire detection or suppression system. If a gas extinguishing system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying the agent discharge and seal tightly against infiltration of the agent into the MCR. Carbon dioxide total flooding systems are not acceptable for these areas.	6.1.2	Conform	The MCR staff areas are separated from the MCR by 1 hour fire rated partitions and protected by an automatic low pressure water mist sprinkler system. Automatic fire detection is provided. A very early warning fire detection system is provided in raised-floor compartments and MCR cabinets. The MCR raised-floor compartment is also provided with an automatic fire suppression system that discharges an environmentally friendly clean fire extinguishing agent that does not present a hazard to MCR personnel. 3-hour fire rated separation is provide for the MCR complex No carbon dioxide systems are used in this area.
Manual firefighting capability should be provided for both of the following: a. fire originating within a cabinet, console, or connecting cables b. exposure fires involving combustibles in the general room area Portable Class A and Class C fire extinguishers should be located in the MCR. A hose station should be installed inside or immediately outside the MCR.	6.1.2.1	Conform	A fire hose station is located in the corridor immediately outside the entrance to the MCR. The appropriate portable extinguishers are located within the MCR.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 37 of 44) *(continued)*

Regulatory Position	Position Number	Conformance	Remarks
Smoke detectors should be provided in the MCR, cabinets, and consoles. If redundant safe-shutdown equipment is located in the same MCR cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the MCR. The outside air intake(s) for the MCR ventilation system should be provided with smoke detection capability to alarm in the MCR to enable manual isolation of the MCR ventilation system and, thus, prevent smoke from entering the MCR.	6.1.2.2	Conform	The US-APWR utilizes a very early warning smoke detection system (air aspirating) within the raised-floor area that also senses within the MCR console and cabinets. Intake air is sampled by smoke detection to alarm and allow manual isolation.
Venting of smoke produced by fire in the MCR by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculating portion of the normal ventilation system. Manually operated venting of the MCR should be available to the operators.	6.1.2.3	Conform	MCR smoke removal is provided by design. The smoke removal function is manually activated by MCR operators.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 38 of 44)

Regulatory Position	Position Number	Conformance	Remarks
A separate cable spreading room should be provided for each redundant division. Cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from the others and from other areas of the plant by barriers with a minimum fire rating of 3 hours. If this is not possible, an alternative, dedicated, or backup shutdown capability should be provided.	6.1.3	N/A	The US-APWR does not utilize a cable spreading room for the design. A raised-floor cable routing space is part of the fire zone separation, has automatic detection and suppression installed.
Computer rooms for computers performing functions important to safety that are not part of the MCR complex should be separated from other areas of the plant by barriers having a minimum fire-resistance rating of 3 hours and should be protected by automatic detection and fixed automatic suppression.	6.1.4	Conform	
Switchgear rooms containing equipment important to safety should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 hours. Redundant switchgear safety divisions should be separated from each other by barriers with a 3-hour fire rating. Automatic fire detectors should alarm and annunciate in the MCR and alarm locally. Cables entering the switchgear room that do not terminate or perform a function should be kept at a minimum to minimize the fire hazard. These rooms should not be used for any other purpose. Automatic fire suppression should be provided consistent with other safety considerations. Fire hose stations and portable fire extinguishers should be readily available outside the area.	6.1.5	Conform	A clean agent gaseous automatic fire suppression system is provided in safety-related switchgear rooms, which is an appropriate fire suppression agent for electrical equipment that would not create system malfunction if inadvertently discharged.
Barriers having a minimum fire rating of 3 hours should separate panels providing remote shutdown capability from the MCR complex. Panels providing remote shutdown capability should be electrically isolated from the MCR complex so that a fire in either area will not affect shutdown capability from the other area. The general area housing remote panels important to safety should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the MCR. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be readily available in the general area.	6.1.6	Conform	The remote shutdown console is located in a separate fire area on a plant level above the MCR complex and is in a room formed by 3-hour fire rated barriers.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 39 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Battery rooms important to safety should be protected against fires and explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 hours inclusive of all penetrations and openings.	6.1.7	Conform	Ventilation system prevents hydrogen gas buildup. System malfunction is alarmed.
NAPS COL 9.5(2)	Diesel generators important to safety should be separated from each other and from other areas of the plant by fire barriers that have a fire-resistance rating of at least 3 hours. Diesel generators that are not important to safety should be separated from plant areas containing equipment and circuits important to safety by fire barriers that have a fire-resistance rating of at least 3 hours.	6.1.8	~~N/A~~ Conform	The US-APWR uses gas turbine generators for emergency power sources. Four safety-related gas turbine generators and the two SBO gas turbine generators are installed in individual fire areas with 3-hour fire rated barriers providing separation. The security diesel generator is installed with 3-hour fire rated barriers providing separation from plant areas containing safety-related equipment and circuits.
STD COL 9.5(2)	Pump houses and rooms housing redundant pump trains important to safety should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour ratings. These rooms should be protected by automatic fire detection and suppression unless a fire hazards analysis can demonstrate that a fire will not endanger other equipment required for safe plant shutdown. Fire detection should alarm and annunciate in the MCR and alarm locally. Hose stations and portable extinguishers should be readily accessible.	6.1.9	Conform	Rooms have fire detection installed. Automatic suppression is not provided unless there is significant lube oil associated with the unit based upon the FHA (See Appendix 9A).

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 39 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
	Other areas within the plant may contain hazards or equipment that warrant special consideration relative to fire protection, including areas containing significant quantities of radioactive materials, yard areas containing water supplies or systems important to safety, and the plant cooling tower.	6.2	Informational Statement	
STD COL 9.5(1)	New Fuel Areas. Portable hand extinguishers should be located near this area. In addition, hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the MCR and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water.	6.2.1	Conform	See Subsection 9.5.1.6.
	Spent Fuel Areas. Local hose stations and portable extinguishers should provide protection for the spent fuel pool. Automatic fire detection should alarm and annunciate in the MCR and to alarm locally.	6.2.2	Conform	

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 40 of 44)

Regulatory Position	Position Number	Conformance	Remarks
Radioactive waste buildings, storage areas, and decontamination areas should be separated from other areas of the plant by fire barriers having at least 3-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Alternatively, manual hose stations and portable extinguishers (handheld and large-wheeled units sized according to the hazards) are acceptable. Automatic fire detection should annunciate and alarm in the MCR and alarm locally. Ventilation systems in these areas should be capable of being isolated to prevent the release of radioactive materials to other areas or the environment. Water from firefighting activities should drain to liquid Radwaste collection systems.	6.2.3	Conform	
The requirements of 10 CFR 72.122(c) address fire protection of dry cask storage and other independent spent fuel storage facilities. The fire protection provided for these facilities should be commensurate with the potential fire hazards and with the potential for an unacceptable release of radiation during and following a fire. In addition to the requirements of 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste," fire protection for independent spent fuel storage installations should ensure that fires involving such installations will not impact plant operations and plant areas important to safety.	6.2.4	N/A	Dry Cask storage is not a feature required for The US-APWR plant.
Storage tanks that supply water for safe shutdown should be protected from the effects of an exposure fire. Combustible materials should not be stored next to outdoor tanks.	6.2.5	Conform	RWSP is internal to R/B and isolated from damage by a fire. Auxiliary feed water storage in within plant separated by 3-hour fire barriers.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 40 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(2)	Cooling towers should constructed of noncombustible construction or be located and protected in such a way that a fire will not adversely affect any systems or equipment important to safety. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply. For the latter, provisions should be made to ensure a continuous supply of fire protection water whenever the cooling tower basin is drained for cleaning or other maintenance.	6.2.6	Conform	Cooling towers for the ultimate heat sink are of non-combustible construction.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 41 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	External RCSs with oil lubrication systems should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be designed, engineered, and installed to ensure that failure will not lead to fire during normal or design-basis accident conditions and that the system will withstand the safe-shutdown earthquake.	7.1	Conform	A compliant oil leakage collection system is provided for RCPs.
	The T/B should be separated from adjacent structures containing equipment important to safety by a fire barrier with a rating of at least 3 hours. The fire barriers should be designed to maintain structural integrity even in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates a direct fire exposure hazard to the barrier.	7.2	Conform	The R/B wall separating the R/B from the T/B areas meets 3-hour fire resistive construction requirements.
	The T/B contains large sources of combustible liquids, including reservoirs and piping for lube oil, seal oil, and electrohydraulic systems. These systems should be separated from systems important to safety by 3-hour rated barriers. Additional protection should be provided on the basis of the hazard or where fire barriers are not provided.	7.2.1	Conform	There is no safety-related equipment in the T/B. The T/B is separated from the R/B by 3-hour barriers. Individual hazards within the T/B are separated based on the US-APWR FHA (Appendix 9A).
STD COL 9.5(2)	Turbine generators may use hydrogen for cooling. Hydrogen storage and distribution systems should meet the guidelines provided in Regulatory Position 7.5 of this guide.	7.2.2	Conform	
	Smoke control should be provided in the T/B to mitigate potential heavy smoke conditions associated with combustible liquid and cable fires. Regulatory Position 4.1.4 provides specific guidance.	7.2.3	Conform	Smoke vents in T/B roof.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 42 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(2)	Transformers installed inside fire areas containing systems important to safety should be of the dry type or insulated and cooled with noncombustible liquid. Transformers filled with combustible fluid that are located indoors should be enclosed in a transformer vault. NFPA 70 offers additional guidance. Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 15.2 m (50 ft) distant from the building, or building walls within 15.2 m (50 ft) of oil-filled transformers should be without openings and have a fire resistance rating of at least 3 hours.	7.3	Conform	Transformers installed inside fire areas containing systems important to safety are the dry type. Outdoor oil-filled transformers are separated from turbine building by a 3-hour fire barrier separation space of at least 50 feet and from adjacent transformers by 2-hour fire rated barriers and protected with an automatic spray type suppression system. See Subsection 9.5.1.2.
NAPS COL 9.5(1)	Diesel fuel oil tanks with a capacity greater than 4,164 L (1,100 gallons) should not be located inside buildings containing equipment important to safety. If aboveground tanks are used, they should be located at least 15.2 m (50 ft) from any building containing equipment important to safety, or if located within 15.2 m (50 ft), they should be housed in a separate building constructed with materials having a minimum fire-resistance rating of 3 hours. Potential oil spills should be confined or directed away from buildings containing equipment important to safety. Totally buried tanks are acceptable outside or under buildings. (See NFPA 30 (Ref. 68) for additional guidance.) An automatic fire suppression system should protect aboveground oil storage, including those tanks located in a separate building.	7.4	Conform	Fuel oil storage to support gas turbine emergency and SBO generator units are installed within concrete vaults having a 3-hour fire rated construction and an automatic fire suppression system.
STD COL 9.5(2)	Bulk gas storage (either compressed or cryogenic) should not be permitted inside structures housing equipment important to safety. Storage of flammable gas such as hydrogen should be located outdoors or in separate, detached buildings so that a fire or explosion will not adversely affect any systems or equipment important to safety.	7.5	Conform	Bulk gas storage is located in yard area away from safety-related plant structures.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 42 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
STD COL 9.5(2)	The fire protection program should address plant support facilities (e.g., offices, maintenance shops, warehouses, temporary structures, equipment storage yards), collocated power generating units (e.g., nuclear, coal, natural gas), and nearby industrial facilities (e.g., chemical plants, refineries, manufacturing facilities) to the extent that fires and or explosions in these facilities may affect equipment important to safety. Fire protection systems and features should be adequate to protect against potential exposure fires and explosions from nearby facilities.	7.6	Conform	Plant support facilities are located away from safety-related plant structures.
	Many of the current fire protection requirements and guidelines for operating reactors were issued after Commission approval of construction permits and/or operating licenses. The backfit of these requirements and guidelines to existing plant designs created the need for considerable flexibility in the application of the regulations on a plant-by-plant basis. New reactor designs should integrate fire protection requirements, including the protection of safe-shutdown capability and the prevention of radiological release, into the planning and design phase for the plant.	8.1	Conform	As an advanced nuclear plant, the US-APWR has integrated fire protection requirements into the planning and design phases of the plant.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 43 of 44)

Regulatory Position	Position Number	Conformance	Remarks
New reactor designs should ensure that safe-shutdown can be achieved assuming that all equipment in any one fire area will be rendered inoperable by fire and that reentry into the fire area for repairs and operator actions is not possible. Because of its physical configuration, the MCR is excluded from this approach, provided the design includes an independent alternative shutdown capability that is physically and electrically independent of the MCR. The MCR should be evaluated to ensure that the effects of fire do not adversely affect the ability to achieve and maintain safe shutdown. New reactors should provide fire protection for redundant shutdown systems in the reactor containment building that will ensure, to the extent practicable, that one shutdown division will be free of fire damage. Additionally, new reactor designs should ensure that smoke, hot gases, or the fire suppressant will not migrate into other fire areas to the extent that they could adversely affect safe shutdown capabilities, including operator actions.	8.2	Conform	The US-APWR meets the enhanced fire protection provisions of SECY-93-087 as demonstrated in the FHA (Appendix 9A).
As discussed in SECY-94-084, the definitions of safe shutdown contained in the Commission's regulations and guidelines do not address the inherent limitations of passive RHR systems. Based on the discussion and recommendations of SECY-94-084, the passive decay heat removal systems must be capable of achieving and maintaining 215.6°C (420°F) or below for non-LOCA events. This safe-shutdown condition is predicated on demonstration of acceptable passive safety system performance.	8.3	N/A	The US-APWR plant uses four redundant active safety-related trains including the RHR systems to achieve cold shutdown in the event of a fire requiring plant shutdown within one of the safety-related trains.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 43 of 44) *(continued)*

	Regulatory Position	Position Number	Conformance	Remarks
NAPS COL 9.5(1)	In general, the fire protection program for new light-water reactor designs should comply with the provisions specified in NFPA 804, "Standard for Fire Protection for Advanced Light-Water Reactor Electric Generating Plants," as they relate to the protection of post-fire safe-shutdown capability and the mitigation of a radiological release resulting from a fire. However, the NRC has not formally endorsed NFPA 804 and some of the guidance in the NFPA standard conflicts with regulatory requirements. When conflicts occur, the applicable regulatory requirements and guidance, including the guidance in this RG, will govern.	8.4	Conform	The US-APWR conforms to the requirements of NFPA 804 except where requirements of RG-1.189 conflicts. See ~~table 9.2-2 for an item by item comparison with the requirements of NFPA 804~~ Table 9.5.1-2R for an item by item comparison with the requirements of NFPA 804-2006.

Table 9.5.1-1R Fire Protection Program Conformance with RG 1.189 (Sheet 44 of 44)

	Regulatory Position	Position Number	Conformance	Remarks
	Fire protection programs for proposed new non-light-water reactor designs should meet the overall fire protection objectives and guidance provided in the applicable regulations and this RG as they relate to safe shutdown and radiological release, as well as the specific fire protection requirements, as applicable.	8.5	N/A	The US-APWR is light-water reactor.
STD COL 9.5(1)	SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," identifies fire protection as an "operation program." However, only those elements of the fire protection program that will not be implemented fully until the completion of the plant should be addressed as an operational program. This may include, but is not be limited to, the fire brigade, combustible and ignition source control program, procedures and prefire plans, and portable extinguishing equipment. The COL application should identify the operational program aspects of the fire protection program and the implementation schedule for each. In lieu of the implementation schedule, the applicant may propose inspections, tests, analyses, and acceptance criteria for these aspects of the program.	8.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	NRC regulations and guidance do not specifically address fire protection during nonpower modes of plant operation (e.g., during shutdown for maintenance and/or refueling) except for existing plants that adopt an NFPA 805 fire protection program. However, the requirements for fire prevention in Regulatory Position 2 of this guide apply to all modes of plant operation, including shutdown. License applications for new reactors should also address any special provisions to ensure that, in the event of a fire during a nonpower mode of operation, the plant can be maintained in safe shutdown.	8.7	Conform	See Subsection 9.5.1.6.
	Licensees may apply for a license renewal to permit continued plant operation beyond the original operating license period of operation, in accordance with the provisions of 10 CFR 54. The fire protection licensing and design basis under license renewal should not differ significantly from that in effect before renewal with the exception that fire protection SSCs must be included in an aging management program as appropriate.	9.	N/A	The US-APWR is a new plant that will obtain an initial operating license. The design life of US-APWR is sixty years.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 1 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	All elements of the site fire protection program shall be reviewed every 2 years and updated as necessary.	4.1.1	Conform	See Subsection 9.5.1.6.
NAPS COL 9.5(1)	Other review frequencies shall be permitted where specified in site administrative procedures and approved by the authority having jurisdiction.	4.1.2	N/A	
STD COL 9.5(1)	A policy document shall be prepared that defines management authorities and responsibilities and establishes the general policy for the site fire protection program.	4.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The policy document shall designate the senior management person with immediate authority and responsibility for the fire protection program.	4.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The policy document shall define the fire protection interfaces with other organizations and assign responsibilities for the coordination activities.	4.2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The policy document shall include the authority for conflict resolution.	4.2.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	A fire prevention program shall be established and documented to include all of the following: (1) Fire safety information for all employees and contractors, including as a minimum familiarization with plant fire prevention procedures, fire reporting, and plant emergency alarms, including evacuation. (2) Documented plant inspections, including provisions for handling of remedial actions to correct conditions that increase fire hazards. (3) Procedures for the control of general housekeeping practices and the control of transient combustibles. (4) Procedures for the control of flammable and combustible gases in accordance with NFPA standards. (5) Procedures for the control of ignition sources, such as smoking, welding, cutting, and grinding (see NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work). (6) Fire prevention surveillance plan (see NFPA 601, Standard for Security Services in Fire Loss Prevention). (7) Fire-reporting procedure, including investigation requirements and corrective action requirements.	4.3	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 2 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A documented fire hazards analysis shall be made for each site.	4.4.1	Conform	See Appendix 9A.
STD COL 9.5(1)	The analysis shall document all of the following: (1) Physical construction and layout of the buildings and equipment, including fire areas and the fire ratings of area boundaries. (2) *Inventory of the principal combustibles within each fire subdivision. (3) Description of the fire protection equipment, including alarm systems and manual and automatic extinguishing systems. (4) Description and location of any equipment necessary to ensure a safe shutdown, including cabling and piping between equipment. (5) Analysis of the postulated fire in each fire area, including its effect on safe shutdown equipment, assuming automatic and manual fire protection equipment do not function. (6) Analysis of the potential effects of a fire on life safety, release of contamination, impairment of operations, and property loss, assuming the operation of installed fire-extinguishing equipment. (7) Analysis of the potential effects of other hazards, such as earthquakes, storms, and floods, on fire protection. (8) Analysis of the potential effects of an uncontained fire in causing other problems not related to safe shutdown, such as a release of contamination and impairment of operations. (9) Analysis of the postfire recovery potential. (10) Analysis for the protection of nuclear safety-related systems and components from the inadvertent actuation or breaks in a FPS. (11) Analysis of the smoke control system and the impact smoke can have on nuclear safety and operation for each fire area. (12) Analysis of the emergency planning and coordination requirements necessary for effective loss control, including any necessary compensatory measures to compensate for the failure or inoperability of any active or passive fire protection system or feature.	4.4.2	Conform	See Appendix 9A.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 3 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A formal procedure system for all actions pertaining to the fire protection program shall be established, including all of the following: (1) Inspection, testing, maintenance, and operation of fire protection systems and equipment, both manual and automatic, such as detection and suppression systems. (2) Inspection, testing, and maintenance of passive fire protection features, such as fire barriers and penetration seals. (3) Trend analysis requirements. (4) Provisions for entering areas with access restrictions. (5) Training requirements.	4.5	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	A quality assurance program shall be established in accordance with ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, for all of the following aspects of the fire protection program related to nuclear safety: (1) Design and procurement document control. (2) *Instructions, procedures, and drawings. (3) *Control of purchased material, equipment, and services. (4) *Inspection. (5) *Test and test control. (6) *Inspection, test, and operating status. (7) *Nonconforming items. (8) *Corrective action. (9) *Records. (10)*Audits.	4.6.1	Conform	See Chapter 17 and Subsection 9.5.1.6.
STD COL 9.5(1)	The quality assurance program shall be documented in detail to verify its scope and adequacy.	4.6.2	Conform	See Chapter 17 and Subsection 9.5.1.6.
STD COL 9.5(1)	A written fire emergency plan shall be established.	4.7.1	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 4 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	As a minimum, this plan shall include the following: (1) Response to fire and supervisory alarms. (2) Notification of plant and public emergency forces. (3) Evacuation of personnel. (4) Coordination with security, maintenance, operations, and public information personnel. (5) Fire extinguishment activities. (6) Postfire recovery and contamination control activities. (7) Control room operations during an emergency. (8) Prefire plan. (9) Description of interfaces with emergency response organizations, security, safety, and others having a role in the fire protection program, including agreements with outside assistance agencies, such as fire departments and rescue services.	4.7.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	A plant fire brigade shall be established as indicated in Chapter 6.	4.8	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The owner or a designated manager shall develop, implement, and update as necessary a fire prevention surveillance plan integrated with recorded rounds to all accessible sections of the plant.	5.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Inspections of the plant shall be conducted in accordance with NFPA 601, Standard for Security Services in Fire Loss Prevention.	5.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	A prepared checklist shall be used for the inspection.	5.2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Areas of primary containment and high-radiation areas normally inaccessible during plant operation shall be inspected as plant conditions permit but at least during each refueling outage.	5.2.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The results of each inspection shall be documented and retained for 2 years.	5.2.5	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	For those plant areas inaccessible for periods greater than 2 years, the most recent inspection shall be retained.	5.2.5.1	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 4 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Plant administrative procedures shall specify appropriate requirements governing the storage, use, and handling of flammable and combustible liquids and flammable gases.	5.3.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	An inventory of all temporary flammable and combustible materials shall be made for each fire area, identifying the location, type, quantity, and form of the materials.	5.3.1.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 5 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Temporary but predictable and repetitive concentrations of flammable and combustible materials shall be considered.	5.3.1.2	Conform	
STD COL 9.5(1)	Combustibles, other than those that are an inherent part of the operation, shall be restricted to designated storage compartments or spaces.	5.3.1.3	Conform	
STD COL 9.5(1)	Consideration shall be given to reducing the fire hazard by limiting the amount of combustible materials.	5.3.1.4	Conform	
STD COL 9.5(1)	The storage and use of hydrogen. shall be in accordance with NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks	5.3.1.5	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The temporary use of wood shall be minimized.	5.3.1.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Plant administrative procedures shall specify that if wood must be used in the power block, it shall be listed pressure-impregnated fire-retardant lumber.	5.3.1.7	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Housekeeping shall be performed in such a manner as to minimize the probability of fire.	5.3.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Accumulations of combustible waste material, dust, and debris shall be removed from the plant and its immediate vicinity at the end of each work shift or more frequently as necessary for safe operations.	5.3.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Plant administrative procedures shall require the following: (1) The total fire loads, including temporary and permanent combustible loading, shall not exceed those quantities established for extinguishment by permanently installed fire protection systems and equipment. (2) Where limits are temporarily exceeded, the plant fire protection manager shall ensure that appropriate fire protection measures are provided.	5.3.3.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire protection manager or a designated representative shall conduct weekly walk-through inspections to ensure implementation of required controls.	5.3.3.2	Conform	
STD COL 9.5(1)	During major maintenance operations, the frequency of these walk-throughs shall be increased to daily.	5.3.3.2.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 5 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	The results of these inspections shall be documented and the documentation retained for a minimum of 2 years.	5.3.3.2.2	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 6 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	When the work is completed, the plant fire protection manager shall have the area inspected to confirm that transient combustible loadings have been removed from the area.	5.3.3.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Extra equipment shall then be returned to its proper location.	5.3.3.3.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The results of this inspection shall be documented and retained for 2 years.	5.3.3.3.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Only noncombustible panels or flame-retardant tarpaulins or approved materials of equivalent fire-retardant characteristics shall be used.	5.3.3.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Any fabrics or plastic films used, other than those complying with 5.3.3.4, shall be certified to conform to the large-scale fire test described in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.	5.3.3.5	Conform	
STD COL 9.5(1)	Flammable and combustible liquid storage and use shall be in accordance with NFPA 30, Flammable and Combustible Liquids Code.	5.3.4.1	Conform	
	Where oil-burning equipment, stationary combustion engines, or gas turbines are used, they shall be installed and used in accordance with NFPA 31, Standard for the Installation of Oil-Burning Equipment, or NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, as appropriate.	5.3.4.2	Conform	
	Flammable and combustible liquid and gas piping shall be in accordance with ASME B31.1, Power Piping, or ASME Boiler and Pressure Vessel Code, Section III, as applicable.	5.3.4.3	Conform	
	Hydraulic systems shall use only listed fire-resistant hydraulic fluids, except as specified by 5.3.4.5.	5.3.4.4	Conform	
	Where unlisted hydraulic fluids must be used, they shall be protected by a fire suppression system.	5.3.4.5	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 7 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The ignition of leaked or spilled liquid shall be minimized by the following methods: (1) *Keeping the liquid from contact with hot parts of the steam system (wall temperature greater than or equal to ignition temperature), such as steam pipes and ducts, entry valve, turbine casing, reheater, and bypass valve. (2) Using suitable electrical equipment. (3) Sealing the insulation of hot plant components to prevent liquid saturation. (4) Using concentric piping. (5) Using liquid collection systems.	5.3.4.6	Conform	
STD COL 9.5(1)	Plant administrative procedures shall require an in-plant review and prior approval of all work plans to assess potential fire hazard situations.	5.4.1.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Where potential fire hazards are determined to exist, special precautions shall be taken to define appropriate conditions under which the work is authorized.	5.4.1.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Written permission from the fire protection manager or a designated alternate shall be obtained before starting activities involving cutting, welding, grinding, or other potential ignition sources.	5.4.2.2	Conform	
STD COL 9.5(1)	A permit shall not be issued until all of the following are accomplished: (1) An inspection has determined that hot work can be conducted at the desired location. (2) Combustibles have been moved away or covered. (3) The atmosphere is nonflammable. (4) A trained fire watch (with equipment) is posted for the duration of the work and for 30 minutes thereafter, to protect against sparks or hot metal starting fires.	5.4.2.3	Conform	
STD COL 9.5(1)	All cracks or openings in floors shall be covered or closed.	5.4.2.4	Conform	
STD COL 9.5(1)	Smoking shall be prohibited at or in the vicinity of hazardous operations or combustible and flammable materials.	5.4.3.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	“No Smoking” signs shall be posted in the areas specified in 5.4.3.1.	5.4.3.2	Conform	
STD COL 9.5(1)	Smoking shall be permitted only in designated and supervised safe areas of the plant.	5.4.3.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 7 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Where smoking is permitted, safe receptacles shall be provided for smoking materials.	5.4.3.4	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 8 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	All temporary electrical wiring shall comply with the following to minimize the ignition of flammable materials: (1) Be kept to a minimum. (2) Be suitable for the location. (3) Be installed and maintained in accordance with NFPA 70, National Electrical Code, or ANSI/IEEE C2, National Electrical Safety Code, as appropriate. (4) Be arranged so that energy shall be isolated by a single switch. (5) Be arranged so that energy shall be isolated when not needed.	5.4.4	Conform	
STD COL 9.5(1)	Only safely installed, approved heating devices shall be used in all locations.	5.4.5.1	Conform	
STD COL 9.5(1)	Ample clearance shall be provided around stoves, heaters, and all chimney and vent connectors to prevent ignition of adjacent combustible materials in accordance with NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel–Burning Appliances (connectors and solid fuel); NFPA 54, National Fuel Gas Code (fuel gas appliances); and NFPA 31, Standard for the Installation of Oil-Burning Equipment (liquid fuel appliances).	5.4.5.2	Conform	
STD COL 9.5(1)	Refueling operations of heating equipment shall be conducted in an approved manner.	5.4.5.3	Conform	
STD COL 9.5(1)	Heating devices shall be situated so that they are not likely to overturn.	5.4.5.4	Conform	
STD COL 9.5(1)	Temporary heating equipment, when utilized, shall be monitored and maintained by properly trained personnel.	5.4.5.5	Conform	
	Open-flame or combustion-generated smoke shall not be used for leak testing.	5.4.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Plant administrative procedures shall specify appropriate requirements governing the control of electrical appliances in all plant areas.	5.4.7	Conform	
STD COL 9.5(1)	Temporary buildings, trailers, and sheds, whether individual or grouped, shall be constructed of noncombustible material and shall be separated from other structures.	5.5.1.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 8 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Temporary buildings, trailers, and sheds and other structures constructed of combustible or limited-combustible material shall be separated from other structures by a minimum distance of 30 ft., unless otherwise permitted by 5.5.1.3.	5.5.1.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 9 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Where all portions of the exposed building (walls, roof) within 30 ft. of the exposure constitute a rated fire barrier, the minimum separation distance shall be permitted to be reduced in accordance with Table 5.5.1.3.	5.5.1.3	Conform	
STD COL 9.5(1)	All exterior buildings, trailers, sheds, and other structures shall have the appropriate type and size of portable fire extinguishers.	5.5.1.4	Conform	
STD COL 9.5(1)	Where coverings are utilized for protection of the outdoor storage of materials or equipment, the following shall apply: (1) Only approved fire-retardant tarpaulins or other acceptable materials shall be used. (2) All framing material used to support such coverings shall be either noncombustible or fire-retardant pressure-impregnated wood. (3) Covered storage shall not be located within 30 ft. of any building.	5.5.2	Conform	
STD COL 9.5(1)	All interior temporary structures shall be constructed of noncombustible, limited-combustible, or fire-retardant pressure-impregnated wood.	5.5.3.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Structures constructed of noncombustible or limited-combustible materials shall be protected by an automatic fire suppression system unless the fire hazard analysis determines that automatic suppression is not required.	5.5.3.1.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The structure shall be protected by an automatic fire suppression system if the structure is constructed of fire-retardant pressure-impregnated wood.	5.5.3.1.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The use of interior temporary coverings shall comply with the following criteria: (1) Be limited to special conditions where interior temporary coverings are necessary. (2) Be constructed of approved fire-retardant tarpaulins.	5.5.3.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Where framing is required, it shall be constructed of noncombustible, limited-combustible, or fire-retardant pressure-impregnated wood.	5.5.3.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	All interior temporary facilities shall have the appropriate type and size of portable fire extinguisher.	5.5.3.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 9 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A written procedure shall be established to address impairments to fire protection systems and features and other plant systems that directly affect the level of fire risk (e.g., ventilation systems, plant emergency communication systems).	5.6.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 10 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Impairments to fire protection systems shall be as short in duration as practical.	5.6.2	Conform	
STD COL 9.5(1)	Appropriate post maintenance testing shall be performed on equipment that was impaired to ensure that the system will function properly.	5.6.3	Conform	
STD COL 9.5(1)	Any change to the design or function of the system after the impairment shall be considered in establishing the testing requirements and shall be reflected in the appropriate design documents and plant procedures.	5.6.4	Conform	
STD COL 9.5(1)	Upon installation, all new fire protection systems and passive fire protection features shall be preoperationally inspected and tested in accordance with applicable NFPA standards.	5.7.1	Conform	
STD COL 9.5(1)	Where appropriate test standards do not exist, inspections and test procedures described in the purchase and design specification shall be followed.	5.7.2	Conform	
STD COL 9.5(1)	Fire protection systems and passive fire protection features shall be inspected, tested, and maintained in accordance with applicable NFPA standards, manufacturers' recommendations, and requirements established by those responsible for fire protection at the plant.	5.7.3	Conform	
STD COL 9.5(1)	Inspection, testing, and maintenance shall be performed using established procedures with written documentation of results and a program of follow-up actions on discrepancies.	5.7.4	Conform	
STD COL 9.5(1)	Consideration shall be given to the inspection, testing, and maintenance of nonfire protection systems and equipment that have a direct impact on the level of fire risk within the plant.	5.7.5	Conform	
STD COL 9.5(1)	Detailed prefire plans shall be developed for all site areas.	6.1.1	Conform	
STD COL 9.5(1)	Prefire plans shall detail the fire area configurations and fire hazards to be encountered in the fire area along with any safety-related components and fire protection systems and features that are present.	6.1.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 11 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Prefire plans shall be reviewed and, if necessary, updated at least every 2 years.	6.1.3	Conform	
STD COL 9.5(1)	Prefire plans shall be available in the control room and made available to the plant fire brigade.	6.1.4	Conform	
STD COL 9.5(1)	A minimum of five plant fire brigade members shall be available for response at all times.	6.2.1.1	Conform	
STD COL 9.5(1)	Fire brigade members shall have no other assigned normal plant duties that would prevent immediate response to a fire or other emergency as required.	6.2.1.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The brigade leader and at least two brigade members shall have training and knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability.	6.2.1.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire brigade shall be notified immediately upon verification of a fire or fire suppression system actuation.	6.2.1.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Plant fire brigade members shall be physically qualified to perform the duties assigned.	6.2.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Each member shall pass an annual physical examination to determine that the fire brigade member can perform strenuous activity.	6.2.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The physical examination shall determine each member's ability to use respiratory protection equipment.	6.2.2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Each fire brigade member shall meet training qualifications as specified in Chapter 6, Section 6.3.	6.2.2.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Plant fire brigade members shall receive training consistent with the requirements contained in NFPA 600, Standard on Industrial Fire Brigades, or NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, as appropriate.	6.3.1.1	Conform	
STD COL 9.5(1)	Fire brigade members shall be given quarterly training and practice in fire fighting.	6.3.1.2	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 11 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A written program shall detail the fire brigade training program.	6.3.1.3	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 12 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Written records that include but are not limited to the following shall be maintained for each fire brigade member: (1) Initial fire brigade classroom and hands-on training. (2) Refresher training. (3) Special training schools attended. (4) Drill attendance records. (5) Leadership training for fire brigades.	6.3.1.4	Conform	
STD COL 9.5(1)	Drills shall be conducted quarterly for each shift to test the response capability of the fire brigade.	6.3.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire brigade drills shall be developed to test and challenge fire brigade response, including the following: (1) Brigade performance as a team. (2) Proper use of equipment. (3) Effective use of prefire plans. (4) Coordination with other groups.	6.3.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire brigade drills shall be conducted in various plant areas, especially in those areas identified by the fire hazards analysis to be critical to plant operation and to contain significant fire hazards.	6.3.2.3	Conform	
STD COL 9.5(1)	Drill records shall be maintained detailing the drill scenario, fire brigade member response, and ability of the fire brigade to perform the assigned duties.	6.3.2.4	Conform	
STD COL 9.5(1)	A critique shall be held after each drill.	6.3.2.5	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The plant fire brigade shall be provided with equipment that enables its members to adequately perform their assigned tasks.	6.4.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Fire brigade equipment shall be tested and maintained.	6.4.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Written records shall be retained for review.	6.4.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 12 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A mutual aid agreement shall be offered to the local off-site fire department.	6.5.1.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Where possible, the plant fire protection manager and the off-site fire authorities shall develop a plan for their interface.	6.5.1.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire protection manager also shall consult with the off-site fire department to make plans for fire fighting and rescue, including assistance from other organizations, and to maintain these plans.	6.5.1.3	Conform	
STD COL 9.5(1)	The local off-site fire department shall be invited to participate in an annual drill.	6.5.1.4	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 13 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Fire fighters from the off-site fire department who are expected to respond to a fire at the plant shall be familiar with the plant layout.	6.5.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The access routes to fires in the controlled area (to which access doors are locked) shall be planned in advance.	6.5.2.2	Conform	
STD COL 9.5(1)	The off-site fire department shall be offered instruction and training in radioactive materials, radiation, and hazardous materials that could be present.	6.5.2.3	Conform	
STD COL 9.5(1)	Plant management shall designate a plant position to act as a liaison to the off-site fire department when it responds to a fire or other emergency at the plant.	6.5.3.1	Conform	
STD COL 9.5(1)	Plant management shall ensure that the off-site fire department personnel are escorted at all times and emergency actions are not delayed.	6.5.3.2	Conform	
STD COL 9.5(1)	The fire brigade shall have at its disposal the necessary equipment to assist with routing water from the affected area.	6.6	Conform	
STD COL 9.5(1)	All plant areas shall be accessible for fire-fighting purposes.	6.7.1	Conform	
STD COL 9.5(1)	Prefire plans shall identify those areas of the plant that are locked and have limited access for either security or radiological control reasons.	6.7.2	Conform	
STD COL 9.5(1)	Provisions shall be made to allow access to the locked areas, including having security and health physics personnel respond to the fire area along with the fire brigade, if necessary.	6.7.2.1	Conform	
STD COL 9.5(1)	Health physics personnel shall confer with the fire brigade leader to determine the safest method of access to any radiologically controlled area.	6.7.2.2	Conform	
STD COL 9.5(1)	Full advantage shall be taken of all fixed radiation shielding to protect personnel responding for fire suppression purposes.	6.8.1	Conform	
STD COL 9.5(1)	Health physics personnel shall advise the fire brigade leader of the best method for affording radiological protection.	6.8.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 14 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	If fixed ventilation systems are not capable of removing smoke and heat, the fire brigade shall utilize portable ventilation equipment (See Chapter 8, Section 8.4).	6.9	Conform	See Subsection 9.5.1.6. Fire Brigade has portable equipment.
	A fire-safe shutdown analysis shall be prepared and maintained for the operating life of the reactor, and shall include, as a minimum, all of the following: (1) Fire hazards analysis. (2) Safe shutdown analysis. (3) Internal plant examination of external fire events for severe accident vulnerabilities.	7.2	Conform	US-APWR designed to allow safe-shutdown from two of three unaffected trains of safety-related equipment using normal plant equipment. See DCD Chapter 7, Section 7.4.
	The fire hazards analysis shall include the criteria indicated in Chapter 4, Section 4.4.	7.2.1	Conform	See Appendix 9A.
	A safe shutdown analysis of the effects of a fire on those essential structures, systems, and components required to safely shut down the plant and maintain it in a safe shutdown condition shall be performed, including, as a minimum, the requirements of this section.	7.2.2	Conform	
	A safe shutdown system available/unavailable calculation or table that provides the following shall be prepared and maintained for each fire area: (1) The document shall identify all safe shutdown equipment that is operable or inoperable due to the effects of a fire in that fire area. (2) The document shall demonstrate compliance with the requirements of Chapter 7, Sections 7.3 and 7.4.	7.2.2.1	Conform	See Appendix 9A.
	A shutdown logic diagram shall be available that identifies the conditions necessary to achieve and maintain safe shutdown capability in the event of a fire and those plant features necessary to realize these conditions, including auxiliary and support features.	7.2.2.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 14 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
A risk assessment that estimates the potential risk from a fire in relation to the plant's core damage frequency shall be prepared.	7.2.3	Conform	Fire PRA for US-APWR is performed. See Chapter 19.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 15 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
An industry-accepted examination process shall be used for the risk assessment.	7.2.3.1	Conform	Fire PRA for US-APWR follows NUREG/CR 6850 guidance.
An acceptable risk assessment shall demonstrate that the probability of core damage as a result of an internal fire is less than 1×10^{-6} per reactor year.	7.2.3.2	See Chapter 19.	
The internal plant examination of external fire events for severe accident vulnerabilities shall be used to evaluate the level of safety of the plant and shall not be used to reduce the overall plant fire protection design basis.	7.2.3.3	Conform	
Only one fire shall be assumed to occur at a given time, and for the purpose of a safe shutdown analysis, damage shall be assumed to occur immediately.	7.3.1.1	Conform	
All components, including electrical cables, that are susceptible to fire damage in a single fire area (except primary containment and annulus areas) shall be assumed to be disabled or to be spuriously actuated, whichever is the worst case.	7.3.1.2	Conform	
A fire shall not impair safe shutdown capability inside primary containment or annulus areas.	7.3.1.3	Conform	
The plant shall be assumed to be operating at 100% power, with all components in their normal configuration, when a postulated fire occurs; however, the analysis also shall consider changes in plant configurations during all normal modes of operation.	7.3.1.4	Conform	
A concurrent single active component failure independent of the postulated fire shall not be assumed to occur.	7.3.1.5	Conform	
Plant accidents or severe natural phenomena shall not be assumed to occur concurrently with a postulated fire, except as specified in 7.3.2.	7.3.1.6	Conform	
A loss of off-site power shall be assumed concurrent with the postulated fire only where the safe shutdown analysis (including alternative shutdown) indicates the fire could initiate the loss of off-site power.	7.3.1.7	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 16 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Fire-safe shutdown components shall be capable of performing all the following functions in the event of the postulated fire: (1) Achieving and maintaining subcritical reactivity conditions in the reactor. (2) Maintaining the reactor coolant inventory such that plant safety limits are not violated. (3) *Establishing reactor decay heat removal to prevent fuel damage and to achieve and maintain cold shutdown conditions. (4) Providing support functions such as process cooling and lubrication necessary to allow operation of the FSSD components. (5) Providing direct readings of the process variables necessary to perform and control the FSSD functions.	7.3.1.8	Conform	
During a postfire shutdown, the fission product boundary integrity shall be maintained within acceptable limits (e.g., fuel clad damage, rupture of any primary coolant boundary, or rupture of the primary containment boundary).	7.3.1.9	Conform	
An evaluation of spurious signals shall be performed based on the following: (1) All components shall be assumed to be in their normal operating positions for the particular mode of operation being considered by the spurious signal evaluation. (2) The evaluation shall consider the following cable failure modes: (a) A hot short in which individual conductors within a cable are shorted to individual conductors of a different cable such that a de-energized circuit might become energized by shorting to an external source of electrical power. (b) An open circuit in which the cable failure results in the loss of electrical continuity. (c) A short to ground in which a cable conductor shorts to grounded structures. (d) A short circuit in which individual conductors within multiconductor cable short to each other.	7.3.1.10.1	Conform	
Functional failure or damage modes of equipment and components that can spuriously operate shall be considered.	7.3.1.10.2	Conform	
The postulates specified in 7.3.1.11.1 through 7.3.1.11.5 shall be used in the analysis of fire-induced spurious actuation of equipment.	7.3.1.11	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 17 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
FSSD capability shall not be adversely affected by simultaneous spurious actuation of all valves in a single high-to-low pressure interface line where the power or control circuits for the valves can be damaged by a postulated fire.	7.3.1.11.1	Conform	
For other than high-to-low pressure boundaries, FSSD capability shall not be adversely affected by spurious actuation or signal.	7.3.1.11.2	Conform	
Separate conditions shall be analyzed concurrent with the spurious actuation(s) or signal addressed in 7.3.1.11.1 and 7.3.1.11.2.	7.3.1.11.3	Conform	
All automatic functions (signal, logic, etc.) from the circuits that can be damaged by the postulated fire shall be assumed lost or assumed to function as intended, whichever is the worst case.	7.3.1.11.4	Conform	
All potential spurious signals shall be analyzed, but only one spurious signal shall be postulated to occur at a time for purposes of analysis, except for high-to-low pressure interface valves.	7.3.1.11.5	Conform	
For the purpose of analysis for cases involving high-to-low pressure interface, hot shorts involving three-phase ac circuits shall be postulated.	7.3.1.12	Conform	
For ungrounded dc circuits, if it can be shown that only two hot shorts of the proper polarity without grounding could cause spurious operation, no further evaluation shall be necessary, except for cases involving high-to-low pressure interfaces.	7.3.1.13	Conform	
All common power supply associated circuits of concern shall be isolated from FSSD circuits by coordinated circuit breakers or fuses.	7.3.1.14	Conform	
Protection for circuits associated by common enclosure shall meet the following criteria: (1) Protection shall be demonstrated by ensuring that suitable electrical overcurrent protection devices are provided for all cables. (2) Appropriate measures to prevent the propagation of fire, such as rated fire stops and seals in the raceway or enclosure, shall be provided.	7.3.1.15.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 18 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
The overcurrent protection devices specified in 7.3.1.15.1(1) shall be located outside the fire area containing the common enclosure.	7.3.1.15.2	Conform	
A high-impedance fault shall be assumed to occur as a result of a fire.	7.3.1.16.1	Conform	
Evaluation of the impact of high-impedance faults on the ability to achieve and maintain safe shutdown shall be performed to demonstrate that sufficient capacity exists in the electrical protective system to preclude a trip of the main source breaker to the supply.	7.3.1.16.2	Conform	
A risk assessment that demonstrates the potential risk from a seismically induced fire in relationship to the plant's core damage frequency shall be prepared and used as follows: (1) The assessment shall be used to evaluate the level of safety of the plant. (2) The assessment shall not be used to reduce the overall plant fire protection design basis.	7.3.2.1	Conform	
An industry-accepted examination process shall be used for the risk assessment.	7.3.2.2	Conform	
One safety division of systems that is necessary to achieve and maintain safe shutdown from either the control room or emergency control station(s) shall be maintained free of fire damage by a single fire, including an exposure fire.	7.4.1	Conform	
One safety division of systems that is necessary to prevent the initiation of a design basis accident shall be maintained free of fire damage from a single fire that occurs outside the MCR.	7.4.2	Conform	
Redundant cables, equipment, components, and associated circuits of nuclear safety-related or safe shutdown systems shall be located in separate fire areas, unless otherwise permitted by 7.4.3.1.	7.4.3	Conform	
Where redundant system separation inside containment cannot be achieved, other measures shall be permitted in accordance with Chapter 7, Section 7.6 to prevent a fire from causing the loss of function of nuclear safety-related or safe shutdown systems.	7.4.3.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 19 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The fire barrier forming the separate fire areas specified in 7.4.3 shall have a 3-hour fire rating and automatic area-wide detection shall be installed throughout the fire areas, unless all the following criteria are met: (1) The fire barriers forming the fire areas shall have a minimum fire-resistive rating of 1 hour. (2) Automatic area-wide detection and suppression shall be installed throughout the fire areas. (3) Structural steel forming a part of or supporting the fire barriers shall be protected to provide fire resistance equivalent to that of the barrier.	7.4.3.2	Conform	
	Structural steel forming a part of or supporting the fire barriers shall be protected to provide fire resistance equivalent to that of the 3-hour fire-rated barrier specified in 7.4.3.2.	7.4.3.3	Conform	
	Fire areas separated by minimum 3-hour fire-rated barriers shall be established to separate redundant safety divisions and safe shutdown functions from fire hazards in nonsafety or safe shutdown-related areas of the plant.	7.4.4	Conform	
	In fire areas containing components of either a nuclear safety–related or safe shutdown system, special attention shall be given to detecting and suppressing fire that can adversely affect the system.	7.4.5	Conform	
	Measures that shall be taken to reduce the effects of a postulated fire in a given fire area include the following: (1) Limiting the amount of combustible materials (see Chapter 5, Section 5.3) (2) Providing fire-rated barriers between major components and equipment to limit fire spread within a fire area (see Chapter 8, Section 8.1) (3) Installing fire detection (see Chapter 9, Section 9.8) and fixed suppression systems (see Chapter 9, Section 9.6)	7.4.6	Conform	
STD COL 9.5(1)	Procedures shall be developed for actions necessary to achieve FSSD.	7.5.1	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 20 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Operator actions necessary to achieve FSSD of the reactor shall meet criteria acceptable to the AHJ.	7.5.2.1	Conform	No operator manual actions required to achieve safe-shutdown.
	No credit shall be taken for operator actions required to effect repairs to equipment to achieve FSSD of the reactor.	7.5.2.2	Conform	
STD COL 9.5(1)	Personnel necessary to achieve and maintain the plant in FSSD following a fire shall be provided from the normal on-site staff, exclusive of the fire brigade.	7.5.2.3	Conform	
STD COL 9.5(1)	The operator training program shall include performance-based simulator training on FSSD procedures.	7.5.2.4	Conform	
STD COL 9.5(1)	Walk-through of operator actions necessary to achieve FSSD of the reactor shall be performed to verify that the actions are feasible and shall be integrated into the operator training program.	7.5.2.5	Conform	
STD COL 9.5(1)	Postfire shutdown and recovery plans shall be included in the station emergency preparedness plan.	7.5.2.6	Conform	
STD COL 9.5(1)	Drills and operator requalification training shall ensure that operations personnel are familiar with and can accomplish the necessary actions.	7.5.2.7	Conform	
	Access routes to areas containing equipment necessary for safe shutdown of the reactor shall be protected from the effects of smoke and fire.	7.5.3.1.1	Conform	
	Two separate access routes shall be provided from the MCR to the remote shutdown location.	7.5.3.1.2	Conform	
	Emergency lighting shall be provided for the access routes and the remote shutdown location (see Chapter 8, Section 8.6).	7.5.3.1.3	Comply	
	Operator safety shall not be threatened by fire conditions while FSSD of the reactor is being implemented.	7.5.3.2.1	Conform	
	Operation of equipment required to effect FSSD of the reactor shall not require any extraordinary actions by the operator.	7.5.3.2.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 20 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Operators (e.g., handwheels of valves that require manual manipulation for FSSD) shall be readily accessible.	7.5.3.2.3	N/A	No operator manual actions required to achieve fire safe shutdown.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 21 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
If the handwheel is located more than 5 ft above the floor, it shall be provided with either a chain operator or a permanent platform.	7.5.3.2.3.1	N/A	No manual manipulation of handwheels required to achieve fire safe-shutdown.
The platform shall be of sufficient size to allow the operator to safely perform the manual action.	7.5.3.2.3.2	N/A	No manual manipulation of handwheels required to achieve fire safe-shutdown.
Alternative shutdown capability provided for a specific fire area shall include the following: (1) Achieving and maintaining subcritical reactivity conditions in the reactor (2) Maintaining the reactor coolant inventory (3) Achieving safe shutdown (4) Maintaining safe shutdown following the fire event	7.6.1	N/A	No alternative shutdown required. Shutdown is achieved through normal operation of two out of three undamaged trains of safety-related equipment.
During the postfire shutdown, the reactor coolant system process variables shall be maintained within those values predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected.	7.6.2	Conform	
Performance goals for reactor shutdown functions shall be the same as those required by 7.3.1.8.	7.6.3	Conform	
The safe shutdown circuits for each fire area shall meet the following criteria: (1) They shall be known to be isolated from associated circuits in the fire area so the hot shorts, shorts to ground, open circuits, or short circuits will not prevent the operation of the safe shutdown equipment. (2) Isolation of associated circuits from the safe shutdown equipment shall be such that a postulated fire involving the associated circuits will not prevent safe shutdown or damage the safe shutdown components.	7.6.4	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 21 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
NAPS COL 9.5(1)	In multiunit plants, each unit shall be separated from adjacent units by either an open space of at least 50 ft or at least a 3-hour-rated fire barrier.	8.1.1.1	Conform	~~See COL Item 9.5(2)~~ Unit 3 is separated from Units 1 and 2 by greater than 50 ft.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 22 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Buildings or portions thereof containing nuclear safety-related systems shall be separated from buildings or portions thereof not related to nuclear safety by barriers having a designated fire resistance rating of 3 hours.	8.1.1.2	Conform	
Buildings containing nuclear safety-related systems shall be permitted to be separated from buildings not related to nuclear safety by an open space of at least 50 ft.	8.1.1.3	Conform	See 8.1.1.2, US-APWR uses 3-hour separation for power block buildings.
Advanced light water reactor electric generating plants shall be subdivided into separate fire areas to minimize the risk of fire spread and the resultant consequential damage from fire gases, smoke, heat, radioactive contamination, and fire-fighting activities.	8.1.2.1	Conform	See Appendix 9A for US-APWR fire area descriptions.
In addition to 8.1.2.1, the subdivision into fire areas shall allow adequate access for manual fire suppression activities.	8.1.2.2	Conform	
A listed fire barrier having a fire resistance rating of at least 3 hours and with listed 3-hour-rated penetration seals shall be provided as follows: (1) To separate all contiguous buildings or portions thereof serving different purposes, such as reactor containment, auxiliary, turbine, radwaste, control, service, administration, and other occupancy areas as dictated by reactor design. (2) To separate safety-related standby emergency diesel generators and combustion turbines from each other and the rest of the plant. (3) To separate the turbine generator lube oil conditioning system and lube oil storage from the turbine building and adjacent areas. (4) To separate diesel fire pumps and associated equipment from other pumps in the same pump house. (5) To separate all areas with heavy concentrations of cables, such as cable spreading rooms, cable tunnels, cable penetration areas, and cable shafts or chases, including those within the reactor containment, from adjacent areas. (6) To separate auxiliary boiler rooms from adjacent areas. (7) Wherever so determined by the fire hazards analysis.	8.1.2.3	Conform	See Appendix 9A.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 23 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
To prevent vertical spread of fire, stairways, elevator shafts, trash chutes, and other vertical shafts and plenums shall be enclosed with barriers having a fire resistance rating of at least 2 hours.	8.1.2.4	Conform	
Openings in the barriers specified in 8.1.2.4 shall be protected with listed automatic or self-closing fire doors having a fire protection rating of at least 1½ hours.	8.1.2.5	Conform	
All openings in fire barriers shall be provided with fire door assemblies, fire dampers, penetration seals (fire stops), or other approved means having a fire protection rating consistent with the designated fire resistance rating of the barrier, unless the criterion of 8.1.3.2 is met.	8.1.3.1	Conform	
Assemblies used to meet the requirements of 8.1.3.1 that are not listed or approved due to nuclear safety or security requirements shall be demonstrated to be equivalent.	8.1.3.2	Conform	
Fire door assemblies, fire dampers, and fire shutters used in 2-hour-rated fire barriers shall be listed as not less than 1½ hour rated and shall meet the requirements of NFPA 80, Standard for Fire Doors and Fire Windows, for fire door requirements and NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, for fire damper requirements, unless otherwise permitted by 8.1.3.4.	8.1.3.3	Conform	
Where approved full-scale fire tests indicate that opening protection is not necessary, the opening protection specified in 8.1.3.3 shall not be required.	8.1.3.4	N/A	No unprotected opening are provided in the fire rated barriers of the US-APWR design.
Windows in fire barriers, such as for a control room or computer room, shall be provided with a listed or approved fire shutter or automatic wall curtain.	8.1.3.4.1	Conform	
Cable openings, piping openings, and building joints shall be provided with fire-rated penetration seals that meet the requirements of ASTM E 814, Fire Tests of Through-Penetration Fire Stops, or UL 1479, Standard for Safety Fire Tests of Through-Penetration Firestops.	8.1.3.4.2	Conform	
All conduits shall be sealed at the barrier with a fire-rated seal, if accessible.	8.1.3.4.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 24 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	As an alternative to 8.1.3.4.3, internally sealing with a fire-rated seal at the first break in the conduit on both sides of the barrier shall be acceptable.	8.1.3.4.3.1	Conform	
	For the configuration specified in 8.1.3.4.3.1, the fire rating of the internal conduit seal shall be equivalent to the rating of the fire barrier being penetrated.	8.1.3.4.3.2	Conform	
	Where approved full-scale fire tests indicate that internal conduit seals are not necessary, internal conduit seals shall not be required.	8.1.3.4.3.3	Conform	
	All fire-rated assemblies shall be tested with a positive pressure in the furnace.	8.1.3.4.4	Conform	
STD COL 9.5(1)	Normally closed fire doors in fire barriers shall be identified with a sign indicating “Fire Door — Keep Closed.”	8.1.3.4.5	Conform	
	Design features that provide for monitoring and control of fire doors to ensure fire door operability and fire barrier integrity shall be provided, unless otherwise permitted by 8.1.3.6.	8.1.3.5	Conform	
STD COL 9.5(1)	Administrative procedures shall be permitted to be used instead of the design features required by 8.1.3.5.	8.1.3.6	Conform	
	NFPA 101, Life Safety Code, shall be the standard for life safety from fire in the design and operation of the Advanced Light Water Reactor, except where modified by this standard.	8.2.1	Conform	
	The majority of the areas involved in the transfer of nuclear energy to electrical energy shall be considered as special-purpose industrial occupancies and special-structure windowless buildings, as defined in NFPA 101, Life Safety Code.	8.2.2	Conform	
	In determining the exits for an Advanced Light Water Reactor plant, the actual number of personnel and occupancy hazards during maintenance, refueling, and testing shall determine the exit requirements and occupant load based on NFPA 101, Life Safety Code.	8.2.3	Conform	
STD COL 9.5(2)	Cafeterias, lunchrooms, conference rooms, and assembly rooms having an occupant load greater than 50 shall conform to the new assembly occupancy requirements in NFPA 101, Life Safety Code.	8.2.4	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 25 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	General office areas, office buildings, and training facilities shall conform to the business occupancy requirements in NFPA 101, Life Safety Code.	8.2.5	Conform	
STD COL 9.5(2)	Warehouses and storage areas shall conform to the storage occupancy requirements in NFPA 101, Life Safety Code.	8.2.6	Conform	
	Construction materials for the Advanced Light Water Reactor plant shall be classified by at least one of the following test methods appropriate to the end-use configuration of the material: (1) NFPA 220, Standard on Types of Building Construction. (2) ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C. (3) NFPA 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials (ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials). (4) NFPA 253, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source. (5) NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials (ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials). (6) NFPA 256, Standard Methods of Fire Tests of Roof Coverings. (7) NFPA 259, Standard Test Method for Potential Heat of Building Materials	8.3.1	Conform	
	All walls, floors, and structural components, except interior finish materials, shall be of noncombustible construction.	8.3.2	Conform	
	Interior wall or ceiling finish classification shall be in accordance with NFPA 101, Life Safety Code, requirements for Class A material.	8.3.2.1	Conform	
	Interior floor finish classification shall be in accordance with NFPA 101, Life Safety Code, requirements for Class I interior floor finish.	8.3.2.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 26 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Thermal insulation materials, radiation shielding materials, ventilation duct materials, soundproofing materials, and suspended ceilings, including light diffusers and their supports, shall be noncombustible or limited combustible.	8.3.3	Conform	
Wiring above suspended ceilings shall be listed for plenum use, routed in armored cable, routed in metallic conduits, or routed in cable trays with solid metal top and bottom covers.	8.3.4	Conform	
Roof coverings shall be Class A as determined by tests described in NFPA 256, Standard Methods of Fire Tests of Roof Coverings.	8.3.5	Conform	
Metal roof deck construction shall be Class I as listed by Factory Mutual or fire acceptable as listed by Underwriters Laboratories Inc.	8.3.6	Conform	
Bulk flammable gas storage, either compressed or cryogenic, shall not be permitted inside structures housing safety-related systems.	8.3.7	Conform	
Storage of flammable gas, such as hydrogen, shall be located outdoors or in separate detached buildings, so that a fire or explosion will not adversely affect any safety-related systems or equipment.	8.3.7.1	Conform	
Outdoor high-pressure flammable gas storage containers shall be located so that the long axis is not pointing at the building walls.	8.3.7.2	Conform	
The following requirements shall apply to bulk storage of flammable and combustible liquids: (1) Storage shall not be permitted inside structures housing safety-related systems. (2) As a minimum, the storage and use shall comply with the requirements of NFPA 30, Flammable and Combustible Liquids Code.	8.3.8	Conform	
The design, installation, and operation of ventilation systems necessary for normal and emergency operation of the plant shall be in accordance with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.	8.4.1	Conform	
Automatic damper closure or shutdown of ventilation systems shall be consistent with nuclear safety and the safety of onsite personnel.	8.4.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 27 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Smoke removal shall be provided for nuclear safety-related areas of the plant, and the following criteria also shall apply: (1) Equipment shall be suitable for removing smoke without damage to equipment. (2) The release to the environment of smoke containing radioactive materials shall be monitored in accordance with emergency plans. (3) For those plants provided with complete automatic sprinkler protection, fixed ventilation systems for the removal of smoke shall not be required.	8.4.3	Conform	
Smoke and heat removal systems shall be provided for other fire areas based on the fire hazards analysis, unless otherwise permitted by 8.4.3.2.	8.4.3.1	Conform	
For those plants provided with complete automatic sprinkler protection, fixed ventilation systems for the removal of smoke shall not be required.	8.4.3.2	Conform	
Smoke from nonnuclear areas shall be discharged directly outside to an area that will not adversely affect nuclear safety-related areas.	8.4.3.3	Conform	
Any ventilation system designed to exhaust potentially radioactive smoke or heat shall be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant.	8.4.3.4	Conform	
To facilitate manual fire fighting, smoke control shall be provided in high-density cable-use areas, switchgear rooms, diesel fuel oil storage areas, T/Bs, and other areas where potential exists for heavy smoke and heat conditions as determined by the fire hazards analysis.	8.4.4	Conform	
The power supply and controls for mechanical ventilation systems used for smoke removal shall be routed outside the fire area served by the system or protected from fire damage.	8.4.5	Conform	
The fresh air supply intakes to plant areas shall be located remote from the exhaust air outlets and smoke vents of other fire areas.	8.4.6	Conform	
Where natural-convection ventilation is used, a minimum ratio of vent area to floor area shall be at least 1 to 200, except in oil hazard areas, where at least a 1-to-100 ratio shall be provided.	8.4.7	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 28 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Combustible ducts, including fire-retardant types, shall not be used for ventilation systems.	8.4.8.1	Conform	
Fire dampers shall be installed in accordance with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems. Consideration shall be given to the velocity in the duct.	8.4.8.2	Conform	
Where full-scale fire tests that are conducted by testing laboratories indicate that fire dampers are not necessary to prevent fire spread through a fire-rated barrier, fire dampers shall be permitted to be omitted from the fire barrier.	8.4.8.2.1	Conform	
As an alternative to fire dampers, the duct system shall be permitted to be enclosed or constructed to provide the required fire barrier through adjacent areas (Refer to Figure A.8.4.8.2).	8.4.8.2.2	Conform	
Listed fire dampers having a rating of 1½ hours shall be installed where ventilation ducts penetrate fire barriers having a required fire resistance rating of 2 hours.	8.4.8.3	Conform	
Approved fire dampers having a fire protection rating of 3 hours shall be installed where ventilation ducts penetrate required 3-hour fire barriers.	8.4.8.4	Conform	
Fire dampers shall be equipped for automatic closure by thermal release elements, and one of the following criteria shall be met: (1) The fire damper shall be mounted directly into the separating wall. (2) The duct shall be protected between the wall and the damper according to the fire resistance of the separating wall structure.	8.4.8.5	Conform	
Fire dampers shall be designed and installed so that the air velocity in the ducts assists in closing fire dampers and does not preclude proper damper closure.	8.4.8.6	Conform	
Ventilation ducts containing fire dampers shall be provided with access ports for ease of inspection and for replacement of the thermal element.	8.4.8.7	Conform	
Air entry filters shall have approved noncombustible filter media that produce a minimum amount of smoke (UL Class 1) when subjected to heat.	8.4.9.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 29 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
To decrease the fire hazard of air entry and oil-bath-type filters, only approved fire-resistive adhesives and oils meeting all of the following criteria shall be used: (1) They shall be in accordance with ASTM D 92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup. (2) Their flash points shall be equal to or greater than 464°F (240°C). (3) They shall not produce appreciable smoke.	8.4.9.2	Conform	
High-efficiency particulate air (HEPA) filters shall meet the requirements of UL 586, Standard for Test Performance of High-Efficiency Particulate Air Filter Units.	8.4.9.3	Conform	
Fixed water spray systems shall be provided for charcoal adsorber beds containing more than 100 lb (45.4 kg) of charcoal.	8.4.9.4	Conform	
Fire suppression systems shall be installed to protect filters that collect combustible material.	9.4.9.5	Conform	
Drainage shall be provided in all areas of the plant for the removal of all liquids directly to safe areas or for containment in the area without adverse flooding of equipment and without endangering other areas.	8.5.1	Conform	
Drainage and the prevention of equipment water damage shall be accomplished by one or more of the following: (1) Floor drains. (2) Floor trenches. (3) Open doorways or other wall openings. (4) Curbs for containing or directing drainage. (5) Equipment pedestals. (6) Pits, sumps, and sump pumps	8.5.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 30 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Drainage and any associated drainage facilities for a given area shall be sized to accommodate the volume of liquid produced by all of the following: (1) The spill of the largest single container of any flammable or combustible liquids in the area. (2) Where automatic suppression is provided throughout, the credible volume of discharge (as determined by the fire hazards analysis) for the suppression system operating for a period of 30 minutes. (3) *Where automatic suppression is not provided throughout, the contents of piping systems and containers that are subject to failure in a fire. (4) Where the installation is outside, the volume of credible environmental factors such as rain and snow. (5) Where automatic suppression is not provided throughout, the volume based on a manual fire-fighting flow rate of 500 gal/min (1892.5 L/min) for a duration of 30 minutes, unless the fire hazards analysis demonstrates a different flow rate and duration.	8.5.3	Conform	
	Floor drainage from areas containing flammable or combustible liquids shall be trapped to prevent the spread of burning liquids beyond the fire area.	8.5.4	Conform	
	Where gaseous fire suppression systems are installed, floor drains shall be provided with adequate seals, or the fire suppression system shall be sized to compensate for the loss of fire suppression agent through the drains.	8.5.5	Conform	
STD COL 9.5(1)	Drainage facilities shall be provided for outdoor oil-insulated transformers, or the ground shall be sloped such that oil spills flow away from buildings, structures, and adjacent transformers.	8.5.6	Conform	
STD COL 9.5(1)	Unless drainage from oil spills is accommodated by sloping the ground around transformers away from structures or adjacent equipment, consideration shall be given to providing curbed areas or pits around transformers.	8.5.6.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 31 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	If a layer of uniformly graded stone is provided in the bottom of the curbed area or pit as a means of minimizing ground fires, the following shall be assessed: (1) The sizing of the pit shall allow for the volume of the stone. (2) The design shall address the possible accumulation of sediment or fines in the stone.	8.5.6.2	Conform	See Subsection 9.5.1.2.1.
STD COL 9.5(1)	For facilities consisting of more than one generating unit, a curb or trench drain shall be provided on solid floors where the potential exists for an oil spill, such that oil released from the incident on one unit will not expose an adjacent unit.	8.5.7	Conform	
	Water drainage from areas that might contain radioactivity shall be collected, sampled, and analyzed before discharge to the environment.	8.5.8	Conform	
	Water released during fire suppression operations in areas containing radioactivity shall be drained to a location that is acceptable for the containment of radioactive materials.	8.5.9	Conform	
	Emergency lighting units shall provide lighting levels as required in 8.6.2.	8.6.1	Conform	See DCD Subsection 9.5.3.2.2.
	The lighting units shall be sized to provide a duration of operation that will illuminate the egress and access routes to areas containing safe shutdown equipment and the equipment operation until all required operator actions are completed or until normal or emergency plant lighting can be reestablished.	8.6.2	Conform	See DCD Subsection 9.5.3.2.2.
	The illumination of means of egress shall be in accordance with NFPA 101, Life Safety Code, and shall include emergency lighting and marking of the means of egress.	8.6.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 31 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
The floor of the means of egress and the safe shutdown operations shall be illuminated to values of not less than 1 footcandle measured at the floor and at safe shutdown equipment at all points, including the following: (1) Angles. (2) Intersections of corridors. (3) Passageways. (4) Stairways. (5) Landings of stairways. (6) Exit doors. (7) Safe shutdown equipment. (8) Access and egress routes to safe shutdown equipment.	8.6.4	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 32 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The required illumination shall be so arranged that the failure of any single lighting unit, such as the burning out of a single light bulb, will not leave any area in darkness.	8.6.5	Conform	
STD COL 9.5(1)	Suitable battery-powered hand lights shall be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.	8.6.6	Conform	
	The plant shall be provided with a lightning protection system in accordance with NFPA 780, Standard for the Installation of Lightning Protection Systems.	8.7	Conform	
	As a minimum, combustible cable insulation and jacketing material shall meet the fire and flame test requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations.	8.8.1	Conform	
	Meeting the requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations, shall not eliminate the need for protection as specified in this standard and the fire hazards analysis.	8.8.2	Conform	
	Fiber optic cable insulation and jacketing material shall meet the fire and flame test requirements of IEEE 383, Standard for Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations.	8.8.3	Conform	
	Group cabling shall be routed away from exposure hazards or protected as specified in this standard.	8.8.4	Conform	
	Group cabling shall not be routed near sources of ignition.	8.8.4.1	Conform	
	Group cabling shall not be routed near flammable and combustible liquid hazards.	8.8.4.2	Conform	
	Cable raceways shall be used only for cables.	8.8.5	Conform	
	Only metal shall be used for cable trays.	8.8.6	Conform	
	Only metallic tubing shall be used for conduit, unless otherwise permitted by 8.8.7.1.	8.8.7	Conform	
	Nonmetallic conduit shall be permitted to be used with concrete encasement or for direct burial runs.	8.8.7.1	Conform	
	Thin-wall metallic tubing shall not be used.	8.8.7.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 33 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Flexible metallic tubing shall be used only in lengths less than 5 ft. to connect components to equipment.	8.8.7.3	Conform	
	Other raceways shall be made of noncombustible materials.	8.8.7.4	Conform	
	Buildings shall be protected from exposure fires by any one of the following: (1) Listed 3-hour fire barrier with automatic or self-closing fire doors having a fire protection rating of 3 hours and listed penetration protection of a 3-hour rating. (2) Spatial separation of at least 50 ft. (3) Exterior exposure protection.	8.9	Conform	
	The electrical design and installation of electrical generating, control, transmission, distribution, and metering of electrical energy shall be provided in accordance with NFPA 70, National Electrical Code, or ANSI/IEEE C2, National Electrical Safety Code, as applicable.	8.10	Conform	
STD COL 9.5(1)	The plant-approved voice/alarm communications system in accordance with NFPA 72, National Fire Alarm Code, shall be available on a priority basis for fire announcements, directing the plant fire brigade, and fire evacuation announcements.	8.11.1	Conform	
STD COL 9.5(1)	A portable radio communications system shall be provided for use by the fire brigade and other operations personnel required to achieve safe shutdown.	8.11.2	Conform	
STD COL 9.5(1)	The radio communications system shall not interfere with the communications capabilities of the plant security force.	8.11.3	Conform	
STD COL 9.5(1)	The impact of fire damage on the communications systems shall be considered when fixed repeaters are installed to permit the use of portable radios.	8.11.4	Conform	
STD COL 9.5(1)	Repeaters shall be located such that a fire-induced failure of the repeater will not also cause failure of the other communications systems relied on for safe shutdown.	8.11.5	Conform	
STD COL 9.5(1)	Plant control equipment shall be designed so that the control equipment is not susceptible to radio frequency interferences from portable radios.	8.11.6	Conform	
STD COL 9.5(1)	Preoperational tests and periodic testing shall demonstrate that the frequencies used for portable radio communications will not affect actuation of protective relays or other electrical components.	8.11.7	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 34 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	A fire hazards analysis shall be conducted to determine the fire protection requirements for the facility.	9.1.1	Conform	See Appendix 9A.
	All fire protection systems, equipment, and installations shall be dedicated to fire protection purposes unless permitted by the following: (1) The requirement of 9.1.2 shall not apply to fire protection systems, equipment, and installations where in accordance with 9.4.10. (2) Fire Protection Systems shall be permitted to be used to provide redundant backup to nuclear safety-related systems provided that both the following criteria are met: (a) The fire protection systems shall meet the design basis requirements of the nuclear safety-related systems. (b) Fire protection systems used in 9.1.2(2)(a) shall be designed to handle both functions.	9.1.2	Conform	The fire protection system may provide backup functions for severe accident mitigation if the system is available.
	All fire protection equipment shall be listed or approved for its intended service.	9.1.3	Conform	
STD COL 9.5(2)	The fire water supply shall be calculated on the basis of the largest expected flow rate for a period of 2 hours but shall not be less than 300,000 gal (1,135,500 L), and the following criteria also shall apply: (1) The flow rate shall be based on 500 gpm (1892.5 L/min) for manual hose streams plus the largest design demand of any sprinkler or fixed water spray system as determined in accordance with this standard, with NFPA 13, Standard for the Installation of Sprinkler Systems, or with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection. (2) The fire water supply shall be capable of delivering the design demand specified in 9.2.1(1) with the hydraulically least demanding portion of the fire main loop out of service.	9.2.1	Conform	See Subsection 9.5.1.2.2.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 35 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
NAPS COL 9.5(2)	Two 100-percent [minimum of 300,000 gal (1,135,500 L) each] system capacity tanks shall be installed, and the following shall apply: (1) The tanks shall be interconnected such that fire pumps can take suction from either or both. (2) A failure in one tank or its piping shall not cause both tanks to drain. (3) The tanks shall be designed in accordance with NFPA 22, Standard for Water Tanks for Private Fire Protection. (4) Refill times for filling the water tanks shall not apply.	9.2.2	~~Conform~~ See Remarks	See Subsection 9.5.1.2.2. Unit 3 utilizes Lake Anna as the sole source of fire protection water as allowed by Reg. Guide 1.189, Position 3.2.1.e.
NAPS COL 9.5(2)	The tanks shall not be supplied by an untreated, raw water source	9.2.3	~~Conform~~ See Remarks	See Subsection 9.5.1.2.2. See above remark, storage tanks are not used. The Lake Anna water can be treated with sodium hypochlorite to address biofouling or microbiologically induced corrosion. The water is not filtered since there is a small amount of total suspended solids in the lake water.
STD COL 9.5(2)	Fire pumps shall meet the requirements of NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, and shall be automatic starting.	9.2.4.1	Conform	See Subsection 9.5.1.2.2.
STD COL 9.5(2)	Fire pumps shall be provided to ensure that 100% of the flow rate capacity will be available assuming failure of the largest pump.	9.2.4.2	Conform	See Subsection 9.5.1.2.2.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 35 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Individual fire pump connections to the yard fire main loop shall be separated with sectionalizing valves between connections, and the following criteria also shall be met: (1) Each pump and its driver and controls shall be located in a room separated from the remaining fire pumps by a fire wall with a minimum rating of 3 hours. (2) The fuel for the diesel fire pump(s) shall be separated so that it does not provide a fire source exposing nuclear safety-related equipment.	9.2.4.3	Conform	See Subsection 9.5.1.2.2.
STD COL 9.5(2)	A method of automatic pressure maintenance of the fire protection system shall be provided independent of the fire pumps.	9.2.4.4	Conform	See Subsection 9.5.1.2.2.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 36 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Supervisory signals and visible indicators required by NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, shall be received in the control room.	9.2.4.5	Conform	
STD COL 9.5(1)	All fire protection water supply and system control valves shall be under a periodic inspection program and shall be supervised by one of the following methods: (1) Electrical supervision with audible and visual signals in the MCR or another constantly attended location and monthly valve inspections. (2) Locking valves in their normal position and monthly valve inspections with keys made available only to authorized personnel. (3) Sealing valves in their normal positions and weekly valve inspections with this option utilized only where valves are located within fenced areas or under the direct control of the property owner.	9.3	Conform	
STD COL 9.5(2)	The underground yard fire main loop shall be installed to furnish anticipated water requirements, and the following criteria also shall be met: (1) The type of pipe and water treatment shall be design considerations, with tuberculation as one of the parameters. (2) Means for inspecting and flushing the systems shall be provided.	9.4.1	Conform	See Subsection 9.5.1.2.2.
STD COL 9.5(2)	Approved visually indicating sectional control valves such as post indicator valves shall be provided to isolate portions of the main for maintenance or repair without simultaneously shutting off the supply to both primary and backup fire suppression systems.	9.4.2	Conform	See Subsection 9.5.1.2.2.
STD COL 9.5(2)	Valves shall be installed to allow isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems.	9.4.3	Conform	See Subsection 9.5.1.2.3.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 37 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Sectional control valves shall allow maintaining independence of the individual loop around each unit, and the following also shall apply: (1) For such installations, common water supplies shall also be permitted to be utilized. (2) For multiple-reactor sites with widely separated plants [approaching 1 mi (1.6 km) or more], separate yard fire main loops shall be used.	9.4.4	Conform	See Subsection 9.5.1.2.3.
STD COL 9.5(2)	Outside manual hose installation shall provide an effective hose stream to any on-site location, and the following also shall apply: (1) Hydrants with individual hose gate valves shall be installed approximately every 250 ft. apart on the yard main system. (2) A hose house equipped with hose and combination nozzle and other auxiliary equipment specified in NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, shall be provided at intervals of not more than 1000 ft. along the yard main system. (3) Mobile means of providing hose and associated equipment, such as hose carts or trucks, shall be permitted in lieu of hose houses, and where provided, such mobile equipment shall be equivalent to that supplied by three hose houses.	9.4.5	Conform	See Subsection 9.5.1.2.3.
STD COL 9.5(2)	One of the following criteria shall be met: (1) Threads compatible with those used by local fire departments shall be provided on all hydrants, hose couplings, and standpipe risers. (2) The fire departments shall be provided with adapters that allow interconnection between plant equipment and the fire department equipment.	9.4.6	Conform	See Subsection 9.5.1.2.3.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 38 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Sprinkler systems and manual hose station standpipes shall have connections to the plant underground water main so that a single active failure or a crack in a moderate-energy line can be isolated so as not to impair both the primary and the backup fire suppression systems unless otherwise permitted by the following: (1) Alternatively, headers fed from each end shall be permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ASME B31.1, Power Piping, are used for the headers (up to and including the first valve) supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. (2) Where provided, such headers shall be considered an extension of the yard main system. (3) Each sprinkler and standpipe system shall be equipped with an outside screw and yoke (OS&Y) gate valve or other approved shutoff valve.	9.4.7	Conform	
	For all power block buildings, Class III standpipe and hose systems shall be installed in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.	9.4.8	Conform	
STD COL 9.5(2)	For all other buildings on-site, the requirements for standpipe and hose systems shall be appropriate for the hazard being protected.	9.4.9	Conform	
STD COL 9.5(1)	The proper type of hose nozzle to be supplied to each area shall be based on the fire hazards analysis, and the following criteria also shall apply: (1) The usual combination spray/straight-stream nozzle shall not be used in areas where the straight stream can cause unacceptable damage. (2) Approved, electrically safe fixed fog nozzles shall be provided at locations where high-voltage shock hazards exist. (3) All hose nozzles shall have shutoff capability.	9.4.10	Conform	
	Provisions shall be made to supply water at least to standpipes and hose stations for manual fire suppression in all areas containing nuclear safety–related systems and components for safe shutdown in the event of a SSE.	9.4.11.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 39 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The piping system serving these hose stations shall be analyzed for safe shutdown and earthquake loading and shall be provided with supports that ensure pressure boundary integrity.	9.4.11.2	Conform	
	The piping and valves for the portion of hose standpipe system affected by the functional requirement of 9.4.11.2 shall, as a minimum, satisfy the requirements of ASME B31.1, Power Piping.	9.4.11.3	Conform	
	The system shall be designed to flow a minimum of one Class III standpipe station in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems.	9.4.11.4	Conform	
	Where the seismic required hose stations are cross-connected to essential seismic Category I water systems, the fire flow shall not degrade the essential water system requirements.	9.4.11.5	Conform	
STD COL 9.5(3)	Portable and wheeled fire extinguishers shall be installed, inspected, maintained, and tested in accordance with NFPA 10, Standard for Portable Fire Extinguishers, unless otherwise permitted by 9.5.2.	9.5.1	Conform	
STD COL 9.5(3)	Where placement of extinguishers would result in required activities that are contrary to personnel radiological exposure concerns or nuclear safety–related concerns, fire extinguishers shall be permitted to be inspected at intervals greater than those specified in NFPA 10, Standard for Portable Fire Extinguishers, or consideration shall be given to locating the extinguishers outside high-radiation areas.	9.5.2	Conform	
	Automatic suppression systems shall be provided in all areas of the plant as required by the fire hazards analysis.	9.6.1	Conform	See Appendix 9A.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 40 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Except as modified in this chapter, the following NFPA standards shall be used: (1) NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam. (2) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems. (3) NFPA 13, Standard for the Installation of Sprinkler Systems. (4) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection. (5) NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems. (6) NFPA 17, Standard for Dry Chemical Extinguishing Systems. (7) NFPA 214, Standard on Water-Cooling Towers. (8) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems.	9.6.2	Conform	
	The extinguishing systems chosen shall be based on the design parameters required as a result of the fire hazards analysis.	9.6.3	Conform	See Appendix 9A, conform except where RG 1.189 recommends protection not dictated by FHA.
	Selection of extinguishing agent shall be based on all of the following: (1) Type or class of hazard. (2) Effect of agent discharge on critical equipment such as thermal shock, continued operability, water damage, overpressurization, or cleanup. (3) Health hazards.	9.6.4	Conform	
	Each fire suppression system shall be equipped with approved alarming devices and annunciate in a constantly attended area.	9.6.5	Conform	
	Fire signaling systems shall be provided in all areas of the plant as required by the fire hazards analysis.	9.7.1	Conform	Local alarm and MCR.
	The requirements of this chapter shall constitute the minimum acceptable protective signaling system functions when used in conjunction with NFPA 72, National Fire Alarm Code.	9.7.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 40 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
The signaling system's initiating device and signaling line circuits shall provide emergency operation for fire detection, fire alarm, and water flow alarm during a single break or a single ground fault.	9.7.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 41 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The fire signaling equipment used for fixed fire suppression systems shall give audible and visual alarm and system trouble annunciation in the plant control room for the power block buildings, and the following shall apply: (1) Local alarms shall be provided. (2) Other fire alarm signals from other buildings shall be permitted to annunciate at the control room or other locations that are constantly attended.	9.7.4	Conform	
	Audible signaling appliances shall meet the following criteria: (1) They shall produce a distinctive sound, used for no other purpose. (2) They shall be located and installed so that the alarm can be heard above ambient noise levels.	9.7.5	Conform	
STD COL 9.5(1)	Plant control room or plant security personnel shall be trained in the operation of all fire signaling systems used in the plant, including the ability to identify any alarm zone or fire protection system that is operating.	9.7.6	Conform	
	Fire signaling equipment and actuation equipment for the release of fixed fire suppression systems shall be connected to power supply sources in accordance with the requirements of NFPA 72, National Fire Alarm Code, and shall be routed outside the area to be protected.	9.7.7	Conform	
	Manual fire alarm boxes shall be installed as required by the fire hazards analysis, and the following criteria also shall be met: (1) Where manual release devices are installed for the purpose of releasing an extinguishing agent in a fixed fire suppression system, the manual releases shall be marked for that purpose. (2) The manual release device circuits shall be routed outside the area protected by the fixed extinguishing system.	9.7.8	Conform	
	All signals shall be permanently recorded in accordance with NFPA 72, National Fire Alarm Code.	9.7.9	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 41 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Automatic fire detectors shall be selected and installed in accordance with all of the following: (1) NFPA 72, National Fire Alarm Code. (2) Design parameters required as a result of the fire hazards analysis of the plant area. (3) Additional requirements of this standard.	9.8	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 42 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
The identification and selection of fire protection systems shall be based on the fire hazards analysis.	10.1.1	Conform	See Appendix 9A.
This chapter identifies fire and explosion hazards in advanced light water reactor plants and specifies the protection criteria that shall be used unless the fire hazards analysis indicates otherwise.	10.1.2	Informational Statement	
Fire protection for the primary and secondary containment areas shall be provided for hazards identified by the fire hazards analysis.	10.2.1	Conform	See Appendix 9A.
Operation of the fire protection systems shall not compromise the integrity of the containment or other safety-related systems.	10.2.1.1	Conform	
Fire protection systems in the containment areas shall function in conjunction with total containment requirements such as ventilation and control of containment liquid and gaseous release.	10.2.1.2	Conform	
Inside primary containment, fire detection systems shall be provided for each fire hazard identified in the fire hazards analysis.	10.2.1.3	Conform	
The type of detection used and the location of the detectors shall be the most suitable for the particular type of fire hazard identified by the fire hazards analysis.	10.2.1.4	Conform	
A general area fire detection capability shall be provided in the primary containment as a backup for the hazard detection described in 10.2.1.4 by the installation of smoke or heat detectors compatible with the radiation environment in accordance with NFPA 72, National Fire Alarm Code.	10.2.1.5	Conform	
Standpipe and hose stations shall be installed inside containment. Standpipe and hose stations inside containment shall be permitted to be connected to a high-quality water supply of the required quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment.	10.2.1.6	Conform	
For inerted primary containment, standpipe and hose stations shall be permitted to be placed outside the primary containment, with hose no longer than 100 ft., to reach any location inside the primary containment with a 30 ft. effective hose stream.	10.2.1.7	NA	US-APWR containment is not inerted.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 42 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Reactor coolant pumps with an external lubrication system shall be provided with an oil collection system.	10.2.1.8	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 43 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	The oil collection system shall be so designed, engineered, and installed that failure of the oil collection system will not lead to a fire during normal operations or off-normal conditions such as accident conditions or earthquakes.	10.2.1.9	Conform	
	The oil collection systems shall be capable of collecting oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump oil systems, and the following criteria also shall apply: (1) Leakage shall be collected and drained to a vented closed container that can hold the entire oil system inventory. (2) Leakage points to be protected shall include the following, where such features exist on the reactor coolant pumps: (a) Lift pump and piping. (b) Overflow lines. (c) Oil cooler. (d) Oil fill. (e) Drain lines and plugs. (f) Flanged connections on oil lines. (g) Oil reservoirs. (3) The drain line shall be large enough to accommodate the largest potential oil leak.	10.2.1.10	Conform	
STD COL 9.5(1)	Management procedures and controls necessary to ensure fire protection for fire hazards introduced during maintenance and refueling shall be provided.	10.2.2.1	Conform	See Subsection 9.5.1.6.
	Backup fire suppression shall be provided so that total reliance is not placed on a single fire suppression system.	10.2.2.2	Conform	
STD COL 9.5(3)	Self-contained breathing apparatus meeting the following criteria shall be provided near the containment entrance for fire-fighting and damage control personnel: (4) The units shall be independent of any breathing apparatus or air supply systems provided for general plant activities. (5) The units shall be marked as emergency equipment.	10.2.2.3	Conform	
	The control room complex (including kitchen, office spaces, etc.) shall be protected against disabling fire damage and shall be separated from other areas of the plant by floors, walls, ceilings, and roofs having a minimum fire resistance rating of 3 hours.	10.3.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 44 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Peripheral rooms in the control room complex shall have an automatic water-based suppression system, where required by the fire hazards analysis, and shall be separated from the control room by noncombustible construction with a minimum fire resistance rating of 1 hour.	10.3.2	Conform	
	Ventilation system openings between the control room and the peripheral rooms shall have automatic smoke dampers installed that close on operation of the fire detection and fire suppression systems.	10.3.3	Conform	
	Manual fire-fighting capability shall be provided for both of the following: (1) Fires originating within a cabinet, console, or connecting cables. (2) Exposure fires involving combustibles in the general room area.	10.3.4	Conform	
	Portable Class A and Class C fire extinguishers shall be located in the control room, and a fire hose station shall be installed outside the control room.	10.3.5	Conform	
STD COL 9.5(1)	Nozzles that are compatible with the hazards and the equipment in the control room shall be provided for the fire hose stations.	10.3.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The choice of nozzles shall satisfy fire-fighting requirements and electrical safety requirements and shall minimize physical damage to electrical equipment from hose stream impingement.	10.3.7	Conform	See Subsection 9.5.1.6.
	Smoke detectors shall be provided in the control room complex, the electrical cabinets, and the consoles.	10.3.8	Conform	
	If redundant safe shutdown equipment is located in the same control room cabinet or console, the cabinet or console shall be provided with internal separation (noncombustible barriers) to limit the damage to one safety division.	10.3.9	NA	US-APWR provides separation of safety trains and remote shutdown console.
STD COL 9.5(3)	Breathing apparatus for the control room operators shall be available.	10.3.10	Conform	
	The outside air intakes for the control room ventilation system shall be provided with smoke detection capability to alarm in the control room and enable manual isolation of the control room ventilation system, thus preventing smoke from entering the control room.	10.3.11	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 45 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Venting of smoke produced by a fire in the control room by means of the normal ventilation system shall be permitted to be acceptable if provision is made for isolation of the recirculation portion of the normal ventilation system.	10.3.12	NA	Smoke removal system designed and installed.
Manually operated venting of the control room shall be available to the operators.	10.3.13	Conform	
All cables that enter the control room shall terminate in the control room, and the following criteria also shall apply: (1) No cabling shall be routed through the control room from one area to another. (2) Cables in spaces underfloor and in above-ceiling spaces shall meet the separation criteria necessary for fire protection.	10.3.14	Conform	
Air-handling functions shall be ducted separately from cable runs in such spaces (underfloor and above ceiling, such spaces shall not be used as air plenums for ventilation of the control room).	10.3.15	Conform	
Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 ft^2 (0.09 m^2) in cross-sectional area, shall have automatic fire suppression inside.	10.3.16	Conform	
Area automatic fire suppression shall be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4 in. (101.6 mm) or smaller steel conduit or cables are in fully enclosed raceways internally protected by automatic fire suppression.	10.3.17	Conform	
The cable spreading room shall have an automatic fixed water-based suppression system, and the following criteria also shall be met: (1) The location of sprinklers or spray nozzles shall protect cable tray arrangements to ensure water coverage for areas that could present exposure fire hazards to the cable raceways. (2) Automatic sprinkler systems shall be designed for a density of 0.30 gpm/ft^2 (12.2 L/min m^2) over the most remote 2500 ft^2 (232.2 m^2).	10.4.1.1	NA	The US-APWR does not use a cable spreading room. The MCR sub floor area is provided with a very early warning smoke detection system and a clean agent environmentally friendly gaseous suppression system.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 45 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Suppression systems shall be zoned to limit the area of protection to that which the drainage system can handle with any two adjacent systems actuated.	10.4.1.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 46 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Deluge and water spray systems shall be hydraulically designed with each zone calculated with the largest adjacent zone flowing.	10.4.1.3	Conform	
Cable spreading rooms shall be provided with all of the following: (1) At least two remote and separate entrances for access by the fire brigade personnel. (2) Aisle separation between tray stacks at least 3 ft. wide and 8 ft. high. (3) Hose stations and portable fire extinguishers installed outside the room. (4) *Area smoke detection.	10.4.1.4	NA	The US-APWR does not employ a cable spreading room.
Cable tunnels shall be provided with smoke detection.	10.4.2.1	N/A	Cable tunnels not employed for US-APWR.
Cable tunnels shall be provided with automatic fixed suppression systems.	10.4.2.2.1	N/A	
Automatic sprinkler systems shall be designed for a density of 0.30 gpm/ft^2 (12.2 L/min•m^2) for the most remote 100 linear ft. of cable tunnel up to the most remote 2500 ft^2.	10.4.2.2.2	N/A	
The location of sprinklers or spray nozzles shall protect cable tray arrangements and possible transient combustibles to ensure water coverage for areas that could present exposure fire hazards to the cable raceways.	10.4.2.2.3	N/A	
Deluge sprinkler systems or deluge spray systems shall meet the following criteria: (1) They shall be zoned to limit the area of protection to that which the drainage system can handle with any two adjacent systems actuated. (2) They shall be hydraulically designed with each zone calculated with the largest adjacent zone flowing.	10.4.2.2.4	N/A	
Cables shall be designed to allow wetting of undamaged cables with water supplied by the fire suppression system without electrical faulting.	10.4.2.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 46 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Cable tunnels over 50 ft. long shall be provided with all of the following: (1) At least two remote and separate entrances for access by the fire brigade personnel (2) An aisle separation between tray stacks at least 3 ft. wide and 8 ft. high (3) Hose stations and portable fire extinguishers installed outside the tunnel	10.4.2.4	N/A	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 47 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Cable tray fire breaks shall be installed every 20 ft. for vertical cable trays that rise over 30 ft., and the following criteria also shall be met: (1) Access to cable shafts shall be provided every 40 ft. with the topmost access within 20 ft. of the cable shaft ceiling. (2) Automatic sprinkler protection and smoke detection shall be provided at the ceiling of the vertical shaft.	10.4.3	Conform	
Computer and communications rooms shall meet the applicable requirements of NFPA 75, Standard for the Protection of Information Technology Equipment.	10.5	Conform	
Smoke detection shall be provided and shall alarm in both the control room and locally, and the following criteria also shall apply: (1) Cables entering the safety-related switchgear rooms shall terminate in the switchgear room. (2) The safety-related switchgear rooms shall not be used for other purposes. (3) Fire hose stations and portable fire extinguishers shall be readily available outside the area.	10.6.1	Conform	
Equipment shall be located to facilitate fire fighting, and the following criteria also shall be met: (1) Drains shall be provided to prevent water accumulation from damaging safety-related equipment. (2) Remote manually actuated ventilation shall be provided for smoke removal when manual fire suppression is needed.	10.6.2	Conform	
Battery rooms shall be provided with ventilation to limit the concentration of hydrogen to 2% by volume, and loss of ventilation shall alarm in the control room.	10.7.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 47 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Safety-related battery rooms shall be protected against fires and explosions, and the following criteria also shall apply: (1) Battery rooms shall be separated from other areas of the plant by fire barriers having a 1-hour minimum rating. (2) Direct current switchgear and inverters shall not be located in the battery rooms. (3) Fire detection shall be provided. (4) Fire hose stations and portable fire extinguishers shall be available outside the room.	10.7.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 48 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
The T/B shall be separated from adjacent structures containing safety-related equipment by fire-resistive barriers having a minimum 3-hour rating, and the following criteria also shall apply: (1) The fire barriers shall be designed so that the barrier will remain in place even in the event of complete collapse of the turbine structure. (2) Openings and penetrations shall be minimized in the fire barrier and shall not be located where turbine oil systems or generator hydrogen cooling systems create a direct fire exposure hazard to the fire barrier. (3) Smoke and heat removal systems shall be provided in accordance with 8.4.3. (4) For those plants provided with complete automatic sprinkler protection at the roof level, smoke and heat removal systems shall not be required.	10.8.1	Conform	
All areas beneath the turbine generator operating floor shall be protected by an automatic sprinkler or foam-water sprinkler system meeting the following criteria: (1) The sprinkler system beneath the turbine generator shall be designed around obstructions from structural members and piping. (2) The sprinkler system shall be designed to a minimum density of 0.30 gpm/ft^2 (12.2 L/min•m^2) over a minimum application of 5000 ft^2 (464.5 m^2).	10.8.2.1	Conform	
Foam-water sprinkler systems installed in place of automatic sprinklers described in 10.8.2.1 shall be designed in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, and the design densities specified in 10.8.2.1.	10.8.2.2	NA	No foam-water sprinkler systems are used for the US-APWR.
Electrical equipment in the area covered by a water or foam system shall be of the enclosed type or otherwise protected to minimize water damage in the event of system operation.	10.8.2.3	Conform	Sensitive equipment is protected from water spray damage.
Automatic fixed suppression systems shall be provided for all turbine generator and exciter bearings.	10.8.3.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 49 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
If closed-head water spray systems utilizing directional nozzles in accordance with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, are provided, bearing protection shall be provided for a minimum density of 0.30 gpm/ft^2 (12.2 L/min•m^2) over the protected area.	10.8.3.2	N/A	
Accidental water discharge on bearing points and hot turbine parts shall be considered. If necessary, these areas shall be permitted to be protected by shields and encasing insulation with metal covers.	10.8.3.3	N/A	
Lubricating oil lines above the turbine operating floor shall be protected with an automatic sprinkler system to a minimum density of 0.30 gpm/ft^2 (12.2 L/min•m^2) that covers those areas subject to oil accumulation, including the area within the turbine lagging (skirt).	10.8.4	Conform	
Lubricating oil reservoirs and handling equipment shall be protected in accordance with 10.8.2.1.	10.8.5	Conform	
If the lubricating oil reservoir specified in 10.8.5 is elevated, sprinkler protection shall be extended to protect the area beneath the reservoir.	10.8.6	Conform	
The following shall apply to protection associated with shaft-driven ventilation systems: (1) Where shaft-driven ventilation systems are not used, the area inside a directly connected exciter housing shall be protected with an automatic fire suppression system. (2) Where shaft-driven ventilation systems are used, an automatic preaction sprinkler system providing a density of 0.30 gpm/ft^2 (12.2 L/min•m^2) over the entire area shall be provided.	10.8.7	Conform	
Clean- or dirty-oil storage areas shall be protected based on the fire risk evaluation, and the designer shall include, as a minimum, the installation of fixed automatic fire protection systems and the ventilation and drainage requirements in Chapter 8.	10.8.8	Conform	See Appendix 9A.
Bulk hydrogen systems supplying one or more generators shall have automatic valves located at the supply and operable by “dead man”–type controls at the generator fill point(s) or operable from the control room.	10.8.9.1.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 50 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
As an alternative to the requirement of 10.8.9.1.1, vented guard piping shall be permitted to be used inside the building to protect runs of hydrogen piping.	10.8.9.1.2	Conform	
A flanged spool piece or equivalent arrangement shall be provided to facilitate the separation of hydrogen supply when the generator is open for maintenance.	10.8.9.1.3	Conform	
Control room alarms shall be provided to indicate abnormal gas pressure, temperature, and percentage of hydrogen in the generator.	10.8.9.1.4	Conform	
The generator hydrogen dump valve and hydrogen-detraining equipment shall meet the following criteria: (1) They shall be arranged to vent directly to a safe outside location. (2) The dump valve shall be remotely operable from the control room or from an area accessible during a machine fire.	10.8.9.1.5	Conform	
An excess-flow check valve shall be provided for the bulk supply hydrogen piping.	10.8.9.1.6	Conform	
Redundant hydrogen seal oil pumps with separate power supplies shall be provided for reliability of seal oil supply.	10.8.9.2.1	Conform	
Where feasible, electrical circuits to redundant pumps shall be run in buried conduit or provided with fire-retardant coating if exposed in the area of the turbine generator, to minimize the possibility of loss of both pumps as a result of a turbine generator fire.	10.8.9.2.2	Conform	
Hydrogen seal oil units shall be protected as follows: (1) In accordance with 10.8.2 (2) By an automatic, open-head water spray system providing a density of 0.30 gpm/ft^2 (12.2 L/min•m^2) over the hydrogen seal area	10.8.9.2.3	Conform	
Curbing or drainage or both shall be provided for the hydrogen seal oil unit in accordance with Chapter 8, Section 8.5.	10.8.9.2.4	Conform	
Hydrogen lines in safety-related areas shall meet one of the following criteria: (1) They shall be designed to seismic Class I requirements or sleeved such that the outer pipe is directly vented to the outside. (2) They shall be equipped with excess-flow valves so that, in case of a line break, the hydrogen concentration in the affected areas will not exceed 2%.	10.8.9.3.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 51 of 62)

Standard Requirement	Paragraph	Conformance	Remarks
Hydrogen lines or sensing lines containing hydrogen shall not be piped into or through the control room.	10.8.9.3.2	Conform	
The hydraulic control system shall use a listed fire-resistant fluid.	10.8.10	Conform	
Turbine lubricating oil reservoirs shall be provided with vapor extractors, which shall be vented to an outside location.	10.8.11.1	Conform	
Curbing or drainage or both shall be provided for the turbine lubricating oil reservoir in accordance with Chapter 8, Section 8.5.	10.8.11.2	Conform	
All oil pipe serving the turbine generator shall be designed and installed to minimize the possibility of an oil fire in the event of severe turbine vibration.	10.8.11.3	Conform	
Piping design and installation shall include all of the following measures: (1) Welded construction. (2) *Guard pipe construction with the pressure feed line located inside the return line or in a separate shield pipe drained to the oil reservoir. (3) Routing oil piping clear of or below steam piping or metal parts. (4) Insulating with impervious lagging for steam piping or hot metal parts under or near oil piping or turbine bearing points.	10.8.11.4	Conform	
Cable for operation of the lubricating oil pumps shall be protected from fire exposure, and the following criteria also shall apply: (1) Where feasible, electrical circuits to redundant pumps shall be run in buried conduit. (2) Protection shall be permitted to consist of separation of cables for ac and dc oil pumps or 1-hour fire-resistive coating (derating of cable shall be considered).	10.8.11.5	Conform	
The installation and operation of standby emergency diesel generators and combustion turbines shall be in accordance with NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, unless otherwise permitted by 10.9.2.	10.9.1	Conform	
The requirement of 10.9.1 shall not apply to automatic shutdown and remote shutdown features, which shall be governed by nuclear-safety requirements.	10.9.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 52 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Standby emergency diesel generators and combustion turbines located within main plant structures shall be protected as follows: (1) They shall be protected by automatic sprinkler, water spray, or foam-water sprinkler systems. (2) The sprinkler and water spray protection systems shall be designed for a 0.25 gpm/ft^2 (10.19 $L/min \bullet m^2$) density over the entire area.	10.9.3	Conform	
	Fire detection shall be provided to alarm and annunciate in the control room and to alarm locally, and the following criteria also shall be met: (1) Fire hose stations and portable fire extinguishers shall be located outside the area. (2) Drainage for fire-fighting water and means for local manual venting of smoke shall be provided.	10.9.4	Conform	
	A day tank shall be permitted in standby emergency diesel generator and combustion turbine rooms if the day tank is located in a diked enclosure that has sufficient capacity to hold 110% of the contents of the day tank or is drained to a safe location.	10.9.5	Conform	
	Diesel fuel oil storage tanks shall not be located inside buildings containing other nuclear safety–related equipment, and the following criteria also shall apply: (1) If aboveground tanks are used, they shall be located at least 50 ft. from any building, or if within 50 ft., they shall be separated from the building by a fire barrier having a minimum 3-hour rating. (2) Potential oil spills shall be confined or directed away from buildings containing safety-related equipment.	10.10.1	Conform	Gas turbines are used for US-APWR. The gas turbine 7-day fuel storage tanks are located within a structure with 3-hour fire rated construction.
NAPS COL 9.5(1)	Aboveground tanks shall be provided with automatic fire suppression systems.	10.10.2	~~N/A~~ Conform	The power source fuel storage vault is protected with an automatic fire sprinkler system.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 52 of 62) *(continued)*

Standard Requirement	Paragraph	Conformance	Remarks
Nuclear safety-related pump rooms shall be protected by fire detection systems, and the following criteria also shall apply: (1) Automatic fire suppression systems shall be provided unless the fire hazards analysis determines that fire suppression is not required. (2) Fire hose stations and fire extinguishers shall be readily accessible.	10.11	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 53 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Fire extinguishers shall be located within the new-fuel area, and the following criteria also shall be met: (1) Fire hose stations shall be located as determined by the fire hazards analysis to facilitate access and use for fire-fighting operations. (2) Fire detection systems shall be provided. (3) Combustible material shall be limited to the minimum necessary for operation in the new-fuel area.	10.12.1	Conform	
	The storage configuration of new fuel shall always be maintained as to preclude criticality for any water density that could occur during fire water application.	10.12.2	Conform	
	Protection for the spent-fuel pool area shall be provided by fire hose stations and fire extinguishers.	10.13.1	Conform	
	Fire detection shall be provided in the area.	10.13.2	Conform	Linear Beam Detectors are provided for this large room.
	Fire barriers, fire detection, and automatic fire suppression shall be provided as determined by the fire hazards analysis.	10.14.1	Conform	See Appendix 9A.
STD COL 9.5(3)	Manual ventilation control to assist in smoke removal shall be provided if necessary for manual fire fighting.	10.14.2	Conform	See subsection 9.5.1.6. Fire brigade has portable smoke removal equipment.
	Storage tanks that supply water for fire-safe shutdown shall be protected from the effects of an exposure fire.	10.15.1	Conform	
	Combustible materials shall not be stored next to these tanks.	10.15.2	Conform	
STD COL 9.5(2)	Record storage areas shall be located and protected in accordance with NFPA 232, Standard for the Protection of Records.	10.16.1	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 53 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Record storage areas shall not be located in safety-related areas and shall be separated from safety-related areas by fire barriers having a minimum 3-hour rating.	10.16.2	Conform	Record storage inside plant is protected with 3-hour fire walls. Primary record storage is in office building spatially separated from plant.
STD COL 9.5(2)	Cooling towers shall be of noncombustible or limited-combustible construction.	10.17.1	Conform	UHS cooling towers of noncombustible construction.
STD COL 9.5(2)	Cooling towers shall be located such that a fire in the cooling tower will not adversely affect safety-related systems or equipment.	10.17.2	Conform	Cooling towers for the Turbine side are located away from plant. UHS cooling towers are safety-related and of noncombustible construction.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 54 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	The following criteria also shall be met: (1) Cooling towers shall be of noncombustible construction when the basin is used as the ultimate heat sink. (2) If cooling towers are of combustible construction, the following criteria shall be met: (a) They shall be protected by automatic sprinklers or water spray systems in accordance with NFPA 214, Standard on Water-Cooling Towers. (b) They shall be located so that they do not affect safety-related systems or equipment in the event of a fire.	10.17.3	Conform	
STD COL 9.5(2)	Gas cylinder storage locations or the fire protection systems that serve those safety-related areas shall not be in areas that contain or expose safety-related equipment.	10.18	Conform	
	Unused ion exchange resins shall not be stored in areas that contain or expose safety-related systems or equipment.	10.19	Conform	
	Hazardous chemicals shall not be stored in areas that contain or expose safety-related systems or equipment.	10.20	Conform	
STD COL 9.5(2)	Automatic sprinkler protection shall be provided for warehouses that contain high-value equipment or combustible materials.	10.21	Conform	Warehouse is sprinkler protected.
STD COL 9.5(2)	Rooms housing diesel-driven fire pumps shall be protected by automatic sprinkler, water spray, or foam-water sprinkler systems.	10.22.1	Conform	Automatic wet-pipe sprinkler system protection is provided.
STD COL 9.5(2)	If sprinkler and water spray systems are provided for fire pump houses, they shall be designed for a minimum density of 0.25 gpm/ft^2 (10.19 L/min•m^2) over the entire fire area.	10.22.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 54 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
NAPS COL 9.5(1)	Buildings shall be protected from exposure fires involving oil-filled transformers by one of the following means: (1) Locating the transformer casing, conservator tank, and cooling radiators at least 50 ft. from buildings. (2) Providing a minimum 2-hour fire barrier between transformers as required in Figure 10.23.1(a) and Figure 10.23.1(b) and exposed buildings. (3) Complying with Table 10.23.1[See Figure 10.23.1(a) and Figure 10.23.1(b)].	10.23.1	Conform	See Appendix 9A. ~~A 3-hour fire barrier~~ A minimum of 50 feet of open space separates the transformers and the turbine building.
NAPS COL 9.5(1)	A minimum 1-hour fire barrier or a distance of 30 ft. shall be provided between adjacent transformers.	10.23.1.1	Conform	A ~~one-hour~~ two-hour fire barrier is provided between transformers.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 55 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Means shall be provided to contain oil spills.	10.23.1.2	Conform	Spill confinement and oil separation is provided for transformers.
STD COL 9.5(1)	Oil-filled main, station service, and startup transformers shall be protected with automatic water spray systems in accordance with NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, or foam-water spray systems in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.	10.23.2	Conform	See Appendix 9A. An automatic water spray system following the guidance of NFPA 15 is provided for these transformers.
	Transformers installed inside fire areas containing safety-related systems or equipment shall be of the dry type or insulated and cooled with noncombustible liquid, unless otherwise specified in 10.23.4.	10.23.3	Conform	
	Transformers filled with combustible fluid that are located indoors shall be enclosed in a transformer vault.	10.23.4	Conform	
STD COL 9.5(2)	Auxiliary boilers, their fuel-burning systems, combustion product removal systems, and related control equipment shall be installed and operated in accordance with NFPA 85, Boiler and Combustion Systems Hazards Code.	10.24.1	Conform	Auxiliary Boiler is in a separate building separated from safety-related structures.
	Oil-fired boilers or boilers using oil ignition within the main plant shall be protected with automatic sprinkler, water spray, or foam-water sprinkler systems covering the boiler area.	10.24.2	N/A	
	Sprinkler and water spray systems shall be designed for a minimum density of 0.25 gpm/ft^2 (10.19 L/min•m^2) over the entire area.	10.24.3	N/A	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 55 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(2)	Automatic sprinklers shall be provided for storage rooms, offices, and shops containing combustible materials that present an exposure to surrounding areas that are critical to plant operation and shall be so located and protected that a fire or the effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.	10.25	Conform	
STD COL 9.5(2)	Simulators shall be provided with a fixed automatic suppression system.	10.26.1	Conform	Simulator is not located in the plant area.
STD COL 9.5(2)	Simulators and supporting equipment shall be separated from other areas by a fire barrier with a minimum 1-hour rating.	10.26.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 56 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
	Technical support centers shall be separated from all other areas by fire barriers or from all other buildings by at least 50 ft. and be protected by an automatic fixed suppression system as required by the fire hazards analysis.	10.27	Conform	
STD COL 9.5(2)	Intake structures shall be of noncombustible construction and shall be provided with automatic sprinkler protection.	10.28	Conform	
STD COL 9.5(1)	Consideration of fire protection shall include safety to life and potential for delays in construction schedules and plant startup, as well as protection of property.	11.1	Conform	
STD COL 9.5(1)	The responsibility for fire protection for the entire site during the construction period shall be defined.	11.2.1	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The administrative responsibilities shall be to develop, implement, and periodically update as necessary the measures outlined in this standard.	11.2.2	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The responsibility for fire protection programs among various organizations onsite shall be delineated.	11.2.3	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire protection program to be followed and the owner's right to administration and enforcement shall be established.	11.2.4	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	The fire protection program shall include a fire risk evaluation of the construction site and construction activities.	11.2.5	Conform	
STD COL 9.5(1)	Written procedures in accordance with Chapter 5 shall be established for the new construction site, including major construction projects in existing plants.	11.2.6	Conform	See Subsection 9.5.1.6.
STD COL 9.5(1)	Security guard service, including recorded rounds, shall be provided through all areas of construction during times when construction activity is not in progress.	11.2.7	Conform	
STD COL 9.5(1)	Construction schedules shall be coordinated so that the planned permanent fire protection systems are installed and placed in service.	11.2.8	Conform	
STD COL 9.5(1)	Construction and installation of fire barriers and fire doors shall be given priority in the construction schedule.	11.2.9	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 57 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Prior to clearing forest and brush-covered areas, the following actions shall be taken: (1) The owner shall ensure that a written fire control plan is prepared and that fire-fighting tools and equipment are made available as required by NFPA 1143, Standard for Wildland Fire Management. (2) Contact shall be made with local fire and forest agencies for current data on restrictions and fire potential and to arrange for necessary permits.	11.3.1.1	Conform	
STD COL 9.5(1)	The following shall apply to all construction vehicles and engine-driven portable equipment: (1) They shall be equipped with effective spark arresters. (2) Vehicles equipped with catalytic converters shall be prohibited from wooded and heavily vegetated areas.	11.3.1.2	Conform	
STD COL 9.5(1)	Fire tools and equipment shall be distinctly marked and used for fire emergencies only.	11.3.1.3	Conform	
STD COL 9.5(1)	Each site utility vehicle shall be equipped with at least one fire-fighting tool, portable fire extinguisher, or backpack pump filled with 4 gal to 5 gal (15 L to 19 L) of water.	11.3.1.4	Conform	
STD COL 9.5(1)	Cut trees, brush, and other combustible spoil shall be disposed of.	11.3.1.5	Conform	
STD COL 9.5(1)	Where it is necessary to dispose of combustible waste by onsite burning, designated burning areas shall be established with the approval of the owner and shall be in compliance with federal, state, and local regulations and guidelines. The contractor shall coordinate burning with the agencies responsible for monitoring fire danger in the area and shall obtain all appropriate permits prior to the start of work.	11.3.1.6	Conform	
STD COL 9.5(1)	All structures that are to be retained, as part of the completed plant shall be constructed of materials as indicated in Chapter 10 and in accordance with other applicable sections in this standard.	11.4.1	Conform	
STD COL 9.5(1)	Construction warehouses, offices, trailers, sheds, and other facilities for the storage of tools and materials shall be located with consideration of their exposure to major plant buildings or other important structures.	11.4.2	Conform	
STD COL 9.5(1)	A fire risk evaluation shall be performed.	11.4.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 58 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Warehouses that contain high-value equipment (as defined by the individual responsible for fire prevention and fire protection) or contents the loss of which or damage to would cause a delay in startup dates of the completed plant shall meet the following criteria: (1) They shall be arranged and protected as indicated in 11.4.4.1 through 11.4.4.4. (2) Although some of these structures are considered to be temporary and will be removed on completion of the plant, the fire and loss potential shall be evaluated and protection provided where warranted.	11.4.4	Conform	
STD COL 9.5(1)	Building construction materials shall be noncombustible or limited-combustible.	11.4.4.1	Conform	
STD COL 9.5(1)	Automatic sprinkler systems shall be designed and installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.	11.4.4.2	Conform	
STD COL 9.5(1)	Waterflow alarms shall be provided and located so as to be monitored at a constantly attended location as determined by the individual responsible for fire protection.	11.4.4.3	Conform	
STD COL 9.5(1)	Air-supported structures shall be used only for the storage of noncombustibles.	11.4.4.4	Conform	
STD COL 9.5(1)	Temporary enclosures, including trailers, inside permanent plant buildings shall be prohibited except where permitted by the individual responsible for fire prevention and fire protection.	11.4.5	Conform	
STD COL 9.5(1)	Where the floor area of a combustible enclosure exceeds 100 ft^2 (9.29 m^2) or where the occupancy presents a fire exposure, the enclosure shall be protected with an approved automatic fire suppression system.	11.4.6	Conform	
STD COL 9.5(1)	Storage of construction materials, equipment, or supplies that are either combustible or in combustible packaging shall be prohibited in main plant buildings unless either of the following conditions exists: (1) An approved automatic fire suppression system is in service in the storage area. (2) Loss of the materials or loss to the surrounding plant area would be minimal, as determined by the individual responsible for fire prevention and fire protection.	11.4.7	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 59 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Construction areas that comprise mobile buildings arranged with the buildings adjoining each other to form one large fire area shall be avoided.	11.4.8	Conform	
STD COL 9.5(1)	If buildings cannot be separated, fire walls shall be installed between units or automatic sprinklers shall be provided throughout the buildings.	11.4.9	Conform	
STD COL 9.5(1)	Fire alarms shall be connected to a constantly attended central location.	11.4.10	Conform	
STD COL 9.5(1)	The handling, storage, and dispensing of flammable liquids and gases shall meet the requirements of NFPA 30, Flammable and Combustible Liquids Code, and NFPA 58, Liquefied Petroleum Gas Code.	11.4.11	Conform	
STD COL 9.5(1)	Vehicle repair facilities shall meet the requirements of NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages.	11.4.12	Conform	
STD COL 9.5(1)	Fire hydrant systems with an approved water supply shall be provided in lay-down areas where the need is determined by the individual responsible for fire prevention and fire protection.	11.5.1	Conform	
STD COL 9.5(1)	Combustible materials shall be separated by a clear space to allow access for manual fire-fighting equipment.	11.5.2	Conform	
STD COL 9.5(1)	Access shall be provided and maintained to all fire-fighting equipment, including fire hoses, extinguishers, and hydrants.	11.5.3	Conform	
STD COL 9.5(1)	Noncombustible or fire-retardant scaffolds, formwork, decking, and partitions shall be used both inside and outside permanent buildings where a fire could cause substantial damage or delay construction schedules.	11.6.1	Conform	.
STD COL 9.5(1)	The use of listed pressure-impregnated fire-retardant lumber or listed fire-retardant coatings shall be provided.	11.6.2	Conform	
STD COL 9.5(1)	Tarpaulins (fabrics) and plastic films shall be certified to conform to the weather-resistant and fire-retardant materials described in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.	11.6.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 60 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Where it is necessary to store new nuclear fuel in areas other than the permanent storage facilities, a written procedure shall be developed to address separation from the following: (1) Combustible materials. (2) Security. (3) Nuclear criticality. (4) Packing material. (5) Noncombustible or limited-combustible building materials. (6) Standpipe. (7) Portable fire extinguishers. (8) Hydrant protection.	11.6.4	Conform	
STD COL 9.5(1)	The permanent underground yard system, fire hydrants, and water supply (at least one water source), as indicated in Chapter 10, shall be installed during the early stages of construction.	11.7.1	Conform	
STD COL 9.5(1)	Where provision of all or part of the permanent underground system and water supply is not practical, temporary systems shall be provided.	11.7.1.1	Conform	
STD COL 9.5(1)	Temporary water supplies shall be hydrostatically tested, flushed, and arranged to maintain a high degree of reliability, including protection from freezing and loss of power.	11.7.1.2	Conform	
STD COL 9.5(1)	Hydrants shall be installed as specified in 11.7.2.1 and 11.7.2.2.	11.7.2	Conform	
STD COL 9.5(1)	Hydrants shall be installed in the vicinity of main plant buildings, important warehouses, office or storage trailer complexes, and outside structures with combustible construction or combustible concrete formwork (e.g., cooling towers).	11.7.2.1	Conform	
STD COL 9.5(1)	The underground main shall be arranged to minimize the possibility that any one break will remove from service any fixed water extinguishing system or leave any area without accessible hydrant protection.	11.7.2.2	Conform	See Subsection 9.5.1.6.

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 60 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	A fire protection water supply shall be provided on the construction site and shall be capable of furnishing the larger of the following for a minimum 2-hour duration: (1) 500 gpm (1892.5 L/min). (2) The in-service fixed water extinguishing system with the highest water demand and 500 gpm (1892.5 L/min) for hose streams.	11.7.3	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 61 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	The highest water demand shall be determined by the hazards present at the stage of construction, which might not correspond with the highest water demand of the completed plant.	11.7.3.1	Conform	
STD COL 9.5(1)	As fixed water extinguishing systems are completed, they shall be placed in service, even when the available construction phase fire protection water supply is not able to meet the designed system demand, and the following criteria shall be met: (1) When the permanent hazard is introduced, the water supply shall be capable of providing the designed system demand. (2) Where construction water is used in permanent systems, adequate strainers shall be provided to prevent clogging of the system by foreign objects and dirt.	11.7.3.2	Conform	
STD COL 9.5(1)	The water supply shall provide the required pressure for hose connections at the highest elevation.	11.7.3.3	Conform	
STD COL 9.5(1)	Fire-fighting equipment shall be provided in accordance with NFPA 600, Standard on Industrial Fire Brigades, and NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.	11.8.1	Conform	
STD COL 9.5(1)	Portable fire extinguishers of the required capacity shall be provided in accordance with NFPA 10, Standard for Portable Fire Extinguishers, where one or more of the following conditions exist: (1) Flammable liquids are stored or handled. (2) Combustible materials are stored. (3) Temporary oil- or gas-fired equipment is used. (4) A tar or asphalt kettle is used. (5) Welding or open flames are in use.	11.8.2	Conform	
STD COL 9.5(1)	A standpipe system shall be provided in any permanent building that has walls erected that are equivalent to two floors in height.	11.8.3	Conform	
STD COL 9.5(1)	Additional standpipe hose connections shall be added to each floor level as soon as sufficient landings are available to fight fires from that level.	11.8.3.1	Conform	
STD COL 9.5(1)	Protection from freezing shall be provided.	11.8.3.2	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 61 of 62) *(continued)*

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	Hoses and nozzles shall be available at strategic locations, such as inside hose cabinets or hose houses or on dedicated fire response vehicles.	11.8.4	Conform	

Table 9.5.1-2R Fire Protection Program Conformance with NFPA 804 (Sheet 62 of 62)

	Standard Requirement	Paragraph	Conformance	Remarks
STD COL 9.5(1)	If fire hose connections are not compatible with local fire-fighting equipment, adapters shall be made available.	11.8.5	Conform	

NAPS COL 9.5(2)

Figure 9.5.1-201 Fire Protection System Schematic

NAPS COL 9.5(2) **Figure 9.5.1-202 Fire Pumping Station Flow Schematic**

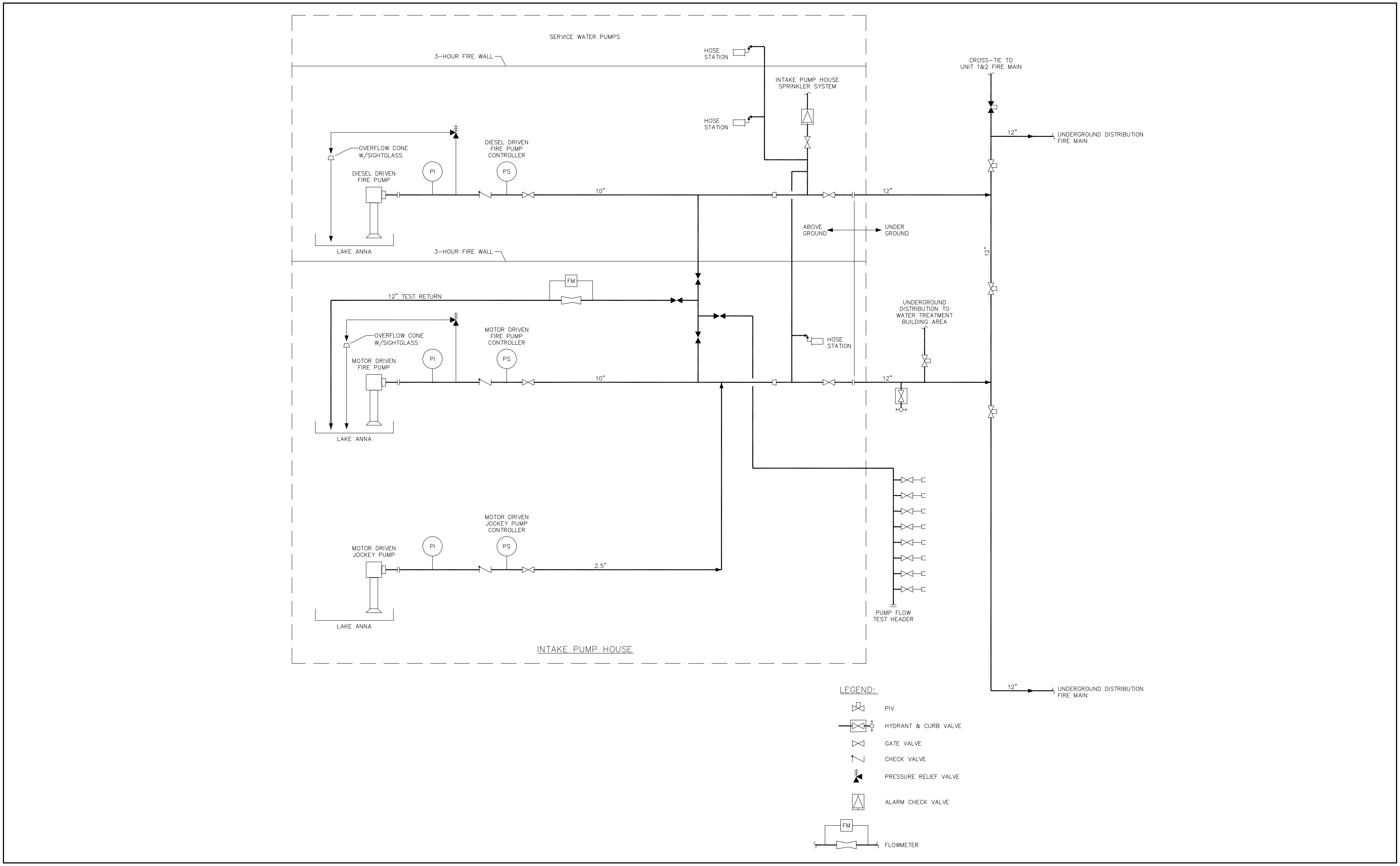
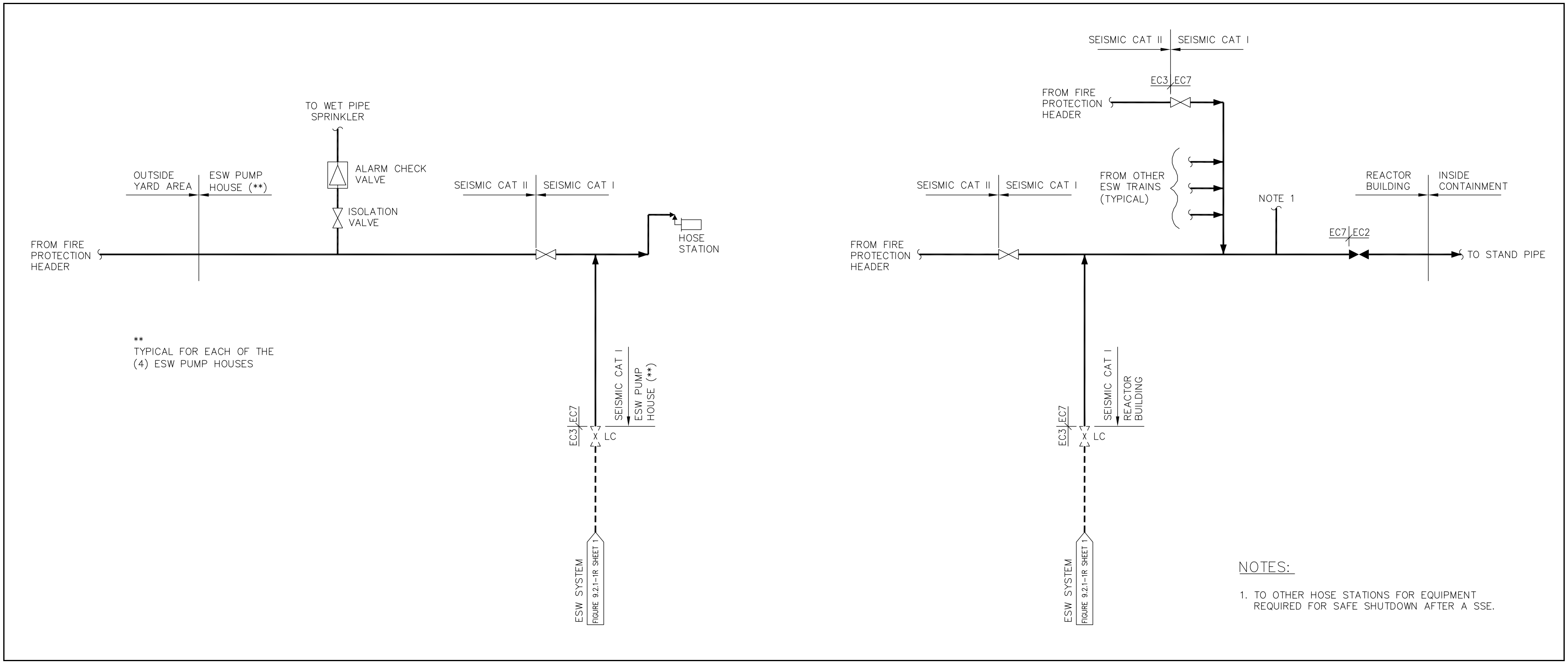


Figure 9.5.1-203 ESW to Fire Protection Cross-Tie Flow Schematic



NAPS COL 9.5(2)

Figure 9.5.1-204 Fire Main Arrangement

Appendix 9A Fire Hazard Analysis

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

9A.3 Fire Hazard Analysis Results

STD COL 9.5(2)

Add the following information after second paragraph in DCD Subsection 9A.3.

The FHA is also conducted for the following site-specific plant structures and associated fire area and/or fire zones which are depicted in Figures 9A-201 and 9A-202.

- Essential Service Water (ESW) Pumping Station
- Ultimate Heat Sink (UHS)
- Transformer Yard
- Plant Support Buildings

Plant buildings are located such that unacceptable exposure to environmental impact such as wildfires does not occur. Structures are located such that non-safety related structures do not pose unacceptable exposure to safety-related structures. For a fire zone by fire zone review, Table 9A-202 identifies the type and quantity of combustible materials in each fire zone of the site-specific plant structures and provides a summary of the FHA for the associated fire zone. The discussion below reviews the fire hazards for each fire area on an area by area basis. Table 9A-203 shows the fire zone to fire zone interface which also depicts fire area to fire area boundaries that must be protected for 3-hour fire rated boundaries.

NAPS COL 9.5(2)

Add the following new subsections after DCD Subsection 9A.3.141.

9A.3.142 FA7-201 A-ESW Pump Room

The A-ESW pump room is shown on Figure 9A-201. The room contains the train A ESW pump, circuits, and controls. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material

associated with the ESW pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train A ESW system. The electrical circuits from other safety trains in this area will be protected by a one-hour fire rated wrap. As such, a fire in this area could only adversely impact the safety train A safe-shutdown functions. The fire would be confined to this area, by fire rated barriers and/or by physical separation. Therefore, equipment within safety trains B, C, and D would remain free of fire damage and able to obtain and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The ESW pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located

within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.143 FA7-202 A-UHS Transfer Pump Room

The A-UHS transfer pump room is shown on Figure 9A-201. The room contains an UHS transfer pump capable of transferring water from the A-cooling tower basin. Its circuits and controls are powered by either the C or D Class 1E bus. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119.

The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the UHS transfer pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in adjacent ESW pump room in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized in damage and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

NAPS COL 9.5(2)

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train C or D depending on the manual breaker alignment. The transfer pump circuits are protected from a fire in the adjacent ESW pump room to assure the transfer pump can perform its safe-shutdown function for a fire in the train A ESW pump room. As such, a fire in this area could only adversely impact the transfer pump functions from the A-cooling tower basin. The fire would be confined to this area by the 3-hour fire rated walls. Therefore, equipment within safety trains A, B, and C or D would remain free of fire damage and able to obtain and maintain safe-shutdown.

STD COL 9.5(2)

Radioactive Release to Environment Evaluation

The UHS transfer pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.144 FA7-203 A-UHS

The A-UHS is shown on Figure 9A-201. A-UHS is a two-fan unit non-combustible constructed cooling tower that serves as the environmental heat sink for safety-related cooling loads served by safety train A ESW system. The unit has two redundant air circulating fans and is constructed chiefly of reinforced concrete.

Fire Detection and Suppression Features

The principal fire protection feature of the UHS cooling tower safety train A is that it is constructed on non-combustible construction. A-UHS is fully separated from the adjacent B-UHS by a 3-hour fire rated wall of reinforced concrete. Since the combustible materials associated with the cooling tower structure are minimal and a fire would be confined to this specific safety train, no automatic fire detection or suppression feature are provided.

STD COL 9.5(2)

Smoke Control Features

The cooling tower structure is an outside component and any smoke from a fire such as associated with a fan motor would be freely released to the surrounding plant environment and not constitute an impediment to fire brigade response.

Fire Protection Adequacy Evaluation

Based on the minimal combustible material and the confinement of any fire that could occur to the location of occurrence, fire protection provided by the noncombustible construction is deemed adequate.

Fire Protection System Integrity

Fire protection of the cooling tower is inherent in its non-combustible design. Therefore, the cooling tower structure does not require automatic or manual fire suppression systems. The FPS integrity for this area is assured by the significant fire protection provided by the cooling tower's concrete structure, which provides fire separation.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train A ESW system and the associated ESW cooling for the train A CCW safe-shutdown cooling functions. As such, a fire in this are could adversely impact safety train A safe-shutdown functions. Since the fire would be confined to this area, equipment within safety trains B, C, and D would remain free of fire damage and able to obtain safe-shutdown.

Radioactive Release to Environment Evaluation

The A-UHS is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the cooling tower structure is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.145 FA7-204 B-ESW Pump Room

The B-ESW pump room is shown on Figure 9A-201. The room contains the train B ESW pump, circuits, and controls. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the ESW pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in accordance with

RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train B ESW system. The electrical circuits from other safety trains in this area will be protected by a one-hour fire rated wrap. As such, a fire in this area could only adversely impact safety train B safe-shutdown functions. The fire would be confined to this area, by fire rated barriers and/or by physical separation. Therefore, equipment within safety trains A, C and D would remain free of fire damage and able to obtain and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The ESW pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.146 FA7-205 B-UHS Transfer Pump Room

The B-UHS transfer pump room is shown on Figure 9A-201. The room contains an UHS transfer pump capable of transferring water from the B-cooling tower basin. Its circuits and controls are powered by either the C or D Class 1E bus. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the UHS transfer pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in adjacent ESW pump room in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

NAPS COL 9.5(2)

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train C or D depending on the manual breaker alignment. The transfer pump circuits are protected from a fire in the adjacent ESW pump room to assure the transfer pump can perform its safe-shutdown function for a fire in the train B ESW pump room. As such, a fire in this area could only adversely impact the transfer pump functions from the B-cooling tower basin. The fire would be confined to this area by the 3-hour fire rated walls. Therefore, equipment within safety trains A, B and C or D would remain free of fire damage and able to obtain and maintain safe-shutdown.

STD COL 9.5(2)

Radioactive Release to Environment Evaluation

The UHS transfer pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.147 **FA7-206 B-UHS**

The B-UHS is shown on Figure 9A-201. B-UHS is a two-fan unit non-combustible constructed cooling tower that serves as the environmental heat sink for safety-related cooling loads served by safety train B ESW system. The unit has two redundant air circulating fans and is constructed chiefly of reinforced concrete.

Fire Detection and Suppression Features

The principal fire protection feature of the UHS cooling tower safety train B is that it is constructed on non-combustible construction. B-UHS is fully separated from the adjacent A-UHS by a 3-hour fire rated wall of reinforced concrete. Since the combustible materials associated with the cooling tower structure are minimal and a fire would be confined to this specific safety train, no automatic fire detection or suppression feature are provided.

STD COL 9.5(2)

Smoke Control Features

The cooling tower structure is an outside component and any smoke from a fire such as associated with a fan motor would be freely released to the

surrounding plant environment and not constitute an impediment to fire brigade response.

Fire Protection Adequacy Evaluation

Based on the minimal combustible material and the confinement of any fire that could occur to the location of occurrence, fire protection provided by the noncombustible construction is deemed adequate.

Fire Protection System Integrity

Fire protection of the cooling tower is inherent in its non-combustible design. Therefore, the cooling tower structure does not require automatic or manual fire suppression systems. The FPS integrity for this area is assured by the significant fire protection provided by the cooling tower's concrete structure, which provides fire separation.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train B ESW system and the associated ESW cooling for the train B CCW safe-shutdown cooling functions. As such, a fire in this are could adversely impact safety train B safe-shutdown functions. Since the fire would be confined to this area, equipment within safety trains A, C, and D would remain free of fire damage and able to obtain safe-shutdown.

Radioactive Release to Environment Evaluation

The B-UHS is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the cooling tower structure is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.148 **FA7-207 C-ESW Pump Room**

The C-ESW pump room is shown on Figure 9A-201. The room contains the train C ESW pump, circuits, and controls. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the ESW pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train C-ESW system. The electrical circuits from other safety trains in this area will be protected by a one-hour fire rated wrap. As such, a fire in this area could only adversely impact the safety train C safe-shutdown functions. The fire would be confined to this area, by fire rated barriers and/or by physical separation. Therefore, equipment within safety trains A, B, and D would remain free of fire damage and able to obtain and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The ESW pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.149 FA7-208 C-UHS Transfer Pump Room

The C-UHS transfer pump room is shown on Figure 9A-201. The room contains an UHS transfer pump capable of transferring water from the C-cooling tower basin. Its circuits and controls are powered by either the A or B Class 1E bus. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the UHS transfer pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in adjacent ESW pump room in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized in damage and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

NAPS COL 9.5(2)

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train A or B depending on the manual breaker alignment. The transfer pump circuits are protected from a fire in the adjacent ESW pump room to assure the transfer pump can perform its safe-shutdown function for a fire in the train C ESW pump room. As such, a fire in this area could only adversely impact the transfer pump functions from the C-cooling tower basin. The fire would be confined to this area by the 3-hour fire rated walls. Therefore, equipment within safety trains C, D and A or B would remain free of fire damage and able to obtain and maintain safe-shutdown.

STD COL 9.5(2)

Radioactive Release to Environment Evaluation

The UHS transfer pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.150 **FA7-209 C-UHS**

STD COL 9.5(2)

The C-UHS is shown on Figure 9A-201. C-UHS is a two-fan unit non-combustible constructed cooling tower that serves as the environmental heat sink for safety-related cooling loads served by safety train C ESW system. The unit has two redundant air circulating fans and is constructed chiefly of reinforced concrete.

Fire Detection and Suppression Features

The principal fire protection feature of the UHS cooling tower safety train C is that it is constructed on non-combustible construction. C-UHS is fully separated from the adjacent D-UHS by a 3-hour fire rated wall of reinforced concrete. Since the combustible materials associated with the cooling tower structure are minimal and a fire would be confined to this specific safety train, no automatic fire detection or suppression feature are provided.

Smoke Control Features

The cooling tower structure is an outside component and any smoke from a fire such as associated with a fan motor would be freely released to the surrounding plant environment and not constitute an impediment to fire brigade response.

Fire Protection Adequacy Evaluation

Based on the minimal combustible material and the confinement of any fire that could occur to the location of occurrence, fire protection provided by the noncombustible construction is deemed adequate.

Fire Protection System Integrity

Fire protection of the cooling tower is inherent in its non-combustible design. Therefore, the cooling tower structure does not require automatic or manual fire suppression systems. The fire protection system integrity for this area is assured by the significant fire protection provided by the cooling tower's concrete structure, which provides fire separation.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train C ESW system and the associated ESW cooling for the train C CCW safe-shutdown cooling functions. As such, a fire in this are could adversely impact safety train C safe-shutdown functions. Since the fire would be confined to this area, equipment within safety trains A, B, and D would remain free of fire damage and able to obtain safe-shutdown.

Radioactive Release to Environment Evaluation

The C-UHS is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the cooling tower structure is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.151 FA7-210 D-ESW Pump Room

The D-ESW pump room is shown on Figure 9A-201. The room contains the train D-ESW pump, circuits, and controls. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the ESW pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in accordance with

RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train D-ESW system. The electrical circuits from other safety trains in this area will be protected by a one-hour fire rated wrap. As such, a fire in this area could only adversely impact the safety train D safe-shutdown functions. The fire would be confined to this area, by fire rated barriers and/or by physical separation. Therefore, equipment within safety trains A, B and C would remain free of fire damage and able to obtain and maintain safe-shutdown.

Radioactive Release to Environment Evaluation

The ESW pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.152 FA7-211 D-UHS Transfer Pump Room

The D-UHS transfer pump room is shown on Figure 9A-201. The room contains an UHS transfer pump capable of transferring water from the D-cooling tower basin. Its circuits and controls are powered by either the A or B Class 1E bus. The walls of this room are of reinforced concrete construction which easily provides a fire resistive capability exceed 3-hour fire resistance as defined by ASTM E-119. The door and all openings or penetrations into this room are protected with 3-hour fire resistive seals or components. The combustible material associated with the UHS transfer pump installation is lube oil and electrical cables.

Fire Detection and Suppression Features

The room is provided with automatic fire detection and automatic wet-pipe sprinkler fire suppression and hose station in adjacent ESW pump room in accordance with RG 1.189 Positions 3.1.1.k, 3.2.1.j and 6.1.9. This will assure that any fire damage occurring within this room is minimized in damage and does not compromise adjacent fire zones and safety-related equipment.

STD COL 9.5(2)

Smoke Control Features

The room's HVAC exhaust will normally ventilate any smoke generated within the room. The plant fire brigade using portable fans and flexible ducting can supplement smoke removal capability.

Fire Protection Adequacy Evaluation

A fire is not expected to occur within this area due to the limited ignition sources and low combustible fire loading. Should a fire occur, it would not propagate outside the fire area boundaries.

Fire Protection System Integrity

The wet-pipe sprinkler system and standpipe is seismically supported such that the failure of the system piping during a design basis seismic event will not damage any of the safety-related equipment in the room. The fire suppression system is designed to NFPA codes and standards, using approved material. The fire suppression system is installed under a QA program that ensures system integrity.

NAPS COL 9.5(2)

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train A or B depending on the manual breaker alignment. The transfer pump circuits are protected from a fire in the adjacent ESW pump room to assure the transfer pump can perform its safe-shutdown function for a fire in the train D-ESW pump room. As such, a fire in this area could only adversely impact the transfer pump functions from the D-cooling tower basin. Since the fire would be confined to this area by the 3-hour fire rated walls. Therefore, equipment within safety trains C, D, and A or B would remain free of fire damage and able to obtain and maintain safe-shutdown.

STD COL 9.5(2)

Radioactive Release to Environment Evaluation

The UHS transfer pump room is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the pump room is not deemed capable of producing a radioactive release.

NAPS COL 9.5(2)

9A.3.153 **FA7-212 D-UHS**

STD COL 9.5(2)

The D-UHS is shown on Figure 9A-201. D-UHS is a two-fan unit non-combustible constructed cooling tower that serves as the environmental heat sink for safety-related cooling loads served by safety train D-ESW system. The unit has two redundant air circulating fans and is constructed chiefly of reinforced concrete.

Fire Detection and Suppression Features

The principal fire protection feature of the UHS cooling tower safety train D is that it is constructed on non-combustible construction. D-UHS is fully separated from the adjacent C-UHS by a 3-hour fire rated wall of reinforced concrete. Since the combustible materials associated with the cooling tower structure are minimal and a fire would be confined to this specific safety train, no automatic fire detection or suppression feature are provided.

Smoke Control Features

The cooling tower structure is an outside component and any smoke from a fire such as associated with a fan motor would be freely released to the

surrounding plant environment and not constitute an impediment to fire brigade response.

Fire Protection Adequacy Evaluation

Based on the minimal combustible material and the confinement of any fire that could occur to place of occurrence, fire protection provided by the non-combustible construction is deemed adequate.

Fire Protection System Integrity

Fire protection of the cooling tower is inherent in its non-combustible design. Therefore, the cooling tower structure does not require automatic or manual fire suppression systems. The fire protection system integrity for this area is assured by the significant fire protection provided by the cooling tower's concrete structure, which provides fire separation.

Safe Shutdown Evaluation

The electrical circuits located within this area are associated with the safety train D-ESW system and the associated ESW cooling for the train D CCW safe-shutdown cooling functions. As such, a fire in this are could adversely impact safety train D safe-shutdown functions. Since the fire would be confined to this area, equipment within safety trains A, B, and C would remain free of fire damage and able to obtain safe-shutdown.

Radioactive Release to Environment Evaluation

The D-UHS is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the cooling tower structure is not deemed capable of producing a radioactive release.

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9A.3.154 FA7-301 Transformer Yard

The transformer yard is shown in Figure 9A-201. The area is located on the south end of the turbine building. Due to the significant plant impact of a transformer fire, the transformer yard is designated as fire area FA7-301. The fire zones in FA7-301 are presented in Table 9A-201.

The transformer yard is located in excess of 50 ft. from the turbine building. A two-hour fire rated barrier separates each transformer from any adjacent transformer. The separation features meet RG 1.189, NFPA 804, and nuclear property insurer's requirements.

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Provision for drainage and oil spill containment is in accordance with NFPA 804, and IEEE 980.

Fire Detection and Suppression Features

Each transformer is provided with an automatic fire detection system (heat detectors) which alarms to the plant fire alarm system and actuates an automatic water spray system installed in accordance with NFPA 15 (Reference 9.5.1-22) requirements.

Smoke Control Features

The transformers are outside components and any smoke from a fire such as associated with a transformer fluid fire would be freely released to the surrounding plant environment and not constitute an impediment to fire brigade response.

Fire Protection Adequacy Evaluation

The fire protection features installed for the transformer yard, fire walls, automatic fire detection and water spray systems, meet industry accepted practices, NFPA code guidance, NRC guidance, and nuclear plant property insurer's recommendations. On this basis, the fire protection features are considered adequate for the fire hazard present.

Fire Protection System Integrity

The firewalls for the transformer yard are freestanding walls designed for wind resistance and seismic occurrences. The fire protection systems are designed, installed, and tested in accordance with NFPA codes and standards under a nuclear quality assurance program. This assures a high degree of fire protection system integrity required for an operating nuclear power plant.

Safe Shutdown Evaluation

A fire involving one of the transformer yard's units would likely necessitate plant shutdown. The yard is located away from safety-related systems, components, and structures and would not spread to impact such features due to the firewalls, automatic fire detection and suppression systems provided. Since none of the four safety trains of equipment provided to assure plant shutdown would be affected, no adverse impact of safe-shutdown would result from a fire in the transformer yard.

Radioactive Release to Environment Evaluation

The transformer yard is a non-radiological area with no piping system containing radioactive material and no other radioactive material located within the area. As such, any fire that could occur within the transformer yard is not deemed capable of producing a radioactive release.

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9A.3.155 Miscellaneous Plant Support Structures

The plant design features a number of miscellaneous plant support structures such as the administration building, security structures, station water intake and fire pump house, circulating water pump house, maintenance building, miscellaneous office and storage spaces, CWS cooling towers, auxiliary boiler building, etc. These structures do not contain any equipment that performs a safety-related function. The structures are located on the site such that they do not represent an unacceptable fire exposure to any safety-related structure, system, or component.

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Fire Detection and Suppression Features

Fire detection and suppression system features vary for the miscellaneous plant support structures according to their importance to personnel safety, continued operation, and the influence of applicable NFPA codes and standards, building code requirements, and nuclear plant property insurer’s requirements or recommendations.

Smoke Control Features

Smoke control features are provided for the miscellaneous plant support structures according to building code requirements and personnel safety concerns. Additional smoke removal in these structures can be provided by portable fans units and ducting by the plant fire brigade of standard firefighting practices.

Fire Protection Adequacy Evaluation

Based on the compliance with accepted industry practices, the fire protection features provided for the miscellaneous structures are deemed adequate for the fire hazards present.

Fire Protection System Integrity

Fire protection systems provided for the miscellaneous plant structures are designed, installed, tested, and maintained in accordance with

applicable NFPA codes and standards. This assures a high degree of system integrity.

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Safe Shutdown Evaluation

Miscellaneous structures do not contain any safety-related or safe-shutdown features. The structures are located and separated such that they do not pose an unacceptable fire exposure to any safety-related or safe-shutdown structure, system, or component. As such, a fire in any of the miscellaneous support structures will not compromise the ability to obtain safe plant shutdown.

Radioactive Release to Environment Evaluation

The miscellaneous support structures are non-radiological areas with no piping system containing radioactive material and no other radioactive material located within the areas. As such, any fire that could occur within one of the site support structures is not deemed capable of producing a radioactive release."

9A.3.156 **Interim Radwaste Storage Facility**

The IRSF is equipped with appropriate fire protection features. These features are discussed in Chapter 11, Appendix 11AA.

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Table 9A-201 Fire Areas and Fire Zones

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
O/B	A	FA7-201	A-ESW Pump Room	FA7-201-01	A-ESW Pump Room
O/B	C or D	FA7-202	A-UHS Transfer Pump Room	FA7-202-01	A-UHS Transfer Pump Room
O/B	A	FA7-203	A-UHS	FA7-203-01	A-UHS
O/B	B	FA7-204	B-ESW Pump Room	FA7-204-01	B-ESW Pump Room
O/B	D or C	FA7-205	B-UHS Transfer Pump Room	FA7-205-01	B-UHS Transfer Pump Room
O/B	B	FA7-206	B-UHS	FA7-206-01	B-UHS
O/B	C	FA7-207	C-ESW Pump Room	FA7-207-01	C-ESW Pump Room
O/B	A or B	FA7-208	C-UHS Transfer Pump Room	FA7-208-01	C-UHS Transfer Pump Room
O/B	C	FA7-209	C-UHS	FA7-209-01	C-UHS
O/B	D	FA7-210	D-ESW Pump Room	FA7-210-01	D-ESW Pump Room
O/B	B or A	FA7-211	D-UHS Transfer Pump Room	FA7-211-01	D-UHS Transfer Pump Room
O/B	D	FA7-212	D-UHS	FA7-212-01	D-UHS
O/B	N	FA7-301	Transformer Yard	FA7-301-01	Main Generator Excitation Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-02	A-Unit Auxiliary Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-03	B-Unit Auxiliary Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-04	C-Unit Auxiliary Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-05	D Unit Auxiliary Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-06	Spare Main Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-07	C-Main Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-08	B-Main Transformer Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-09	A-Main Transformer Zone

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Table 9A-201 Fire Areas and Fire Zones

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
O/B	N	FA7-301	Transformer Yard	FA7-301-10	RAT 1 Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-11	RAT 2 Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-12	RAT 4 Zone
O/B	N	FA7-301	Transformer Yard	FA7-301-13	RAT 3 Zone

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-201-01**	Figure	**9A-201**	Section	**9A.3.142**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**2059**
Area Designation	**A-ESW Pump Room**			Associated Safety Division(s)	**A**
Zone Designation	**A-ESW Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72, and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+-5** **1.84E+-6** **2.46E+-6** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.5E+03**
Maximum Anticipated Combustible Loading	**7.8E+03**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-202-01** **FA7-203-01** **FA7-206-01** **FA7-101-01**	—	—	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-202-01**	Figure	**9A-201**	Section	**9A.3.143**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**360**
Area Designation	**A-UHS Transfer Pump Room**			Associated Safety Division(s)	**C or D**
Zone Designation	**A-UHS Transfer Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72, 80 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System** Fire Suppression - Primary **Wet Pipe Sprinkler**	**Manual Fire Alarm Pull Station** Fire Suppression - Backup **Fire Hose Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Trains A, B, C, and D ESW functions remain free of fire damage.**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**3.7E+04**
Maximum Anticipated Combustible Loading	**4.5E+04**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-201-01** **FA7-203-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-203-01**	Figure	**9A-201**	Section	**9A.3.144**
Building	**UHS**	Floors	**1**	Floor Area, ft^2	**13,600**
Area Designation	**A-UHS**			Associated Safety Division(s)	**A**
Zone Designation	**A-UHS**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Grease High-Voltage Cable Control Cable Instrumentation Cable	**1.84E+06** **2.46E+06** **3.09E+06** **3.29E+06**	**There is no automatic detection.**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**An unsuppressed fire would self extinguish due to lack of combustible continuity but potentially result in loss of the cooling tower function. Trains B, C, and D remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Fire Hose Station	**Portable Fire Extinguisher**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.9E+02**
Maximum Anticipated Combustible Loading	**9.5E+02**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-201-01** **FA7-202-01** **FA7-101-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-204-01**	Figure	**9A-201**	Section	**9A.3.145**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**2059**
Area Designation	**B-ESW Pump Room**			Associated Safety Division(s)	**B**
Zone Designation	**B-ESW Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Luge Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.5E+03**
Maximum Anticipated Combustible Loading	**7.8E+03**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-102-01** **FA7-205-01** **FA7-206-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-205-01**	Figure	**9A-201**	Section	**9A.3.146**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**360**
Area Designation	**B-UHS Transfer Pump Room**			Associated Safety Division(s)	**D or C**
Zone Designation	**B-UHS Transfer Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72, 80 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Trains A, B, C, and D ESW functions remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**3.7E+04**
Maximum Anticipated Combustible Loading	**4.5E+04**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-204-01** **FA7-206-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-206-01**	Figure	**9A-201**	Section	**9A.3.147**
Building	**UHS**	Floors	**1**	Floor Area, ft^2	**13,600**
Area Designation	**B-UHS**			Associated Safety Division(s)	**B**
Zone Designation	**B-UHS**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Grease High Voltage Cable Control Cable Instrumentation Cable	**1.84E+06** **2.46E+06** **3.09E+06** **3.29E+06**	**There is no automatic detection.**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**An unsuppressed fire would self extinguish due to lack of combustible continuity but potentially result in loss of the cooling tower function. Trains A, C, and D remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Fire Hose Station	**Portable Fire Extinguisher**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.9E+02**
Maximum Anticipated Combustible Loading	**9.5E+02**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-201-01** **FA7-203-01** **FA7-204-01** **FA7-205-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-207-01**	Figure	**9A-201**	Section	**9A.3.148**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**2059**
Area Designation	**C-ESW Pump Room**			Associated Safety Division(s)	**C**
Zone Designation	**C-ESW Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.5E+03**
Maximum Anticipated Combustible Loading	**7.8E+03**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-103-01** **FA7-208-01** **FA7-209-01** **FA7-212-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-208-01**	Figure	**9A-201**	Section	**9A.3.149**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**360**
Area Designation	**C-UHS Transfer Pump Room**			Associated Safety Division(s)	**A or B**
Zone Designation	**C-UHS Transfer Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72, 80 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Trains A, B, C, and D ESW functions remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**3.7E+04**
Maximum Anticipated Combustible Loading	**4.5E+04**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-207-01** **FA7-209-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-209-01**	Figure	**9A-201**	Section	**9A.3.150**
Building	**UHS**	Floors	**1**	Floor Area, ft^2	**13,600**
Area Designation	**C-UHS**			Associated Safety Division(s)	**C**
Zone Designation	**C-UHS**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Grease High Voltage Cable Control Cable Instrumentation Cable	**1.84E+-6** **2.46E+06** **3.09E+06** **3.25E+06**	**There is no automatic detection.**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**An unsuppressed fire would self extinguish due to lack of combustible continuity but potentially result in loss of the cooling tower function. Trains A, B, and D remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Fire Hose Station	**Portable Fire Extinguisher**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.9E+02**
Maximum Anticipated Combustible Loading	**9.5E+02**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-103-01** **FA7-207-01** **FA7-208-01** **FA7-212-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-210-01**	Figure	**9A-201**	Section	**9A.3.151**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**2059**
Area Designation	**D-ESW Pump Room**			Associated Safety Division(s)	**D**
Zone Designation	**D-ESW Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Three trains remain free from the fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Wet Pipe Sprinkler	**Fire Hose Station**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.5E+03**
Maximum Anticipated Combustible Loading	**7.8E+03**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-104-01** **FA7-211-01** **FA7-212-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-211-01**	Figure	**9A-201**	Section	**9A.3.152**
Building	**ESW Pumping Station**	Floors	**1**	Floor Area, ft^2	**360**
Area Designation	**D-UHS Transfer Pump Room**			Associated Safety Division(s)	**B or A**
Zone Designation	**D-UHS Transfer Pump Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 72, 80 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Lube Oil Grease High Voltage Cable Low Voltage Cable Control Cable Instrumentation Cable	**5.15E+05** **1.84E+06** **2.46E+06** **2.14E+06** **3.09E+06** **3.29E+06**	**Automatic Fire Detection System** Fire Suppression - Primary **Wet Pipe Sprinkler**	**Manual Fire Alarm Pull Station** Fire Suppression - Backup **Fire Hose Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**A fire in this fire zone could damage the few functions of 1 safe-shutdown train. Trains A, B, C, and D ESW functions remain free of fire damage.**

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**3.7E+04**
Maximum Anticipated Combustible Loading	**4.5E+03**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-210-01** **FA7-212-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-212-01**	Figure	**9A-201**	Section	**9A.3.153**
Building	**UHS**	Floors	**1**	Floor Area, ft^2	**13,600**
Area Designation	**D-UHS**			Associated Safety Division(s)	**D**
Zone Designation	**D-UHS**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Grease High Voltage Cable Control Cable Instrumentation Cable	**1.84E+06** **2.46E+06** **3.09E+06** **3.29E+06**	**There is no automatic detection.**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the safety-related equipment consistent with GDC-3.**	**An unsuppressed fire would self extinguish due to lack of combustible continuity but potentially result in loss of the cooling tower function. Trains A, B, and C remain free of fire damage.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Fire Hose Station	**Portable Fire Extinguisher**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.9E+02**
Maximum Anticipated Combustible Loading	**9.5E+02**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-207-01** **FA7-209-01** **FA7-210-01** **FA7-211-01**	-	-	**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. The door to the room is 3-hour fire rated and all openings and penetrations into the room are rated to provide 3-hour fire resistance.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-01**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**1650**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Main Generator Excitation Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**7.84E+08**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**4.8E+05**
Maximum Anticipated Combustible Loading	**5.7E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-02** **FA7-301-08** **FA7-301-09**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A separation of at least 50 feet of this zone from the turbine building exists and a freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-02**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**1650**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**A-Unit Auxiliary Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**7.84E+08**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**4.8E+05**
Maximum Anticipated Combustible Loading	**5.7E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-01** **FA7-301-03** **FA7-301-07** **FA7-301-08**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A separation of at least 50 feet of this zone from the turbine building exists and a freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-03**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**1650**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**B-Unit Auxiliary Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**7.84E+08**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**4.8E+05**
Maximum Anticipated Combustible Loading	**5.7E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-02** **FA7-301-04** **FA7-301-07**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A separation of at least 50 feet of this zone from the turbine building exists and a freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-04**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**1650**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**C-Unit Auxiliary Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**9.60E+08**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**5.8E+05**
Maximum Anticipated Combustible Loading	**7.0E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-03** **FA7-301-05** **FA7-301-06** **FA7-301-07**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A separation of at least 50 feet of this zone from the turbine building exists and a freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-05**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**1650**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**D Unit Auxiliary Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**9.60E+08**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**5.8E+05**
Maximum Anticipated Combustible Loading	**7.0E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-04** **FA7-301-06** **FA7-301-10**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A separation of at least 50 feet of this zone from the turbine building exists and a 2-hour rated firewall on the North and East side and a 3-hour firewall on the West side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-06**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2700**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Spare Main Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.88E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.0E+05**
Maximum Anticipated Combustible Loading	**8.4E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-04** **FA7-301-05** **FA7-301-07** **FA7-301-10**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall on the East and West side and a 3-hour firewall on the North side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-07**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2700**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**C-Main Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.88E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.0E+05**
Maximum Anticipated Combustible Loading	**8.4E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-03** **FA7-301-04** **FA7-301-06** **FA7-301-08**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall on the East and West side and a 3-hour firewall on the North side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-08**	Figure	**9A-202**	Section	**9A.3-154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2700**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**B-Main Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.88E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.0E+05**
Maximum Anticipated Combustible Loading	**8.4E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-01** **FA7-301-02** **FA7-301-07** **FA7-301-09**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall on the East and West side and a 3-hour firewall on the North side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-09**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2700**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**A-Main Transformer Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.88E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**7.0E+05**
Maximum Anticipated Combustible Loading	**8.4E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-01** **FA7-301-08**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall on the East and West side and a 3-hour firewall on the North side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-10**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2500**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Reserve Auxiliary Transformer 1 Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.38E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**5.5E+05**
Maximum Anticipated Combustible Loading	**6.6E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-05** **FA7-301-06** **FA7-301-11**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall on the North and West side and a 3-hour firewall on the East side separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-11**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2500**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Reserve Auxiliary Transformer 2 Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.38E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**5.5E+05**
Maximum Anticipated Combustible Loading	**6.6E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-10** **FA7-301-12**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-12**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2500**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Reserve Auxiliary Transformer 4 Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.69E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no or safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.8E+05**
Maximum Anticipated Combustible Loading	**8.1E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-11** **FA7-301-13**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-202 Fire Hazard Analysis Summary

Fire Zone	**FA7-301-13**	Figure	**9A-202**	Section	**9A.3.154**
Building	**Transformer Yard**	Floors	**N/A**	Floor Area, ft^2	**2500**
Area Designation	**Transformer Yard**			Associated Safety Division(s)	**N**
Zone Designation	**Reserve Auxiliary Transformer 3 Zone**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 15, 24, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Transformer Oil	**1.69E+09**	**Automatic heat**	**Manual Fire Alarm Pull Station**	**A quickly detected and suppressed fire in this room will minimize fire damage to the transformer.**	**There is no safe-shutdown circuit in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Water Spray System	**Yard Hydrant**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.8E+05**
Maximum Anticipated Combustible Loading	**8.1E+05**

	Wall	Floor	Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 9A-203 for complete listing.)	**FA7-301-12**	-	-	**This zone is surrounded with freestanding fire barriers and open space. A freestanding 2-hour rated firewall separates this zone from surrounding transformers.**

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Table 9A-203 Fire Zone/Fire Area Interfaces

Fire Zone	Interface	Adjacent Fire Zones
FA7-101-01	Wall	FA7-102-01, FA7-201-01, FA7-203-01, FA7-206-01
FA7-102-01	Wall	FA7-101-01, FA7-103-01, FA7-204-01, FA7-206-01
FA7-103-01	Wall	FA7-102-01, FA7-104-01, FA7-207-01, FA7-209-01, FA7-210-01, FA7-212-01
FA7-104-01	Wall	FA7-103-01, FA7-210-01, FA7-212-01
FA7-201-01	Wall	FA7-101-01, FA7-202-01, FA7-203-01, FA7-206-01
FA7-202-01	Wall	FA7-201-01, FA7-203-01
FA7-203-01	Wall	FA7-101-01, FA7-201-01, FA7-202-01, FA7-206-01
FA7-204-01	Wall	FA7-102-01, FA7-205-01, FA7-206-01
FA7-205-01	Wall	FA7-204-01, FA7-206-01
FA7-206-01	Wall	FA7-101-01, FA7-102-01, FA7-201-01, FA7-203-01, FA7-204-01, FA7-205-01
FA7-207-01	Wall	FA7-103-01, FA7-208-01, FA7-209-01, FA7-212-01
FA7-208-01	Wall	FA7-207-01, FA7-209-01
FA7-209-01	Wall	FA7-207-01, FA7-212-01, FA7-103-01, FA7-208-01
FA7-210-01	Wall	FA7-211-01, FA7-212-01, FA7-104-01
FA7-211-01	Wall	FA7-210-01, FA7-212-01
FA7-212-01	Wall	FA7-103-01, FA7-104-01, FA7-207-01, FA7-209-01, FA7-210-01, FA7-211-01
FA7-301-01	Wall	FA7-301-02, FA7-301-08, FA7-301-09
FA7-301-02	Wall	FA7-301-01, FA7-301-03, FA7-301-07, FA7-301-08
FA7-301-03	Wall	FA7-301-02, FA7-301-04, FA7-301-07
FA7-301-04	Wall	FA7-301-03, FA7-301-05, FA7-301-06, FA7-301-07
FA7-301-05	Wall	FA7-301-04, FA7-301-06, FA7-301-10
FA7-301-06	Wall	FA7-301-04, FA7-301-05, FA7-301-07, FA7-301-10
FA7-301-07	Wall	FA7-301-03, FA7-301-04, FA7-301-06, FA7-301-08
FA7-301-08	Wall	FA7-301-01, FA7-301-02, FA7-301-07, FA7-301-09
FA7-301-09	Wall	FA7-301-01, FA7-301-08
FA7-301-10	Wall	FA7-301-05, FA7-301-06, FA7-301-11
FA7-301-11	Wall	FA7-301-10, FA7-301-12
FA7-301-12	Wall	FA7-301-11, FA7-301-13
FA7-301-13	Wall	FA7-301-12

NAPS DEP 9.2(1)

Figure 9A-13R Fire Zones and Fire Areas A/B EL 261'-1" NAVD88 (B1F)

NAPS DEP 9.2(1)

Figure 9A-14R Fire Zones and Fire Areas A/B EL 291'-0" NAVD88 (1F)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 9A-20R Fire Zones and Fire Areas T/B EL 262'-5" NAVD88 (B1F)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 9A-21R Fire Zones and Fire Areas T/B EL 291'-0" NAVD88 (1F)**

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 9A-22R Fire Zones and Fire Areas T/B EL 326'-5" NAVD88 (2F)

NAPS DEP 10.4(1)

Figure 9A-23R Fire Zones and Fire Areas T/B EL 353'-5" NAVD88 (3F)

NAPS DEP 10.4(1)

Figure 9A-24R Fire Zones and Fire Areas T/B EL 381'-3" NAVD88 (4F)

NAPS DEP 10.4(1)

Figure 9A-25R Fire Zones and Fire Areas T/B EL 400'-11" NAVD88 (5F)

NAPS DEP 10.4(1)

Figure 9A-26R Fire Zones and Fire Areas T/B EL 461'-10" NAVD88 (Roof)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS COL 9.5(2)
NAPS CDI

Figure 9A-27R Fire Zones and Fire Areas ESW Piping Tunnel and Power Source Fuel Storage Vault

NAPS COL 9.5(2)

Figure 9A-201 Fire Zones and Fire Areas ESW Pump Rooms and UHS

NAPS COL 9.5(2) **Figure 9A-202 Fire Zones and Fire Area Transformer Yard**

10 Steam and Power Conversion System

10.0 Steam and Power Conversion System

10.1 Summary Description

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

10.1.1 General Description

NAPS DEP 10.2(1) Replace the first sentence of the fourth paragraph of DCD Subsection 10.1.1 with the following:

The turbine-generator has an output ranging from 1500 MWe to 1630 MWe depending on the plant condition for the MHI nuclear steam supply system (NSSS) thermal output of 4,466 MWt.

Table 10.1-1R Significant Design Features and Performance Characteristics for Major Steam and Power Conversion System Components

Nuclear steam supply system, rated power operation

Rated NSSS power (MWt)	4,466
Steam generator outlet pressure (psig)	957
Steam generator inlet feedwater temperature (°F)	456.7
Maximum steam generator outlet steam moisture (%)	0.1
Steam generator outlet steam temperature (°F)	541.2
Quantity of steam generators	4
Total steam flow rate from steam generator (lb/hr)	20,200,000

Turbine

NAPS DEP 10.2(1)	Output (MWe)	~~1,625~~ 1,584 (Note)
NAPS DEP 10.2(1)	Turbine type	Tandem-compound, 6-flow, ~~74~~ 54-in last-stage blade
	Turbine elements	1 double flow high pressure, 3 double flow low pressure
	Operating speed (rpm)	1,800

Note: Output is based on main condenser pressure of 2.6 inch-HgA

Figure 10.1-1R Overall System Flow Diagram

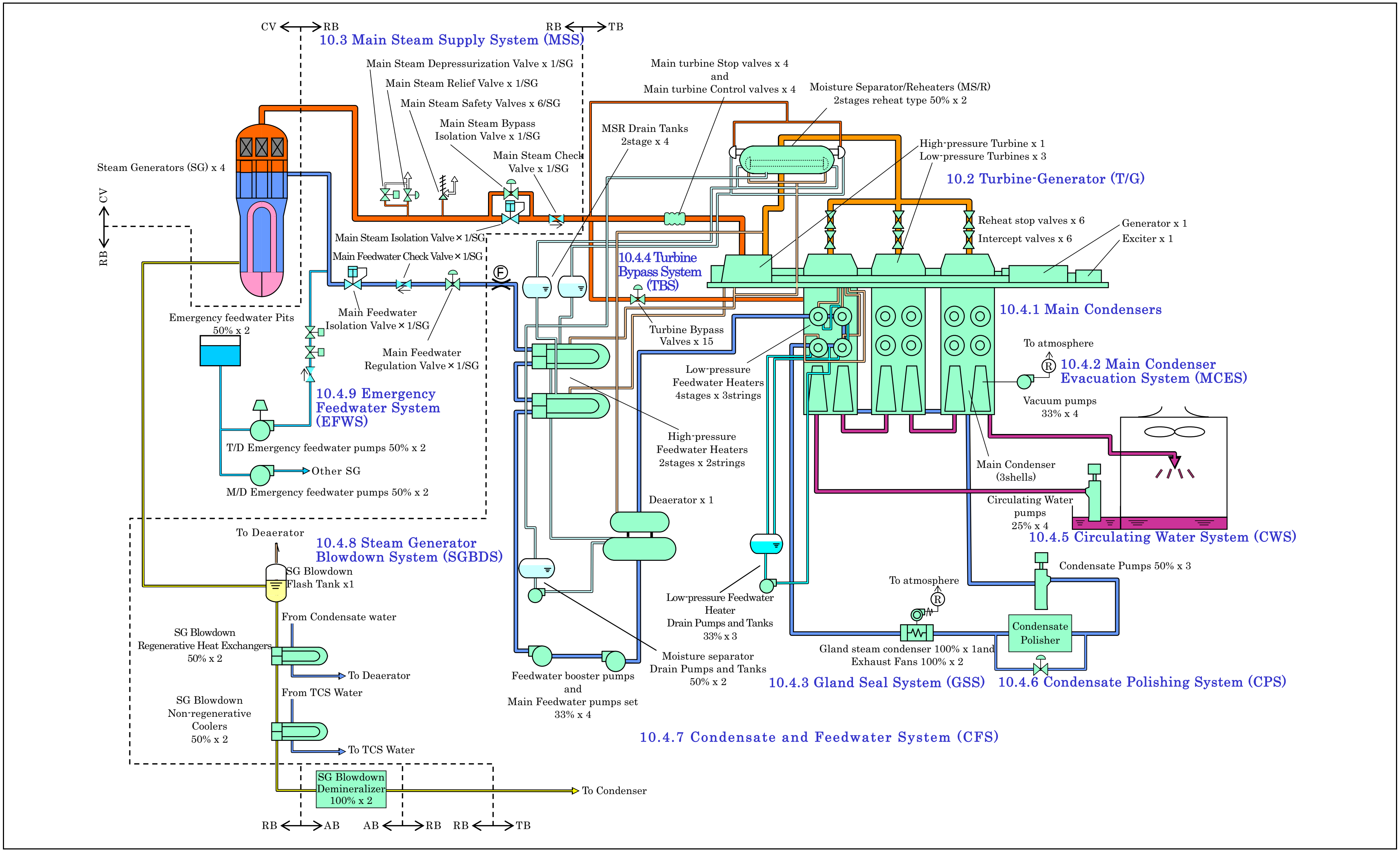
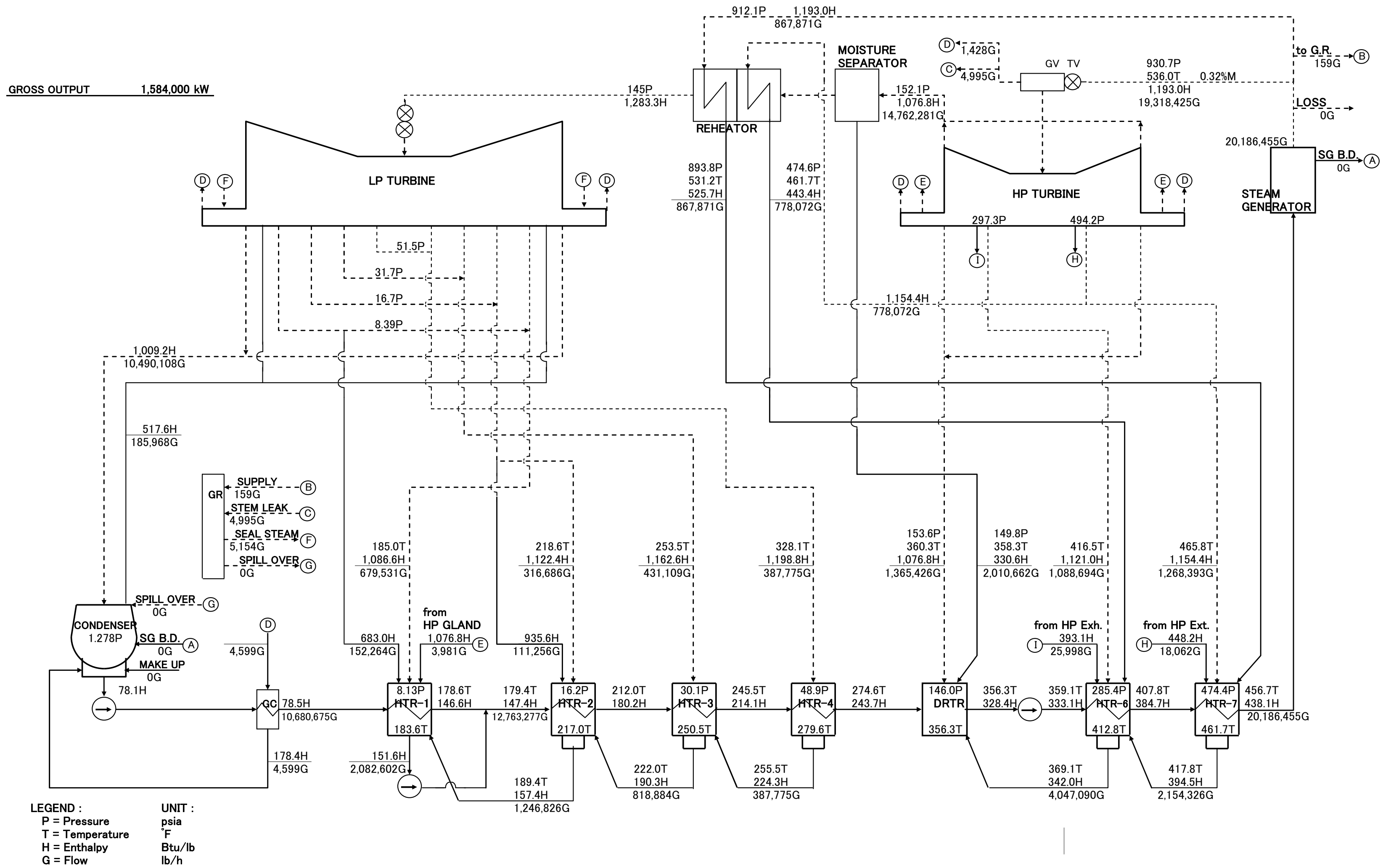
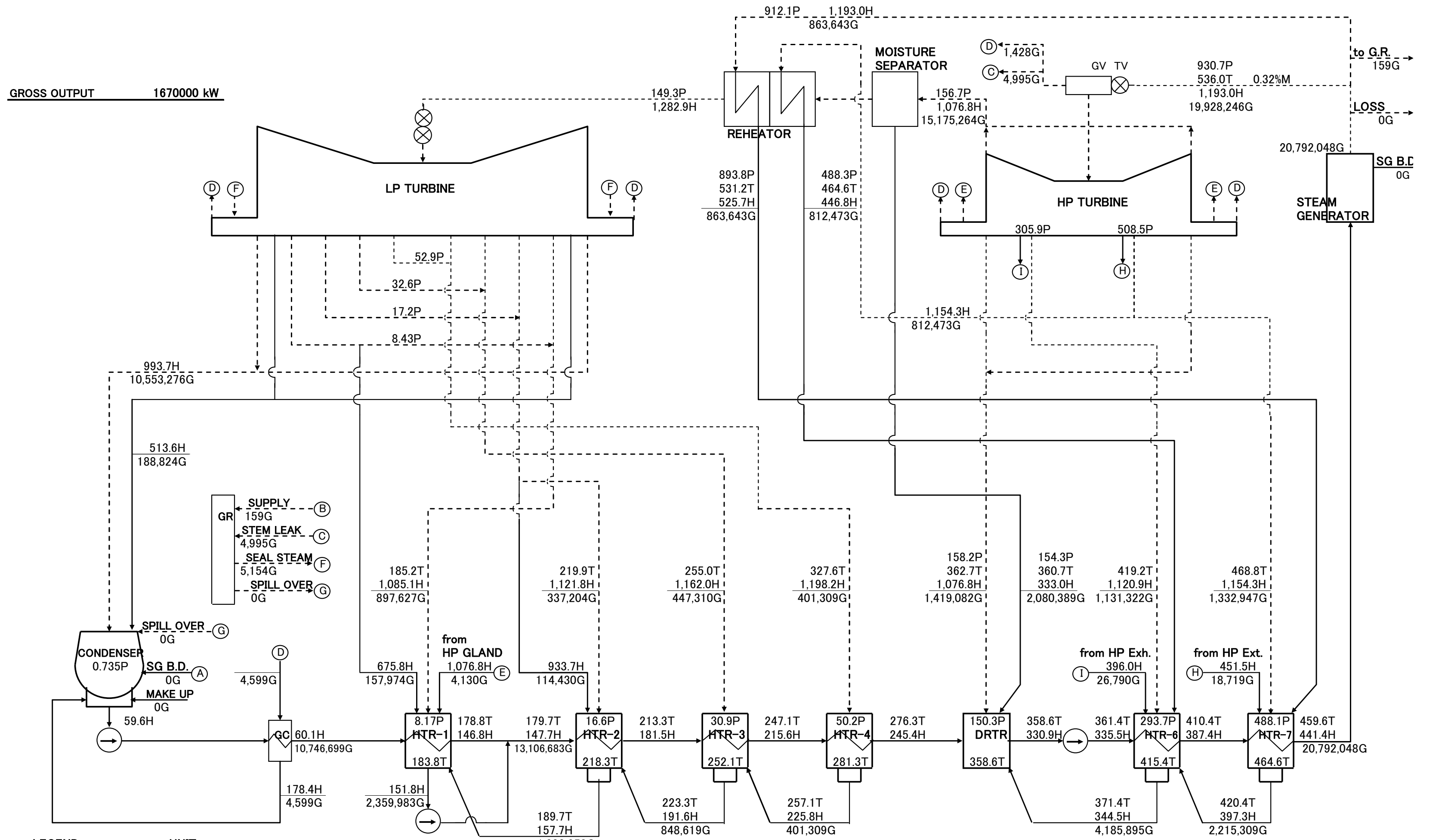


Figure 10.1-2R Heat Balance Diagram Rated Condition (Cond. press.: 2.6 in HgA)



NOTE :
CALCULATIONS ARE BASED ON IF-97 FORMULATIONS OF STEAM TABLE.
CALCULATIONS ARE BASED ON NO RADIATION LOSSES FROM HEATERS OR EXTRACTION PIPINGS LOCATED IN THE CONDENSER NECK.
THIS GROSS OUTPUT IS ELECTRICAL OUTPUT AFTER SUBSTRACTING EXCITATION POWER FROM GENERATOR TERMINAL OUTPUT.

Figure 10.1-3R Heat Balance Diagram VWO Condition (Cond. press.: 1.5 in HgA)



LEGEND :
- P = Pressure
- T = Temperature
- H = Enthalpy
- G = Flow

UNIT :
- psia
- ˚F
- Btu/lb
- lb/h

NOTE :
CALCULATIONS ARE BASED ON IF-97 FORMULATIONS OF STEAM TABLE.
CALCULATIONS ARE BASED ON NO RADIATION LOSSES FROM HEATERS OR EXTRACTION PIPINGS LOCATED IN THE CONDENSER NECK
THIS GROSS OUTPUT IS ELECTRICAL OUTPUT AFTER SUBSTRACTING EXCITATION POWER FROM GENERATOR TERMINAL OUTPUT.

10.2 Turbine-Generator (T/G)

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

10.2.2.2.5 Low-Pressure Turbine (LPT)

NAPS DEP 10.2(1)

Replace the first sentence of the first paragraph of DCD Subsection 10.2.2.2.5 with the following.

There are three double flow LPTs with 54-inch last stage blades.

10.2.3.5 Inservice Inspection

STD COL 10.2(1)

Replace the last paragraph of DCD Subsection 10.2.3.5 with the following.

A turbine maintenance and inspection procedure will be established prior to fuel load. The procedure will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in DCD Subsection 10.2.3.5.

10.2.5 Combined License Information

Replace the content of DCD Subsection 10.2.5 with the following.

STD COL 10.2(1)

10.2(1) ***Inservice Inspection***

This Combined License (COL) item is addressed in Subsection 10.2.3.5.

10.2.6 References

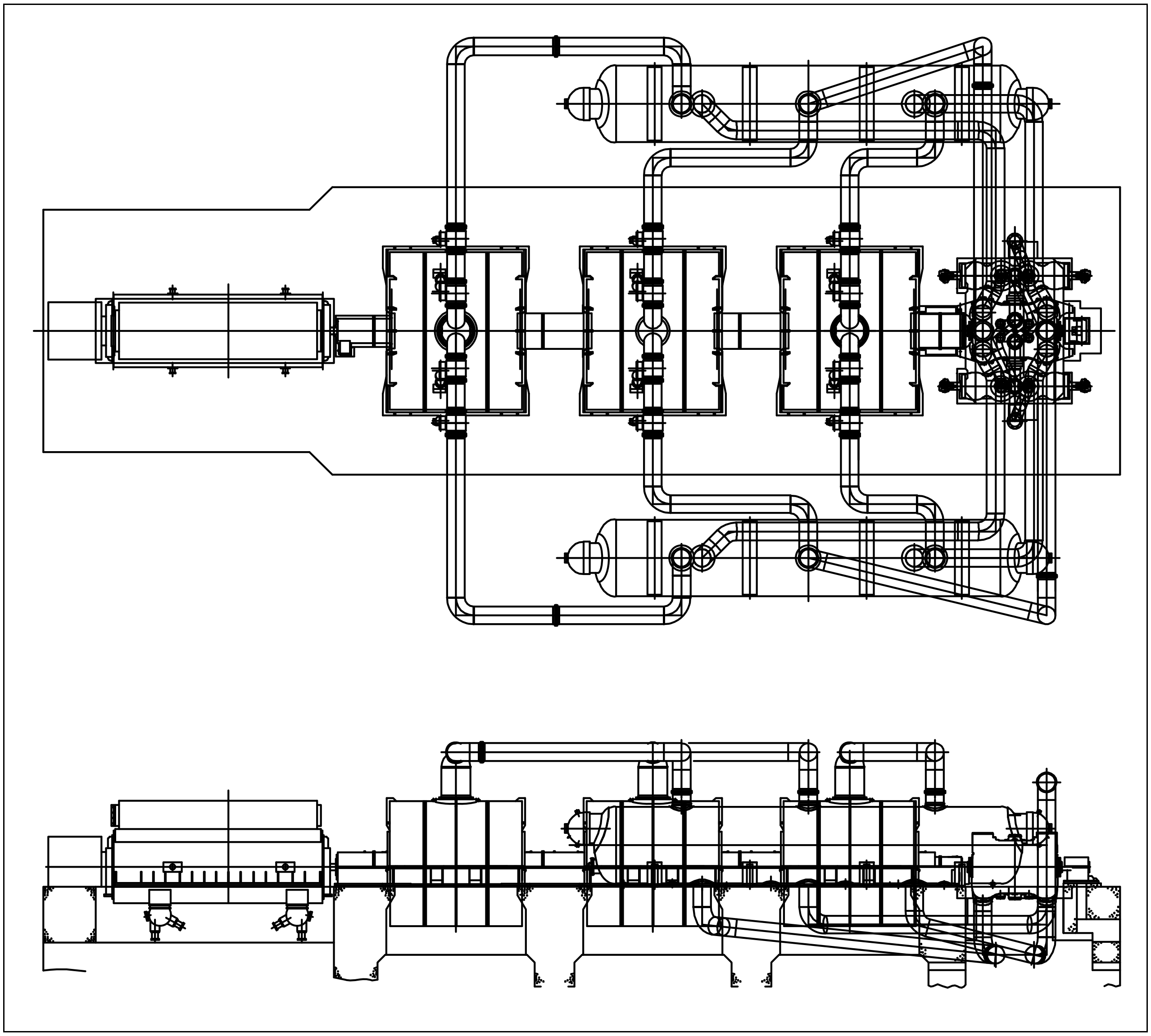
Replace Reference 10.2-9 of DCD Subsection 10.2.6 with the following.

10.2-9R Probability of Missile Generation from Low Pressure Turbines for Model L54, MUAP-10005-P, Rev. 1 (Proprietary) and MUAP-10005-NP, Rev. 1 (Non-Proprietary), Mitsubishi Heavy Industries, Ltd., Tokyo, Japan, July 2011.

Table 10.2-1R Turbine-Generator and Auxiliaries Design Parameters

	Manufacturer Mitsubishi Heavy Industries, Ltd.	
	Turbine	
	Type	Tandem compound six exhaust flow
	Number of elements	4 (one HPT and three LPTs)
NAPS DEP 10.2(1)	Last-stage blade length (in.)	~~74~~ 54
	Operating speed (rpm)	1,800
	Design condensing pressure (in. HgA)	1.5
	Generator	
NAPS DEP 10.2(1)	Expected generator output at 100% NSSS output (kW)	~~1,700,000~~ 1,629,000
	Power factor	0.9
	Generator rating (kVA)	1,900,000
	Hydrogen pressure (psig)	75
	Moisture separator/reheater	
	Moisture separator	Chevron vanes
	Reheater	U-tube
	Number	2 shell
	Stages of reheating	2
	Feedwater heating system	
	Number of stages	7 (2 HP heaters, Deaerator and 4 LP heaters)

NAPS DEP 10.2(1) **Figure 10.2-1R Turbine-Generator Outline Drawing**



10.3 Main Steam Supply System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

10.3.2.4.3 Water (Steam) Hammer Prevention

STD COL 10.3(3)

Replace the first sentence of third paragraph in DCD Subsection 10.3.2.4.3 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

10.3.5.5 Action Levels for Abnormal Conditions

NAPS SUP 10.3(1)

Replace the second paragraph in DCD Subsection 10.3.5.5 with the following.

Secondary side water chemistry control program is based on the latest version of the EPRI PWR Secondary Water Chemistry Guidelines in effect at the time of the COLA submittal.

10.3.6.3 Flow-Accelerated Corrosion (FAC)

STD COL 10.3(1)

Replace the last paragraph in DCD Subsection 10.3.6.3 with the following.

10.3.6.3.1 Flow-Accelerated Corrosion (FAC) Monitoring Program

Erosion-corrosion in piping systems is a flow-induced material degradation process. It can affect metallic materials whose corrosion resistance is based on the formation of oxide (protective) surface film. Wear-off destruction of the oxide film by turbulent flow water or steam causes corrosion of the unprotected metal.

The FAC monitoring program analyzes, inspects, monitors, and trends FAC degradation of carbon steel piping and piping components in high-energy systems that carry water or wet steam and are susceptible to erosion-corrosion damage. In addition, the FAC monitoring program addresses the concerns of Generic Letter 89-08 and consistent with the guidelines of NSAC-202L-R2. The FAC monitoring program will be established prior to fuel load.

The thrust of the FAC monitoring program is to:

- Conduct appropriate analysis and perform preservice inspection.
- Determine the extent of pipe wall thinning, if any, and repair/replace components as necessary.
- Perform follow-up inspections to confirm or quantify pipe wall thinning and take long-term corrective actions (such as adjust water chemistry, operating parameters or others).

10.3.6.3.1.1 **Analysis**

An industry-sponsored program is used to predict the wear rate for piping and components in high-energy carbon steel piping systems which are susceptible to FAC. Each susceptible component is tracked in a database and is inspected in the order of susceptibility. For each piping component, the analytical method predicts the FAC wear rate, trends the estimated inspection interval, repairs, and/or replacement. Carbon steel piping American Society of Mechanical Engineers (ASME) III and B31.1 and pipe components that are used in single-phase and two-phase high-energy flow systems are the most susceptible to FAC damage and receive the most critical analysis.

10.3.6.3.1.2 **Inspections**

Inspections that involve wall thickness measurements are used to identify wall thickness margins for thinning and to evaluate the FAC trending data, and provide the refinement of the predictions. Components are inspected for wear using ultrasonic examination method with grid location, radiographic examination method, or visual observation. Preservice wall thickness measurement or baseline data are collected prior to individual system turnover to operation. The first inspection after preservice inspection is used as a baseline trend for future inspections. Each subsequent inspection determines the FAC wear rate for the piping and piping components and the need for inspection frequency adjustment for those components.

10.3.6.3.1.3 **Training**

The FAC monitoring program is administered by trained and experienced personnel. Task-specific training is provided for plant personnel that implement the monitoring program. The specific nondestructive examination (NDE) is carried out by qualified personnel. Inspection data

are analyzed by engineers and/or other experienced personnel to determine the overall effect on the piping and piping components.

10.3.6.3.1.4 Procedures

a. **Specific Plant Procedure**

The FAC monitoring program is governed by a procedure. This procedure contains the following elements:

- Requirement to monitor and control FAC
- Identification of the tasks to be performed (including implementing procedures) and associated responsibilities
- Identification of a managerial position that has overall responsibility for the FAC monitoring program at each plant
- Communication requirements between the manager and other departments that have responsibility for performing support tasks
- Quality assurance (QA) requirements
- Identification of long-term goals and strategies for reducing high FAC wear rates
- A method for evaluating plant performance against long-term goals

b. **Implementing Procedures**

The FAC implementing procedures provide guidelines for controlling the major tasks. The plant procedures for major tasks are as follows:

- Identifying susceptible systems, including piping and pipe components
- Performing FAC analysis
- Performing preservice inspections to verify wall thickness margin for thinning
- Selecting and scheduling components for initial inspection
- Performing inspections after plant operation cycles
- Evaluating degraded and/or thinning components
- Repairing, replacing and/or remodeling components, when necessary
- Selecting and scheduling locations for the next inspections
- Collection and storage of inspections records

- Expanding the inspection locations as necessary

10.3.6.3.1.5 **Industry Experience**

Industry experience provides valuable supplement to the plant analysis and management program. The FAC monitoring program is updated from time to time to include industry experience by identifying susceptible components or piping features.

10.3.6.3.1.6 **Long-Term Strategy**

The long-term strategy is to improve the inspection program and to reduce susceptibility of piping components to FAC. An effective long-term monitoring program description is included in the FAC Monitoring Program.

10.3.6.3.1.7 **Plant Chemistry**

The responsibility for system chemistry is under the purview of the plant chemistry section. The plant chemistry section specifies chemical addition in accordance with plant procedures.

10.3.7 Combined License Information

Replace the content of the DCD Subsection 10.3.7 with the following.

STD COL 10.3(1) *10.3(1)* ***FAC monitoring program***

This COL item is addressed in Subsection 10.3.6.3

10.3(2) ***Deleted from the DCD.***

STD COL 10.3(3) *10.3(3)* ***Operating and maintenance procedures for water (steam) hammer prevention***

This COL item is addressed in Subsection 10.3.2.4.3.

10.4 Other Features of Steam and Power Conversion System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

10.4.1.2 System Description

NAPS DEP 10.4(1)

Replace the first sentence of the second paragraph of DCD Subsection 10.4.1.2 with the following.

The main condenser is a three-shell, single-pass, multi-pressure, rigidly supported unit with divided water boxes.

Replace the third paragraph of DCD Subsection 10.4.1.2 with the following.

The condenser shells operate at different pressures and temperatures because circulating water passes through each shell in order. The hotwell of each condenser is connected by the hotwell connection piping. Condensate is drawn from the hotwell of the highest pressure condenser, and then flows through a single header to the suction of the condensate pumps.

10.4.1.3 Safety Evaluation

NAPS DEP 10.4(1)

Replace the eighth sentence of the second paragraph of DCD Subsection 10.4.1.3 with the following.

10.4.1.4 During normal plant operation, noncondensable gases are removed from the main condenser by the operation of three vacuum pumps. If one pump trips, the condition is alarmed in the MCR, and the standby pump is started. Therefore, the potential for hydrogen buildup within the condenser shells does not exist due to pump failure.

10.4.2.2.1 General Description

NAPS DEP 10.4(1)

Replace the first sentence of the second paragraph in DCD Subsection 10.4.2.2.1 with the following.

The Main Condenser Evacuation System (MCES) consists of four vacuum pumps, with three normally operating pumps and one standby pump. Each condenser shell is connected to a normally operating pump

and also connected to the stand-by pump via the branch line from each normal suction line.

10.4.2.2.2 Component Description

NAPS DEP 10.4(1)

Replace the first sentence of the first paragraph of DCD Subsection 10.4.2.2.2 with the following.

The MCES consists of four vacuum pumps.

10.4.2.2.3 System Operation

NAPS DEP 10.4(1)

Add the following sentence to the end of the first paragraph of DCD Subsection 10.4.2.2.3.

The fourth pump is in standby.

Replace the first sentence of the second paragraph of DCD Subsection 10.4.2.2.3 with the following.

During normal plant operation, noncondensable gases are removed from the main condenser by the operation of three vacuum pumps.

10.4.5.2.1 General Description

NAPS COL 10.4(1)
NAPS CDI

Replace the first paragraph in DCD Section 10.4.5.2.1 with the following.

Figure 10.4.5-1R depicts the CWS flow diagram. The CWS draws water from the CWS cooling tower (CTW) forebay, and returns water to the CWS CTWs after passing through the main condenser. A parallel circuit supplies CWS water to the non-essential service water (non-ESW) system for cooling of the turbine building CCWS heat exchangers. The CWS is comprised of four 25 percent capacity pumps arranged in parallel, two main circulating water lines, an array of dry, mechanical draft cooling tower cells arranged in banks, and one combination (hybrid) wet/dry, mechanical draft cooling tower. Table 10.4.5-1R includes the temperature range of the water delivered by the CWS pumps to the main condenser.

Figure 10.4.5-1R provides the CWS flow diagram and Figure 10.4.5-201 provides the Cooling Tower Makeup and Blowdown System flow diagram. The CWS and cooling tower design and selection are subject to the operating conditions as indicated in Table 10.4.5-1R.

Replace the sixth through eighth paragraphs in DCD Section 10.4.5.2.1 with the following.

The CWS water is normally circulated by four M/D pumps through the condenser and back to the cooling towers. The four CWS pumps are arranged in parallel. Discharge lines combine into two parallel main circulating water supply lines to the main condenser. Each main circulating water supply line connects to a low pressure condenser inlet water box.

Depending on ambient conditions, system configuration, and heat load, one CWS pump may be taken out of operation with the flow of the remaining three CWS pumps providing sufficient water for condenser heat removal. Design parameters for the major components are described in Table 10.4.5-1R.

The CWS and condenser are designed to permit isolation of half of the three series connected tube bundles to permit repair of leaks and cleaning of water boxes while operating at reduced power.

Replace the first and second sentences of the last paragraph in DCD Section 10.4.5.2.1 with the following.

Makeup water is provided from Lake Anna by makeup water pumps to the CTW basin to compensate for the CTW evaporation, drift, and blowdown. The makeup water pumps also supply makeup water to the Ultimate Heat Sink (UHS) cooling tower basins during normal operation. Blowdown is discharged to the Waste Heat Treatment Facility. The Cooling Tower Makeup and Blowdown System is shown in Figure 10.4.5-201. Circulating water chemistry is maintained by the chemical injection system in conjunction with blowdown.

10.4.5.2.2 Component Description

NAPS COL 10.4(1)
NAPS CDI

Replace the first paragraph and seven bullets of DCD Section 10.4.5.2.2 with the following.

The CWS consists of the following major components:

- Four 25 percent capacity pumps and pump discharge valves
- Condenser water boxes, piping, and valves
- Condenser tube cleaning equipment

- A removable assembly of coarse and fine screens that separate the pump forebay (suction) from the hybrid cooling tower basin
- An array of dry, mechanical draft cooling tower cells arranged in banks
- One combination (hybrid) wet/dry, mechanical draft cooling tower
- Cooling Tower Makeup and Blowdown System
- Chemical injection system

10.4.5.2.2.1 Circulating Water Pumps

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.2.2.1 with the following.

There are four 25 percent capacity circulating water pumps that take suction from the pump forebay and circulate the water through the main condenser.

10.4.5.2.2.2 Cooling Towers

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.2.2.2 with the following.

The CTW flow diagrams are shown in Figures 10.4.5-202 and 10.4.5-203. The cooling tower arrangement includes a dry cooling tower array and a round, wet/dry (hybrid) cooling tower that may operate independently or in series. The towers may be bypassed or partially or fully utilized as required, depending on desired operating configuration, heat load, and ambient conditions.

The dry tower array is arranged in rectangular banks of multiple cells. Each cell includes air cooled heat exchange surfaces, a M/D mechanical draft fan, and inlet and outlet isolation valves. The round, hybrid cooling tower includes a dry upper section and a wet lower section. Both the wet and dry sections of the hybrid tower include mechanical draft fans to provide air flow. The combination of dry and hybrid cooling tower arrangements supports a condenser maximum cold water temperature of 100°F.

Both the dry and hybrid cooling towers are located at least a distance equal to their height away from any seismic Category I or II structures, or safety related components. Thus, if there were any structural failure of the cooling towers, no seismic Category I or II structures or any safety-related systems or components would be affected or damaged. Both the dry and hybrid cooling towers have multiple fans with associated motors, couplings, and gearboxes. The fans rotate at slow speeds and

the fan blades are made of low-density material. A failure of a fan could result in the generation of missiles. However, due to the site arrangement and construction of the respective towers, any damage would be confined to the cooling towers. Therefore, there would be no damage to any seismic Category I or II structures or any safety-related systems or components.

10.4.5.2.2.4 Cooling Tower Makeup Water Pumps

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.2.2.4 with the following.

Three 50 percent capacity CTW makeup water pumps provide makeup water. The makeup water pumps supply makeup water to the wet/dry (hybrid) cooling tower basin. The makeup water pumps are vertical, driven by electric motors and are located in the Station Water Intake/Fire Pump House.

10.4.5.2.2.5 Blowdown Pumps

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.2.2.5 with the following.

Three 50 percent capacity CTW blowdown pumps are located in the cooling tower basin pump structure and take suction from the CTW basin. The blowdown flow is discharged to the Waste Heat Treatment Facility.

10.4.5.2.2.6 Piping and Valves

NAPS COL 10.4(1)

Replace the first and second sentences of the second paragraph in DCD Section 10.4.5.2.2.6 with the following.

An interconnecting line is provided between the two main circulating water supply lines. The interconnecting line is located near the discharge of the circulating water pumps and is used for flow balancing. A motor operated isolation valve is provided on the flow balancing line. This valve allows operation of the CWS with one main circulating water supply line out of service. The discharge of each pump is fitted with a remotely operated valve. This arrangement permits isolation and maintenance of any one pump while the others remain in operation and minimizes reverse flow through an out-of-service pump. MOVs are also provided in each of the circulating water lines at the inlet and outlet of the condenser to permit isolation of portions of the condenser.

10.4.5.2.2.8 Chemical Injection

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.2.2.8 with the following.

Circulating water chemistry is maintained by the chemical injection system. Chemical feed equipment injects the required chemicals into the circulating water at the pump forebay before water enters the circulating water pumps. Chemical injection maintains a non-corrosive, non-scale-forming condition and limits the biological film formation that reduces the heat transfer rate in the condenser and cooling towers.

Plant chemistry specifies the required chemicals used within the system. The chemicals can be divided into five categories based upon function: biocide, algaecide, pH adjuster, corrosion inhibitor, and scale inhibitor. The pH adjuster, corrosion inhibitor, and scale inhibitor are metered into the system continuously or as required to maintain proper concentrations. Biocide application frequency may vary with seasons. Algaecide is applied, as necessary, to control algae formation in the cooling towers. Chemicals that are injected in the CWS include sodium hypochlorite, acid, bromide, dispersants, and non-oxidizing biocides.

Circulating water chemistry is also controlled as required with blowdown. Chemicals selected are compatible with selected materials or components used in the CWS.

10.4.5.3.2 Normal Operation

NAPS COL 10.4(1)
NAPS COL 10.4(6)
NAPS CDI

Replace the content of DCD Section 10.4.5.3.2 with the following.

The four circulating water pumps take suction from the pump forebay and circulate the water through the main condenser. Circulating water returns through the condenser discharge to the cooling towers. The operating configuration of the cooling towers and CWS is modified depending on desired configuration, heat load, and ambient conditions. Circulating water discharged from the condenser first passes through the dry cooling tower arrays where sensible heat is removed. The water then passes through the dry section of the hybrid tower, where additional sensible heat is removed prior to entering the wet section of the hybrid tower. In the wet section, the water is distributed through nozzles in the hybrid cooling tower’s distribution headers. The water then falls through film-type fill material to the basin beneath the tower. In the process, the

water rejects additional heat to the atmosphere through direct contact with the air and evaporation of a small amount of water.

Provisions are made to vary the operation of the CWS and cooling towers during specific ambient conditions such as hot and cold weather, and in response to specific environmental conditions such as periods of low water level in Lake Anna. Various configurations are utilized where select mechanical draft fans are started, operated at reduced speed, or stopped, and select portions of the cooling tower system is bypassed. These alternate and transitional configurations are utilized to provide benefits such as freeze protection, water conservation, energy conservation, plume minimization, and isolation of portions of the CWS and other systems for maintenance. Selected components may be taken out of service during power operation. These alternate configurations normally change plant thermal performance. In some configurations, reactor power reduction may be required to avoid a turbine trip on decreasing condenser vacuum.

The CWS system incorporates 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 MOVs, air release valves to fill and keep the system full, vacuum release valves that minimize pressure transients, 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. The CWS includes water box vents to help fill the condenser water boxes during startup and remove accumulated air and other gases from the water boxes during normal operation.

Leakage of condensate from the main condenser into the CWS via a condenser tube leak is not likely during power operation, since the CWS normally operates at a greater pressure than the shell (condensate) side of the condenser.

10.4.5.3.4.1 Circulating Water Piping/Expansion Joint Failures

NAPS COL 10.4(1) Add the following after the last paragraph of DCD Section 10.4.5.3.4.1.

Failure of a pipe or component in the CWS hybrid cooling tower or elsewhere in CWS in the yard would not have an adverse impact on the intended design functions of safety-related SSCs.

For the hybrid cooling tower, the largest components are the two vertical large-bore CWS pipes that connect to the hybrid cooling tower's distribution headers. It is conservatively assumed that these large CWS underground pipes surface outside the confines of the hybrid cooling tower basin.

A postulated rupture of one of these pipes would result in water flow in the area of the yard with the cooling towers. The yard in this area slopes to the west (based on true north). Water discharged from such a break would flow down to the drainage ditch along the west side of the cooling tower area and drain away from Unit 3 toward Lake Anna.

Depending on the size and orientation of the break, some discharging water may flow eastward toward a drainage ditch along the east side of the cooling tower area or toward the access road leading to Unit 3. Water reaching the access road would flow into the ditches along the plant access road. The flow-rate in the ditches past the power block area would be less than that considered for the local PMP event. Therefore, safety-related SSCs would not be subjected to flooding as a result of a failure of the largest hybrid cooling tower component.

The failure of this vertical large-bore CWS pipe bounds other failures of piping and components in the CWS. The remainder of the system is either underground or has a smaller diameter. Failures of these underground/smaller diameter components would have lower flow-rates than a postulated failure of a vertical, above-ground, large-bore CWS pipe. Also, flow from such failures would be either in the cooling tower area or toward the plant access road ditches and to either the storm water basin or the make-up water intake area.

Failure of the CWS hybrid cooling tower basin has also been considered. Because the basin is an in-ground structure, the maximum water level elevation in the hybrid cooling tower basin is lower than the elevations of the surrounding areas. This design and the selected location ensure that failure of the basin results in no water discharge to the surface. However, should any discharge occur, the water would flow toward Lake Anna rather than toward the plant.

10.4.5.6 Instrumentation Applications

NAPS COL 10.4(1)
NAPS CDI

Replace the content of DCD Section 10.4.5.6 with the following.

Temperature monitors are provided upstream and downstream of each condenser shell section. The temperature in each condenser cooling water supply line is indicated in the MCR.

Indication is provided in the MCR to identify open and closed positions of remotely operated valves in the CWS piping.

Major CWS valves, which control the flow path, are operated by local controls or by remote controls located at the MCR. The pump discharge isolation valves are interlocked with the circulating water pumps so that when a pump is started, its discharge valve is opening while the pump is coming up to speed, thus assuring that there is water flow through the pump. When a pump is stopped or trips, the discharge valve closes automatically to prevent or minimize backward rotation of the pump and motor. The circulating water pumps are provided with an anti-reverse rotational device.

Monitoring of the performance of the CWS is accomplished by differential pressure transducers located on each condenser waterbox with indication provided in the MCR. Temperature signals from the supply and discharge sides of the condenser are transmitted to the MCR for recording, display, and condenser performance calculations.

Level instrumentation provided in the circulating water pump forebay controls makeup flow from the makeup water pumps to the cooling tower basin. Level instrumentation in the pump forebay initiates alarms in the MCR on abnormally low or high water level. Pressure indication is provided on the circulating water pump discharge. Differential pressure instrumentation is provided across the inlet and outlet to the condenser and is used to determine the frequency of operating the condenser tube cleaning system. Local grab samples are used to periodically test the circulating water quality.

10.4.7.7 Water Hammer Prevention

STD COL 10.4(6)

Replace the first sentence of 6th paragraph in DCD Subsection 10.4.7.7 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

10.4.8.1.2 Non-safety Power Generation Design Bases

NAPS COL 10.4(2)
NAPS CDI

Add the following text before the first paragraph in DCD Subsection 10.4.8.1.2.

Throughout this subsection 10.4.8, “waste water system (WWS)” described in DCD 10.4.8 is replaced with “blowdown sump”.Add the following text after the last bullet in DCD Subsection 10.4.8.1.2.

- Discharge secondary side water (after cooling) to the blowdown sump or LWMS during plant start up and abnormal chemistry conditions.
- Monitor the concentration of radioactive material in the cooled blowdown water with startup SG blowdown heat exchanger downstream radiation monitor located downstream of startup SG blowdown heat exchanger.

10.4.8.2.1 General Description

STD COL 10.4(2)

Replace the first and second paragraph in DCD Subsection 10.4.8.2.1 with the following.

The steam generator blowdown system (SGBDS) flow diagrams are shown in Figures 10.4.8-1R, 10.4.8-2R, and 10.4.8-201. Classification of equipment and components in the SGBDS is provided in Subsection 3.2.

The SGBDS equipment and piping are located in the containment, the reactor building, the auxiliary building, the turbine building (T/B), and outdoors.

Add the following text after the third paragraph in DCD Subsection 10.4.8.2.1.

The SGBDS also includes startup SG blowdown flash tank, startup blowdown heat exchanger, piping, valves and instrumentation used during plant startup and abnormal water chemistry conditions.

NAPS COL 10.4(2)
NAPS CDI

Replace the thirteenth and fourteenth paragraph in DCD Subsection 10.4.8.2.1 with the following.

During plant startup, the blowdown rate is up to approximately 3% of maximum steaming rate (MSR) at rated power. The blowdown from each SG flows to the startup SG blowdown flash tank. The blowdown lines from SGs A and B and the blowdown lines from SGs C and D are joined together before flowing to the startup SG blowdown flash tank.

The blowdown water from each SG is depressurized by a throttle valve located downstream of the isolation valves located in the startup blowdown line. The throttle valves can be manually adjusted to control the blowdown rate.

The depressurized blowdown water flows to the startup SG blowdown flash tank, where water and flashing vapor are separated. The vapor is diverted to the condenser and the water flows to the startup SG blowdown heat exchanger for cooling. The CWS cools blowdown water in this heat exchanger before discharging to the blowdown sump. After further cooling in this sump the blowdown water is discharged to WHTF. A radiation monitor located downstream of the startup SG blowdown heat exchanger measures radioactive level in the blowdown water. When an abnormally high radiation level is detected, the blowdown lines are isolated and the blowdown water included in the SGBDS is transferred to waste holdup tank in the LWMS. The location and other technical details of the monitor (RMS-RE-037) are described in Subsection 11.5.2.5.3 and Table 11.5-201.

The discharge line to the blowdown sump consists of the following segments and design features:

1. The piping after the startup SG blowdown heat exchanger is constructed of stainless steel up to and including the connector after the isolation valve following the radiation monitor.

2. The discharge piping that continues the discharge line from the connector is a double-walled high density polyethylene (HDPE) pipe. The HDPE piping is fusewelded in order to prevent leakage and minimize crud traps. Within the doublewalled pipe, the blowdown water flows through the inner pipe while the outer pipe serves as containment in the event of leakage. Once the pipe exits the startup SG blowdown facility, the HDPE pipe is buried and routed underground to the blowdown sump.

3. Manholes constructed of HDPE are located at specified pipe lengths along the buried pathway to facilitate the containment of leakage by means of a collection basin. This design approach minimizes unintended releases and provides accessibility to facilitate periodic testing and visual inspection to maintain pipe integrity.

4. From the blowdown sump, the blowdown water, mixed with the liquid waste effluent and the blowdown flows from the CWS and UHS cooling towers, is routed through additional piping leading to the WHTF for discharge.

The manholes provided along the buried discharge piping are watertight to prevent the intrusion of precipitation or groundwater. The double-walled HDPE piping is sloped in the direction of flow so that leakage can be collected at the next downstream manhole. The manholes each contain a collection basin equipped with level detection instrumentation in order to provide early leak detection. When liquid in the manhole collection basin reaches a predetermined setpoint, the leak detection instrumentation sends a signal to the MCR to alarm for operator action. This approach also facilitates the determination of the leaking segment of pipe. Analysis of samples of the liquid collected in the manholes can also determine if the liquid is rainwater, groundwater or leakage from the discharge piping. These design features comply with the guidance of RG 4.21 as described in Subsection 12.3.1.3.1.1.

In addition, the startup SG blowdown facility has an epoxy-coated concrete floor which is sloped to facilitate drainage to a sump for leakage collection. The sump is equipped with level detection instrumentation which alarms to the MCR for operator action. These design features of the startup SG blowdown facility comply with RG 4.21.

With abnormal water chemistry, the flow of blowdown up to approximately 3% of MSR at rated power is directed to the blowdown sump via the

startup SG blowdown flash tank for processing. In this mode, flashed vapor from the startup SG blowdown flash tank flows to the deaerator.

During normal operation, blowdown rate is approximately 0.5 to 1% of MSR at rated power. At the 1% of MSR at rated power blowdown rate, both cooling trains are used.

STD COL 10.4(2)

Add the following text after last bullet of the seventeenth paragraph in DCD Subsection 10.4.8.2.1.

- High radiation signal from startup SG blowdown water radiation monitor
- High water level in the startup SG blowdown flash tank
- High pressure in the startup SG blowdown flash tank

10.4.8.2.2.4 Steam Generator Drain

NAPS COL 10.4(5)
NAPS CDI

Replace the DCD Subsection 10.4.8.2.2.4 with the following.

Pressurized nitrogen is used to send secondary side water in the steam generators under pressure to the blowdown sump or the condenser. An approximate 20 psig pressure is maintained. This pressure facilitates draining steam generators without using a pump. If the SG drain temperature exceeds the operating temperature limit of the blowdown sump prior to discharging to this sump, the SG drain is cooled in the startup SG blowdown heat exchanger.

10.4.8.2.3 Component Description

STD COL 10.4(2)

Replace the first sentence of first paragraph in DCD Subsection 10.4.8.2.3 with the following.

Component design parameters are provided in Table 10.4.8-1R.

NAPS COL 10.4(2)

Add the following text after the last paragraph in DCD Subsection 10.4.8.2.3.

(9) **Startup SG blowdown flash tank**

The startup SG blowdown flash tank is located outdoors. During plant startup operation and abnormal secondary water chemistry conditions, up to 3% MSR at rated power conditions, blowdown fluid is separated

into flashing vapor and saturated liquid in this tank by lowering the pressure and temperature in the tank.

(10) **Startup SG blowdown heat exchanger**

The startup SG blowdown heat exchanger is located outdoors. One 100% capacity heat exchanger for the SG blowdown water flow rate and temperature conditions at 3% of MSR at rated power is provided. The SG blowdown water from the startup SG blowdown flash tank or SG drain is cooled in this heat exchanger by the CWS not to exceed permissible temperature of blowdown sump.

10.4.8.5 Instrumentation Applications

STD COL 10.4(2)

Add the following after the last paragraph in DCD Subsection 10.4.8.5.

High pressure and high water level in the startup SG blowdown flash tank closes the upstream flow control valve.

The startup SG blowdown heat exchanger downstream radiation monitor, located in the piping downstream of the startup SG blowdown heat exchanger, detects the presence of radioactivity in the SGBDS. Upon detection of the significant levels of radioactivity, the blowdown water is diverted to the LWMS.

A high radiation signal of the startup SG blowdown heat exchanger downstream radiation monitor closes the SGBDS isolation valves.

10.4.9.2.2 System Operation

STD COL 10.4(6)

Replace the first sentence of last paragraph in DCD Subsection 10.4.9.2.2 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

10.4.11.1.2 Power Generation Design Basis

NAPS DEP 9.2(1)

Replace the third bullet in DCD Subsection 10.4.11.1.2 with the following.

- The auxiliary steam drain monitors the leakage of the radioactive materials from the degasifier to the condensed water of the auxiliary steam supply system (ASSS).

10.4.11.2.1 General Description

NAPS DEP 9.2(1)

Replace the first paragraph of DCD Subsection 10.4.11.2.1 with the following.

The ASSS P&ID is shown in Figure 10.4.11-1R.

Replace the first bullet of the fourth paragraph of DCD Subsection 10.4.11.2.1 with the following.

- Degasifier

Replace the first sentence of the seventh paragraph of DCD Subsection 10.4.11.2.1 with the following.

Monitoring the leakage from the primary side of the degasifier, the radiation monitor is attached to the downstream of the auxiliary steam drain pump.

10.4.11.2.3 System Operation

NAPS DEP 9.2(1)

Replace the first sentence of the third paragraph and the preceding heading of DCD Subsection 10.4.11.2.3 with the following.

Leakage of radioactive materials from primary side in the degasifier

If there is leakage of radioactive materials from the primary side in the degasifier, the auxiliary steam drain tank pump discharge isolation valve is closed and the auxiliary steam drain pumps are tripped by the auxiliary steam drain monitor high alarm.

10.4.11.5 Instrumentation Applications

NAPS DEP 9.2(1)

Replace the first sentence of the third paragraph in DCD Subsection 10.4.11.5 with the following.

The radiation monitor is provided to monitor the leakage of radioactive materials in the condensed water from the degasifier.

10.4.12 Combined License Information

Replace the content of the DCD Subsection 10.4.12 with the following.

NAPS COL 10.4(1)

10.4(1) ***Circulating Water System***

This COL item is addressed in Subsection 10.4.5, Table 10.4.5-1R, Figure 10.4.5-1R, Figure 10.4.5-201, Figure 10.4.5-202, and Figure 10.4.5-203.

STD COL 10.4(2)
NAPS COL 10.4(2)

10.4(2) ***Steam Generator Blowdown System***

This COL item is addressed in Subsection 10.4.8.1, 10.4.8.2, 10.4.8.5, Table 10.4.8-1R, Figure 10.4.8-1R, Figure 10.4.8-2R and Figure 10.4.8-201.

10.4(3) ***Deleted from the DCD.***

10.4(4) ***Deleted from the DCD.***

NAPS COL 10.4(5)

10.4(5) ***System design for Steam Generator Drain***

This COL item is addressed in Subsection 10.4.8.2.2.4.

STD COL 10.4(6)
NAPS COL 10.4(6)

10.4(6) ***Operating and maintenance procedures for water hammer prevention***

This COL item is addressed in Subsections 10.4.5.3.2, 10.4.7.7, and 10.4.9.2.2.

Table 10.4.1-1R Main Condenser Design Data

NAPS DEP 10.4(1)	Condenser type		Horizontal, Radial Flow, ~~Single~~ Multi Pressure, Single Pass, Surface Cooling Type
	Number of Shell		3
NAPS DEP 10.4(1)	Design operating pressure		~~2.6~~ 4.2 in.-HgA
NAPS DEP 10.4(1)	Heat transfer		~~9.90×10^9~~ 1.017×10^{10} Btu/hr See Note 1
NAPS DEP 10.4(1)	Circulating water flow		~~1.28~~ 0.65 x 10^6 gpm
NAPS DEP 10.4(1)	Circulating water inlet temperature		~~88.5~~ 100°F
NAPS DEP 10.4(1)	Circulating water outlet temperature		~~104~~ 131.2°F
NAPS DEP 10.4(1)	Circulating water temperature rise		~~15.5~~ 31.2°F
	Hotwell storage capacity		5 min. (holdup time)
NAPS DEP 10.4(1)	Tube size		~~1~~ 1 1/8 in. O.D. 23 BWG
	Shell pressure (design)		0 in.-HgA to 15 psig
	Material	Shell	Carbon Steel
		Tube	Titanium
		Tube Sheet	Titanium Clad
		Water Box	Carbon Steel with rubber lining

NAPS DEP 10.4(1) Note 1: Main condenser heat transfer design value includes design margin beyond the expected maximum heat rejection rate of 1.01×10^{10} Btu/hr.

Table 10.4.2-1R Main Condenser Evacuation System Design Data

Condenser Vacuum Pump

NAPS DEP 10.4(1)		
	Number of pumps	~~3~~ 4
	Type	liquid ring type
	Capacity	24 Standard CFM at 1 in Hg A
	Driver	Electric motor

NAPS CDI

Table 10.4.5-1R Design Parameters for Major Components of Circulating Water System

Design Parameter	Value
Circulating Water Pumps	
NAPS COL 10.4(1) Number of Pumps	4–25%
Pump Type	Vertical, wet pit, turbine
Unit Flow Capacity**, gpm	Approx. 169,600
Driver Type	Electric motor
Normal Power Heat Sink	
Normal Heat Removal Duty @ 100°F CWS Supply Temperature, BTU/hr	1.02×10^{10}
Dry Cooling Tower Array	
Array Length*, ft	760
Array Width*, ft	400
Wet/Dry (Hybrid) Cooling Tower	
Outside Base Diameter*, ft	442
Height*, ft	180
Operating Temperatures	
Temperature range of water delivered to the main condenser, °F	***32 to 100
CWS temperature for rated turbine performance, °F	83
System design pressure/temperature, psig/°F	125 / 140
Cooling Tower Makeup Water Pumps	
Number of Pumps	3 – 50%
Unit Flow Capacity**, gpm	11,134
Driver Type	Electric motor
Blowdown Pumps	
Number of Pumps	3–50%
Unit Flow Capacity**, gpm	2,755
Driver Type	Electric motor

* Cooling tower dimensions and specifications are approximate.

** This capacity includes the total flow for condenser cooling and for cooling of turbine components by the non-ESW system, at design supply temperature of 100°F

*** If the Normal Power Heat Sink does not maintain temperatures above the minimum temperature, then the minimum temperature is maintained by warm water recirculation and cooling tower bypass.

Table 10.4.7-2R Major Component Design Parameters (Sheet 1 of 2)

Condensate pump	
Number	3
Type	Vertical, multistage, centrifugal
Driver	Induction ac motor
Rated flow (gpm)	12,500
Rater head (ft)	1,000
Rated power (HP)	4,500
Feedwater booster pump	
Number	4
Type	Centrifugal, horizontal
Driver	Induction ac motor (Main feedwater pump common use)
Rated flow (gpm)	16,700
Rater head (ft)	2,820 (the sum total with main feedwater pump)
Rated power (HP)	14,700 (the sum total with main feedwater pump)
Main feedwater pump	
Number	4
Type	Centrifugal, horizontal
Driver	Induction ac motor
Variable speed unit	Hydro coupling unit
Rated flow (gpm)	16,700
Rater head ()ft	2,820 (the sum total with feedwater booster pump)
Rated power (HP)	14,700 (the sum total with feedwater booster pump)
Low-pressure feedwater heater No. 1	
Number	3
Type	Horizontal, single zone, shell and U-tube
Material, shell	Carbon steel
Material, tubes	Stainless steel
Heat duty (Btu/hr)	~~7.4×10^8~~ 7.3×10^8

NAPS DEP 10.2(1)

Table 10.4.7-2R Major Component Design Parameters (Sheet 1 of 2) *(continued)*

Low-pressure feedwater heater No. 2

Number	3
Type	Horizontal, two zone, shell and U-tube with drain cooler
Material, shell	Carbon steel
Material, tubes	Stainless steel

Table 10.4.7-2R Major Component Design Parameters (Sheet 2 of 2)

NAPS DEP 10.2(1)	Heat duty (Btu/hr)	~~4.4×10^8~~ 4.2×10^8
	Low-pressure feedwater heater No. 3	
	Number	3
	Type	Horizontal, two zone, shell and U-tube with drain cooler
	Material, shell	Carbon steel
	Material, tubes	Stainless steel
NAPS DEP 10.2(1)	Heat duty (Btu/hr)	~~4.4×10^8~~ 4.3×10^8
	Low-pressure feedwater heater No. 4	
	Number	3
	Type	Horizontal, two zone, shell and U-tube with drain cooler
	Material, shell	Carbon steel
	Material, tube	Stainless steel
NAPS DEP 10.2(1)	Heavy duty (Btu/hr)	~~3.7×10^8~~ 3.8×10^8
	Low-pressure feedwater heater No. 5 (Deaerator with a storage tank)	
	Number	1
	Type	Horizontal, spray and tray type
	Dissolved oxygen at exit (ppb)	5 or less
	Material, shell	Carbon steel
	High-pressure feedwater heater No. 6	
	Number	2
	Type	Horizontal, two zone, shell and U-tube with drain cooler
	Material, shell	Carbon steel
	Material, tubes	Stainless steel
NAPS DEP 10.2(1)	Heat duty (Btu/hr)	~~1.1×10^9~~ 1.0×10^9
	High-pressure feedwater heater No. 7	
	Number	2
	Type	Horizontal, two zone, shell and U-tube with drain cooler
	Material, shell	Carbon steel
	Material, tubes	Stainless steel
	Heat duty (Btu/hr)	1.1×10^9

NAPS COL 10.4(2)

Table 10.4.8-1R Steam Generator Blowdown System Major Component Design Parameters (Sheet 4 of 4)

Startup SG blowdown flash tank		
Type	Vertical cylindrical	
Number of tanks	1	
Capacity (ft^3)	1100	
Design flow rate (lb/hr)	606,000 (3% of MSR at rated power)	
Design pressure (psig)	300	
Design temperature (°F)	410	
Materials of construction	Stainless steel	
Startup SG blowdown heat exchanger		
Type	Shell and tube	
Number of exchangers	1	
Startup condition	Tube side	Shell side
Design heat duty (Btu/hr)	71.9×10^6	
Fluid	SG blowdown water	Circulating water
Operating temperature - In (°F)	307	100
- Out (°F)	140	170
Design flow rate (lb/hr)	431×10^3	103×10^4
Abnormal water chemistry conditions	Tube side	Shell side
Design heat duty (Btu/hr)	112×10^6	
Fluid	SG blowdown water	Circulating water
Operating temperature - In (°F)	378	100
- Out (°F)	140	150
Design flow rate (lb/hr)	471×10^3	224×10^4
Design pressure (psig)	300	125
Design temperature (°F)	410	200
Materials of construction	Stainless steel	Carbon steel]

NAPS DEP 10.4(1) **Figure 10.4.2-1R Main Condenser Evacuation System Piping and Instrumentation Diagram**

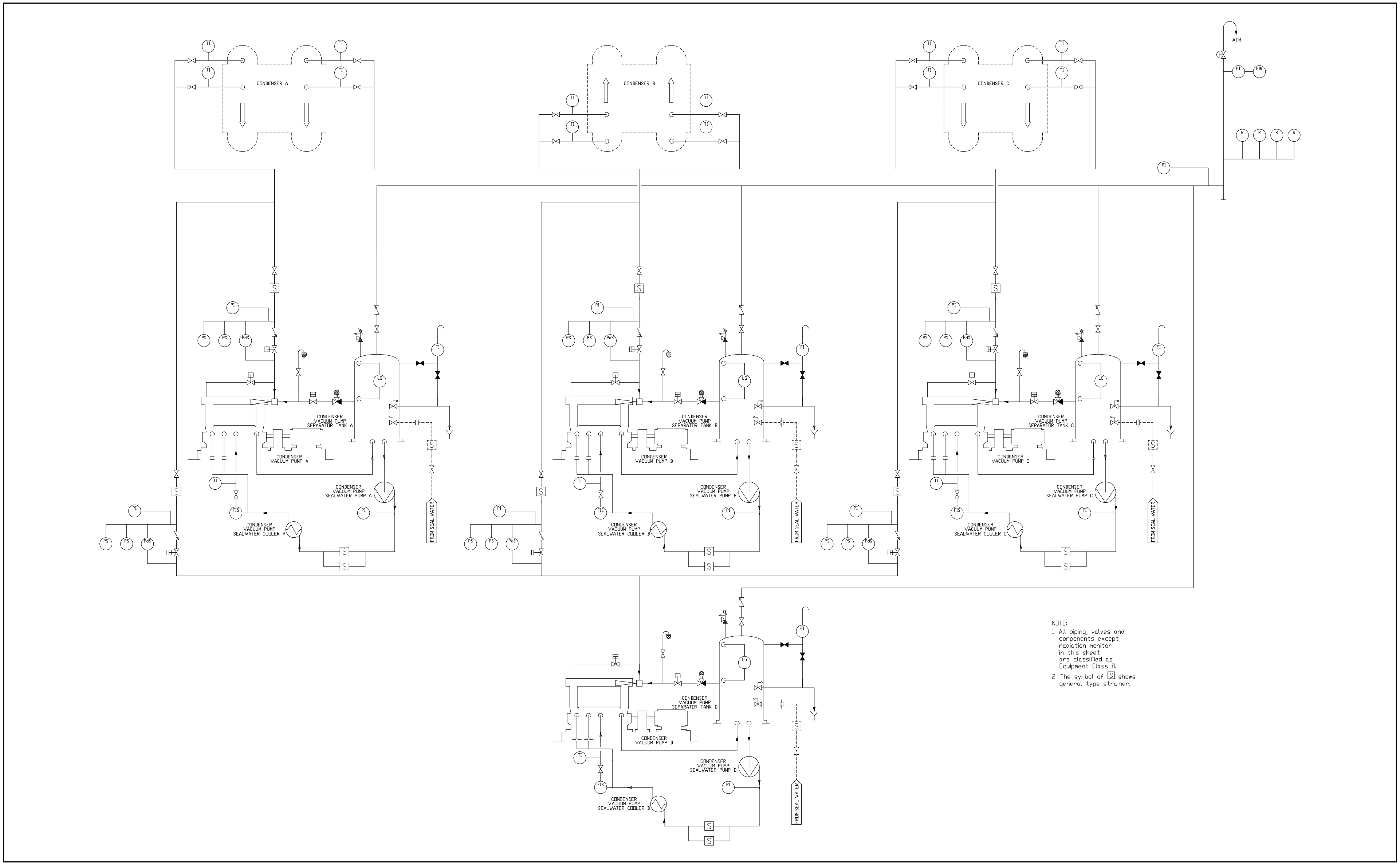
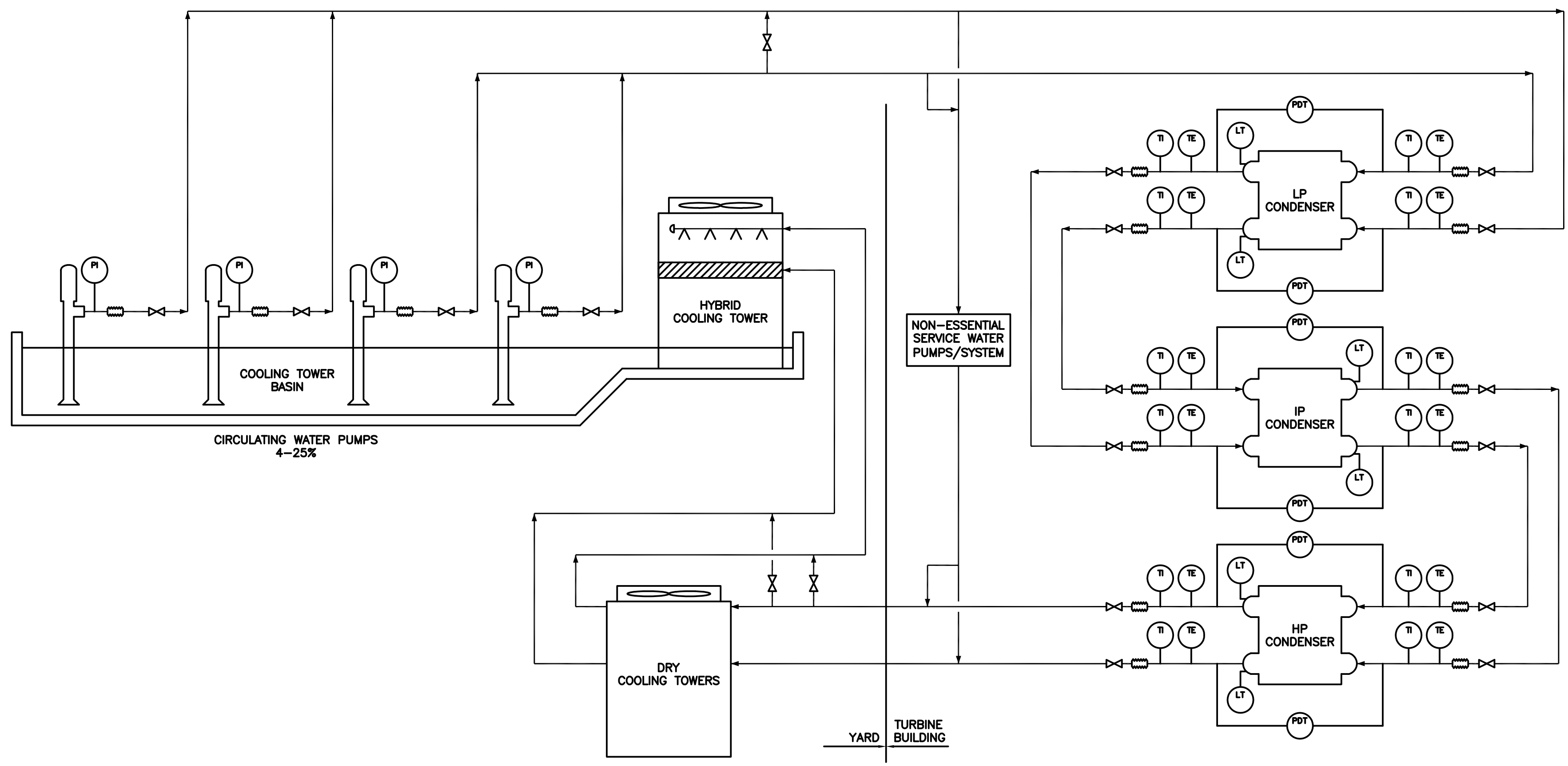
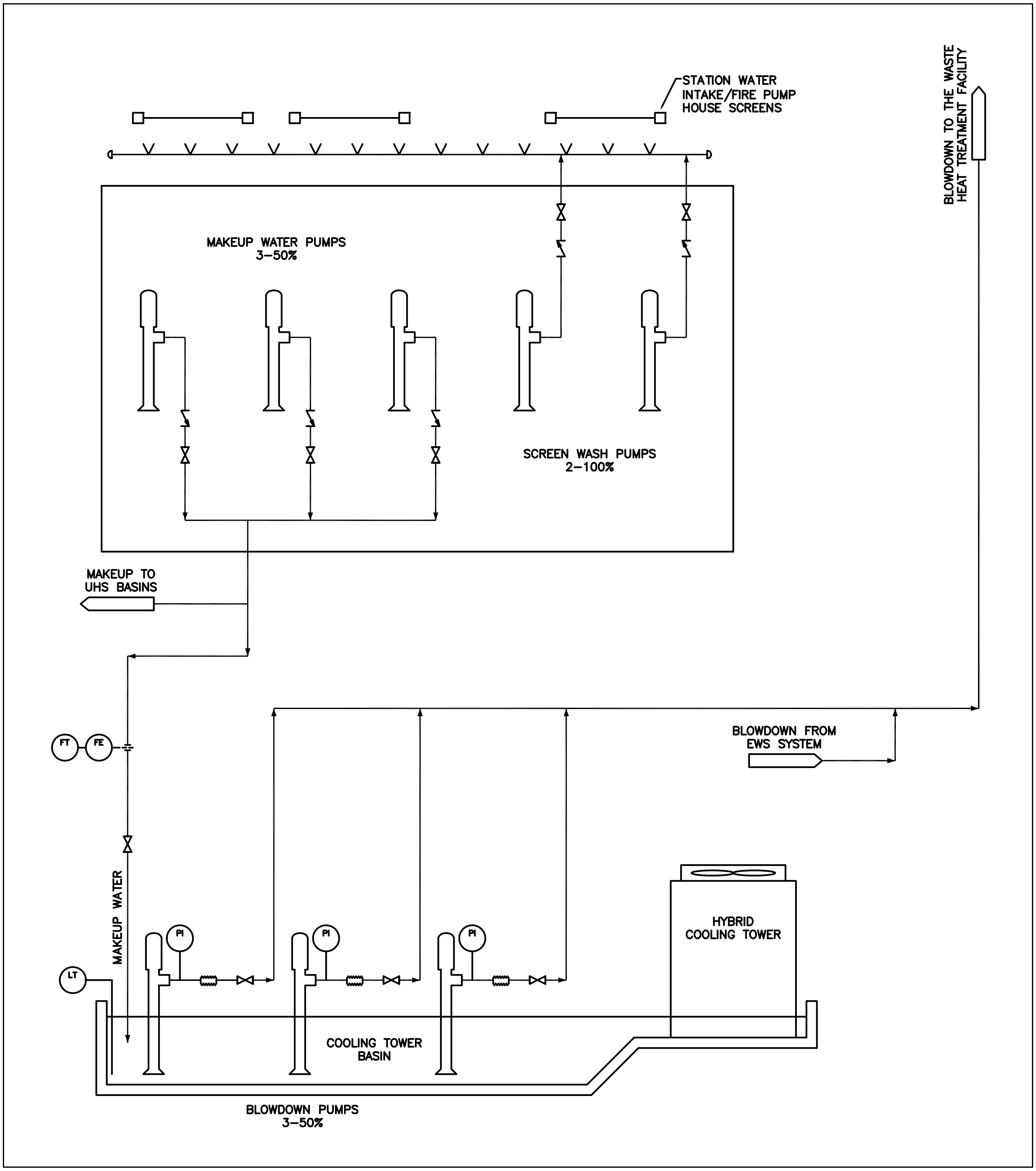


Figure 10.4.5-1R Circulating Water System Piping and Instrumentation Diagram

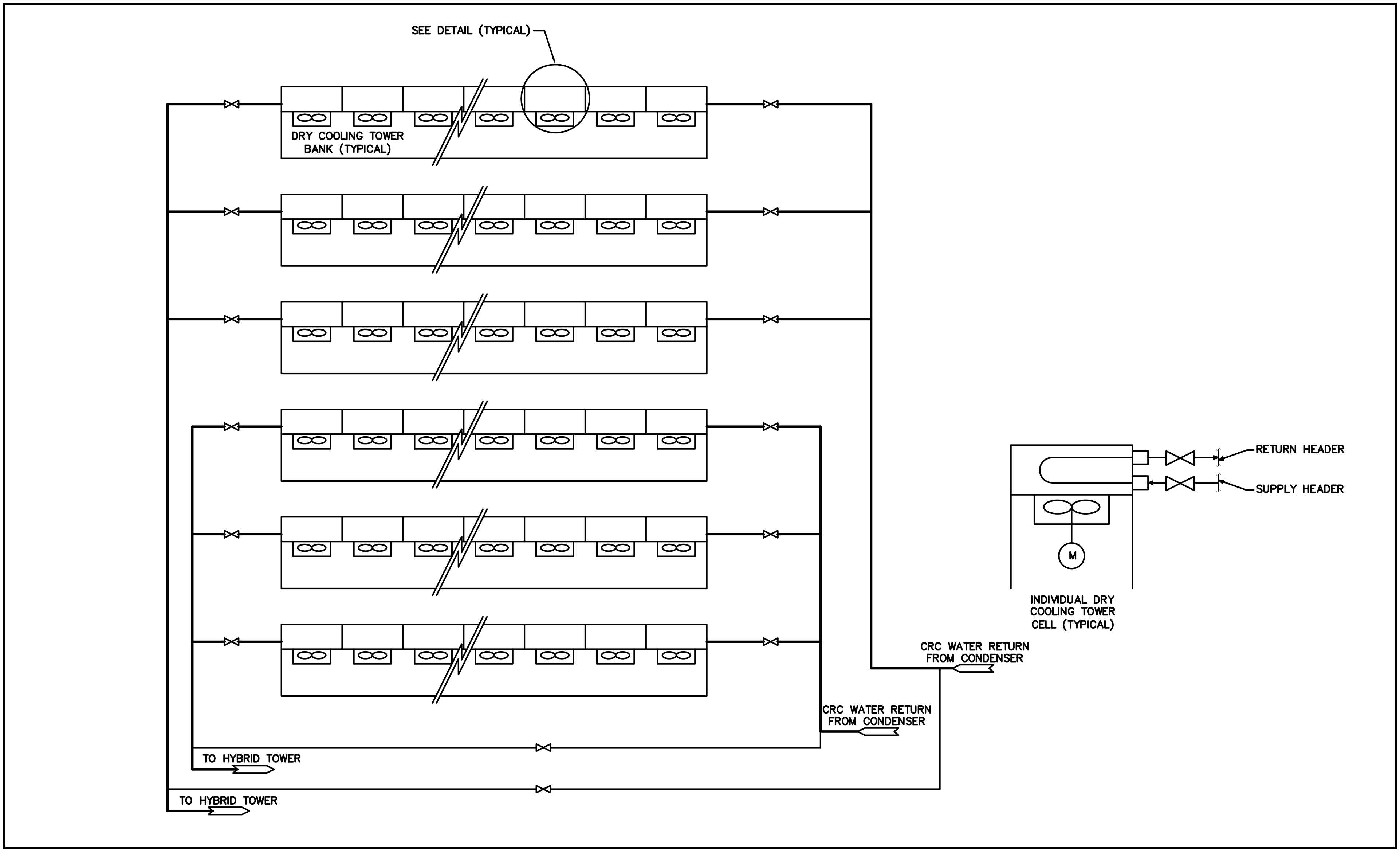


NOTES:
1. ALL PIPING, VALVES AND COMPONENTS IN THIS SHEET ARE CLASSIFIED AS EQUIPMENT CLASS 9, EXCEPT FOR THE CONDENSER, WHICH IS CLASSIFIED AS EQUIPMENT CLASS 8.

NAPS COL 10.4(1) **Figure 10.4.5-201 Cooling Tower Make-Up and Blowdown System**



NAPS COL 10.4(1) **Figure 10.4.5-202 Dry Cooling Tower Array P&ID**



NAPS COL 10.4(1) **Figure 10.4.5-203 Hybrid Cooling Tower**

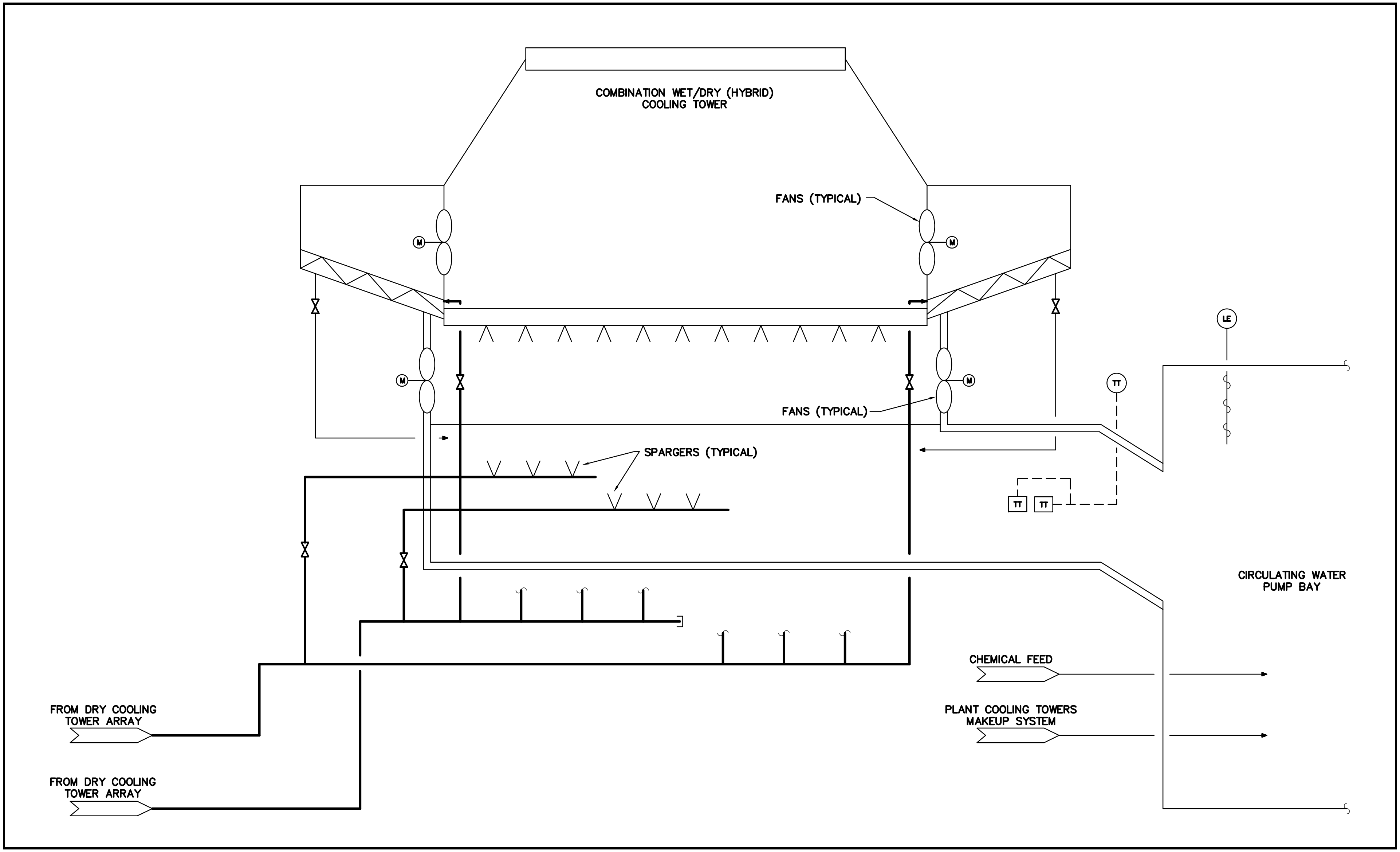


Figure 10.4.7-2R Condensate and Feedwater System Piping and Instrumentation Diagram (2/4)

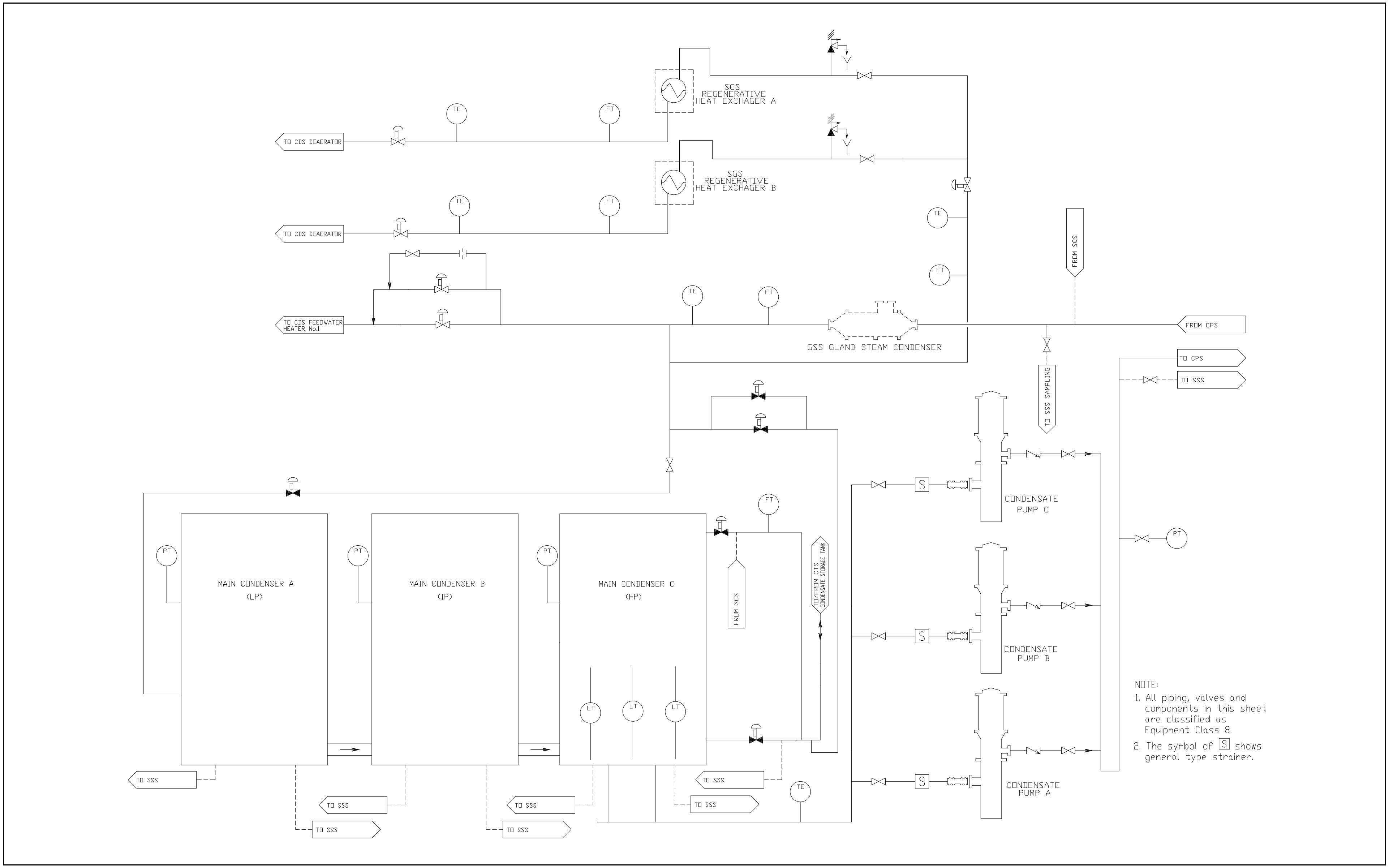


Figure 10.4.8-1R Steam Generator Blowdown System Piping and Instrumentation Diagram (1/2)

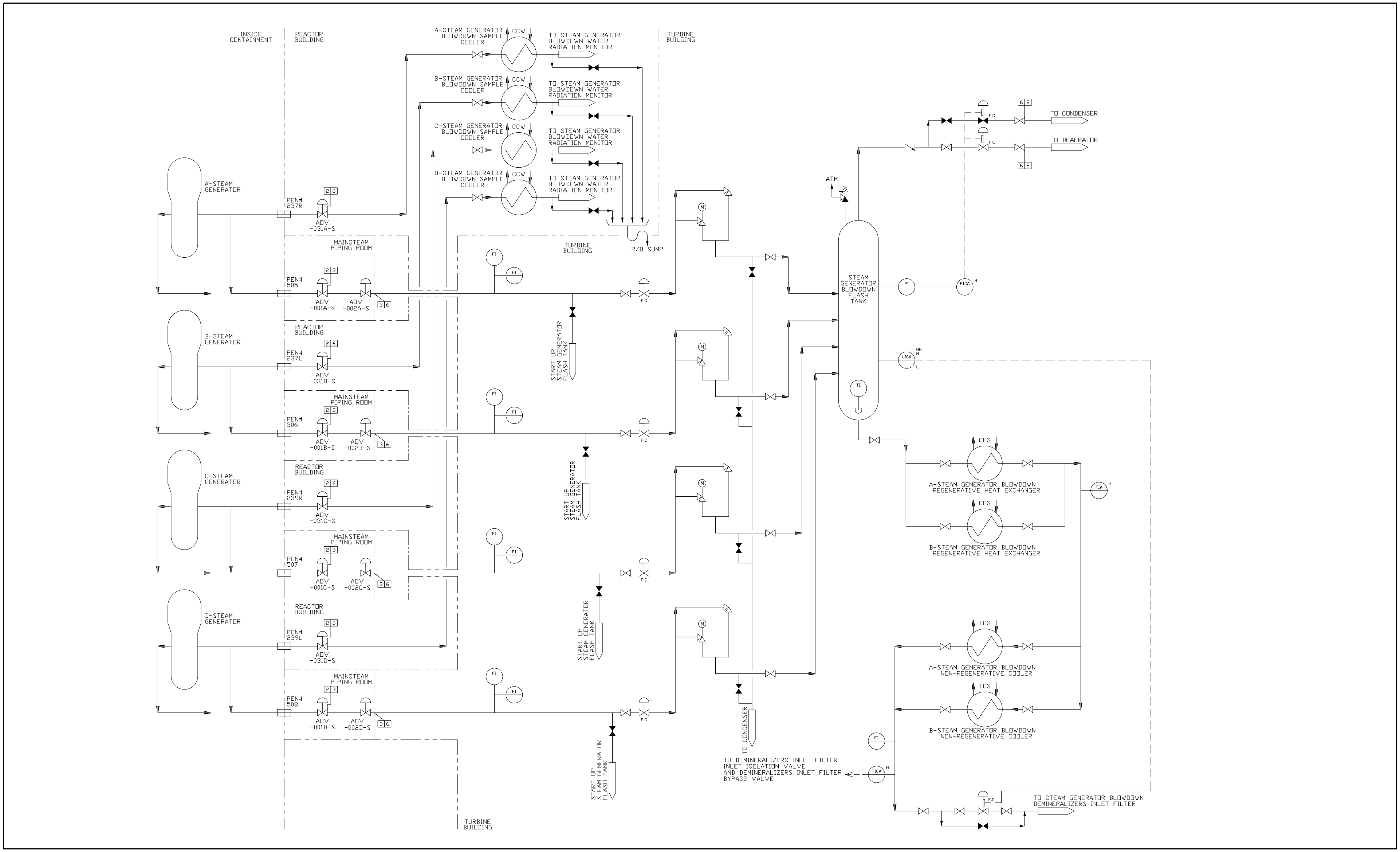
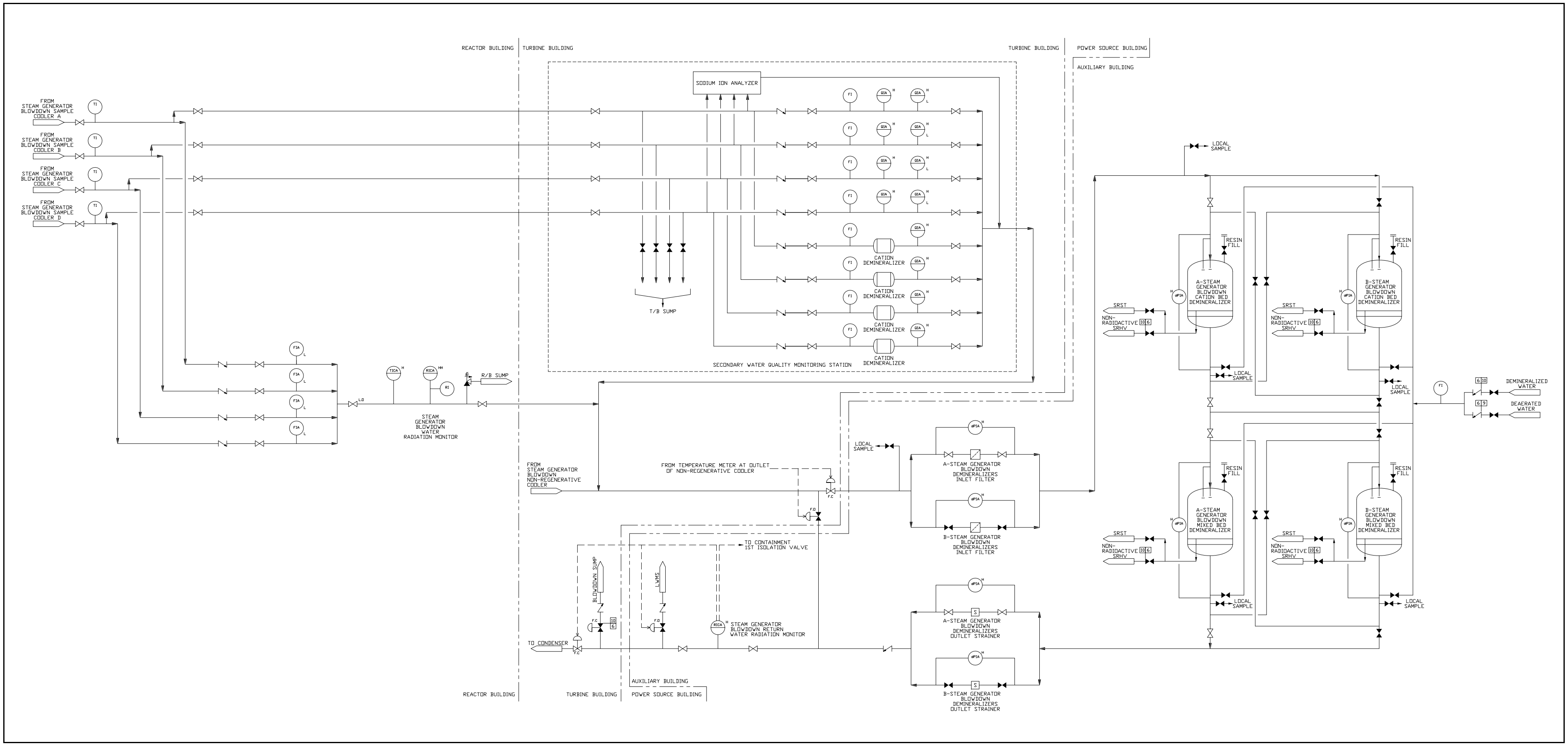


Figure 10.4.8-2R Steam Generator Blowdown System Piping and Instrumentation Diagram (2/2)



NAPS COL 10.4(2)

Figure 10.4.8-201 Steam Generator Blowdown System P&ID (Site-Specific Portion)

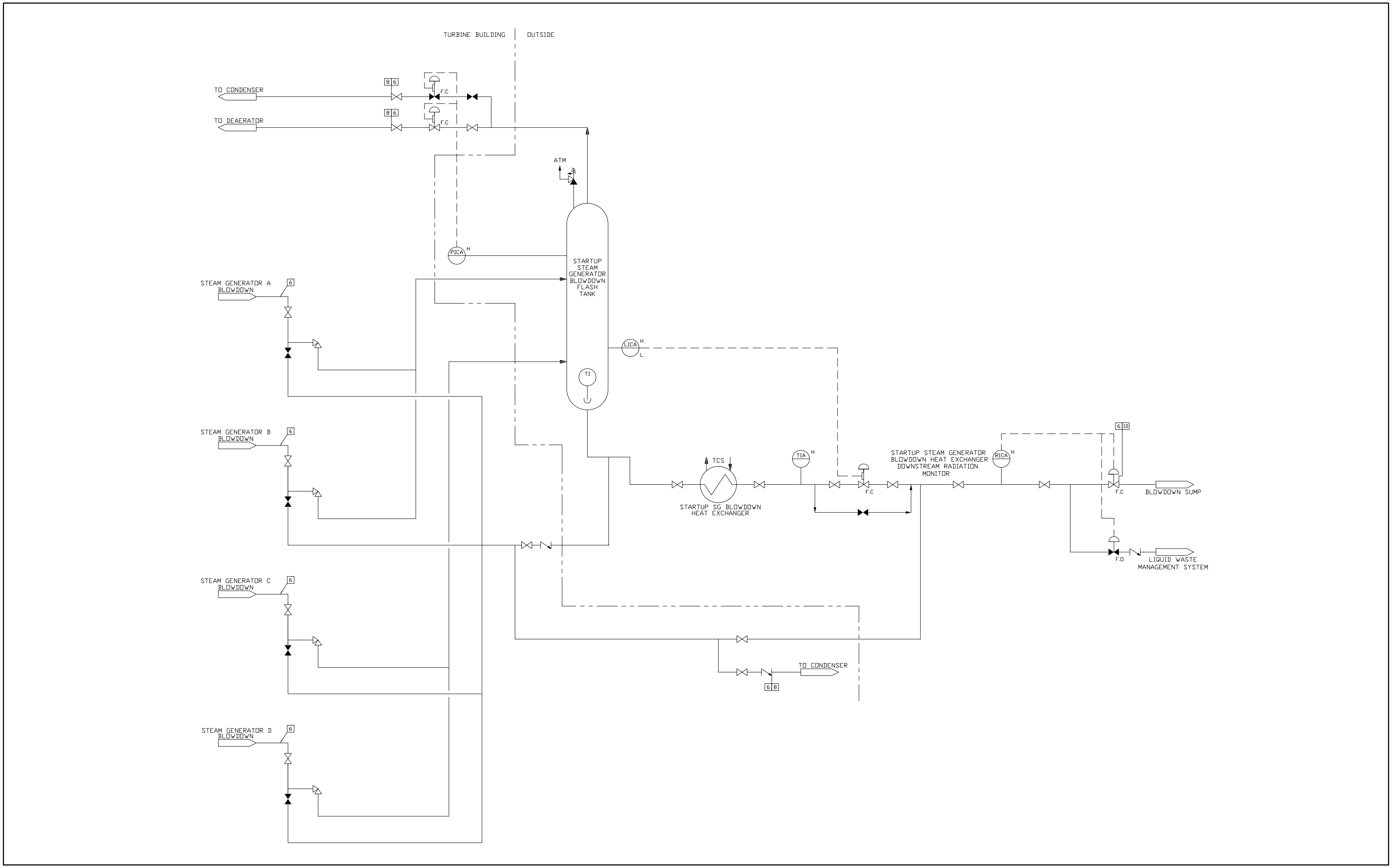
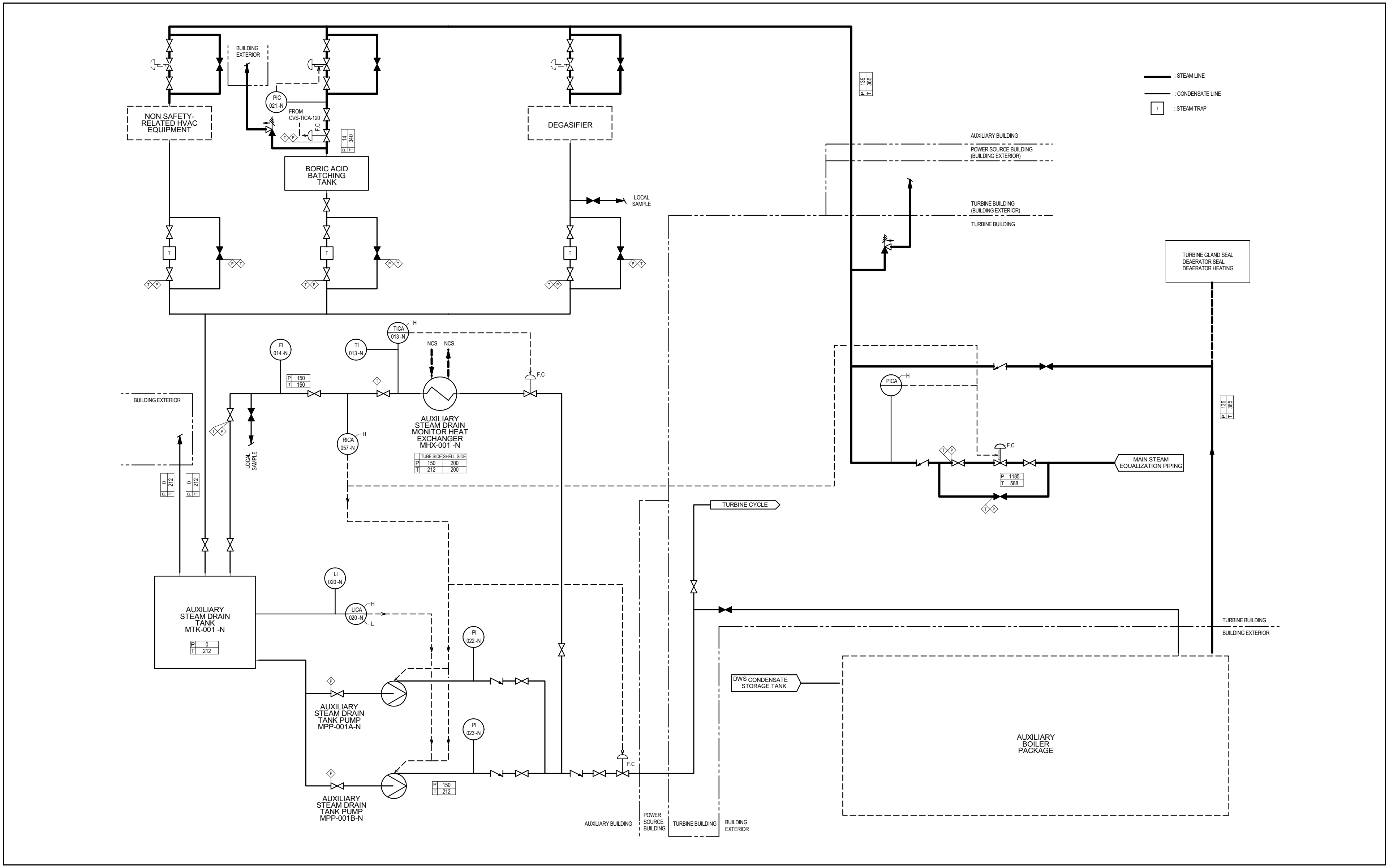


Figure 10.4.11-1R Auxiliary Steam Supply System Piping and Instrumentation Diagram



11 Radioactive Waste Management System

11.0 Radioactive Waste Management System

11.1 Source Terms

This section of the referenced DCD is incorporated by reference with no departures or supplements.

11.2 Liquid Waste Management System

NAPS PC 3.E(3)

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.2.1.5 Site-Specific Cost-Benefit Analysis

NAPS COL 11.2(5)
NAPS ESP COL 11.1-1

Replace the third paragraph in DCD Subsection 11.2.1.5 with the following.

RG 1.110 methodology was applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D, for the system augments compatible with PWR plant design features. Cost parameters used to calculate the Total Annual Cost (TAC) for each applicable radwaste treatment system augment listed in RG 1.110 are taken without exception from RG 1.110, Appendix A. These costs are Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). Other cost parameters used to determine TAC are as follows:

- Capital Recovery Factor (CRF) - Obtained from RG 1.110, Table A-6, this factor reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with OMB Circular A-94, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs” (Reference 11.2-202). Based on a 30-year service life, Table A-6 gives a CRF of 0.0806.
- Indirect Cost Factor (ICF) - Obtained from RG 1.110, Table A-5, this factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site). Because this is a single US-APWR unit site, this analysis is for a single unit, which gives an ICF of 1.75.

- Labor Cost Correction Factor (LCCF) - Obtained from RG 1.110, Table A-4, this factor takes into account the relative labor cost differences among geographical regions. A factor of 1 (the lowest value) is assumed in this analysis.
- The value of $1,000 per person-rem is prescribed in 10 CFR 50, Appendix I.

If it is conservatively assumed that each radwaste treatment system augment is a “perfect” technology that reduces the effluent dose by 100 percent, the annual cost of the augment can be determined and the lowest annual cost can be considered a threshold value. The lowest-cost option for augments is a 20 gpm cartridge filter at $11,380 per year, which yields a threshold value of 11.38 person-rem whole body or thyroid dose from liquid effluents.

The total body and thyroid doses to the population for the liquid effluents from Unit 3 are given in Table 11.3-203. None of the augments provided in RG 1.110 is found to be cost beneficial in reducing the annual population doses of 6.2 person-rem total body and 4.2 person-rem thyroid.

The lowest cost augment for the liquid radwaste system is the 20 gpm cartridge filter, with a minimum annual cost of $11,380. The total body and thyroid liquid population doses for Unit 3 are 6.2 and 4.2 person-rem, respectively. These correspond to equivalent annual benefits of $6200 and $4200 for reducing total body and thyroid doses, respectively. Because the cost of the least costly liquid augment exceeds the benefit, no liquid augments are justified.

11.2.1.6 Mobile or Temporary Equipment

STD COL 11.2(1)
STD COL 12.3(7)

Replace the last sentence in the first paragraph in DCD Subsection 11.2.1.6.

Process piping connections have connectors different from the utility connectors to prevent cross-connection and contamination. The use of mobile or temporary equipment will require applicable regulatory requirements and guidance such as 10 CFR 50.34a, 10 CFR 20.1406 and RG 1.143 to be addressed. As such the purchase or lease contracts for any temporary and mobile equipment will specify the applicable criteria.

The space allocated for the temporary and mobile equipment is located in the Auxiliary Building to minimize the impact to the environment in the event of an accident or spillage of radioactive materials. Shield walls are provided on three sides with one side open for access during installation, operation, inspection, and maintenance. The shield walls also serve to minimize spread of contamination to the entire area. A shield door is provided with truck bay access door from the common walkway inside the A/B. At the door opening a curb with sloped sided is constructed to prevent spreading of any liquid spillage into the truck bay area. The connection for the spent resin is provided on the process piping panel and the transfer line is built into the pipe chase for shielding purposes. The location of the mobile unit facilitates short transfer distance. Drainage collection is provided for liquid leakage and is routed to the waste holdup tanks, which are located on a floor below, for reprocessing. Provisions are included to mitigate contamination of the facility. Demineralized water piping is provided for decontaminating the facility. The floor in the area for the mobile system is sloped away from the truck bay door and the stairwell. The floor is sloped toward the plant west wall, where contamination from leaks from the mobile systems can enter the floor drain for processing by the LWMS. A level detector is provided within the drain collection header.

STD COL 11.2(8)
STD COL 12.3(7)

Replace the second paragraph of DCD Subsection 11.2.1.6 with the following.

The temporary mobile/portable equipment installed in the LWMS is vendor supplied and operated within the specified requirements. The temporary mobile/portable equipment includes the necessary connections and fittings to interface with the plant piping. The connectors are uniquely designed to prevent inadvertent cross connection between the radioactive and non-radioactive plant piping. The piping also includes backflow inhibitors. Liquid effluent from the temporary mobile/portable equipment is routed to the LWMS. An operating procedure will be provided prior to fuel load to ensure proper operation of the temporary mobile/portable equipment to prevent contamination of non-radioactive piping or uncontrolled releases of radioactivity into the environment so that guidance and information in Inspection and Enforcement (IE) Bulletin 80-10 (Ref. 11.2-25) is followed.

11.2.2 System Description

NAPS COL 11.2(2)
NAPS COL 11.2(6)

Replace third paragraph in DCD Subsection 11.2.2 with the following.

Process flow diagrams with process equipment, flow data, tank batch capabilities, and key control instrumentation are provided to indicate process design, method of operation, and release monitoring for the site specific LWMS.

Figure 11.2-201, Sheets 1 through 8 illustrate the piping and process equipment, instrumentation and controls for the LWMS.

The treated liquid effluents released from Unit 3 are piped directly into the blowdown sump, which includes the flows from the CWS and UHS. These effluents mix in the sump and flow freely into the piping which empties into the discharge canal. At this discharge location, the Unit 3 treated effluent and the Units 1 and 2 circulating water flows are commingled in the large volume of water in the discharge canal.

The LWMS effluent piping consists of the following segments and design features:

1. The LWMS effluent release piping for transporting radioactive effluent from the discharge valve inside the A/B to the blowdown sump is constructed from double-walled HDPE piping. The HDPE piping is fuse-welded in order to prevent leakage and minimize crud traps. The liquid effluent flow is contained in the inner pipe, and the outer pipe serves as containment in the event of leakage from the inner pipe.

2. Manholes constructed of HDPE are located at specified pipe lengths along the buried pathway to facilitate the containment of leakage by means of a collection basin. This design approach minimizes unintended releases and provides accessibility to facilitate periodic testing and visual inspection to maintain pipe integrity.

3. From the blowdown sump, the liquid effluent, mixed with the startup steam generator blowdown system discharge and the blowdown flows from the CWS and UHS cooling towers, is routed through additional piping leading to the WHTF for discharge.

The manholes provided along the buried discharge piping are watertight to prevent the intrusion of precipitation or groundwater. The

double-walled HDPE piping is sloped in the direction of flow so that leakage can be collected at the next downstream manhole. The manholes each contain a collection basin equipped with level detection instrumentation in order to provide early leak detection. When liquid in the manhole collection basin reaches a predetermined setpoint, the leak detection instrumentation sends a signal to the MCR to alarm for operator action. This approach also facilitates the determination of the leaking segment of pipe. Analysis of samples of the liquid collected in the manholes can also determine if the leakage is rain water, groundwater or leakage from the effluent release piping. These design features comply with the guidance of RG 4.21 as described in Subsection 12.3.1.3.1.1.

The bypass valve, VLV-531, is located in the same area with the radiation monitor and the discharge CVs (RCV-035A and RCV-035B), which are inside the Auxiliary Building. All normal discharge is required to go through the discharge CVs. To ensure discharge operation is not prevented by the failure of the CVs at any time, a bypass valve is added around the radiation monitor and the discharge CVs. Plant procedures require that an operator verify the tank water radioactivity concentration by sampling and water volume by level indicator prior to a liquid effluent release via the bypass valve. The ODCM and supporting procedures ensure appropriate actions to prevent an unmonitored release.

Any leakage from the bypass valve is collected in the floor drain sump, and is forwarded to the waste holdup tank for re-processing. It should be noted that the discharge CVs are downstream of the discharge isolation valves (AOV-522A and AOV-522B). During normal operations, the discharge is anticipated to occur once a week for approximately three hours for treated effluent, and one discharge (approximately one hour at 20 gpm) of detergent waste (filtered personnel showers and hand washes) daily. After each discharge, the line is flushed with demineralized water for decontamination.

The bypass valve is normally locked-closed. It requires an administrative approval key to open and the valve position is verified by at least two technically qualified members of the Operations staff before discharge can start. Thus, a single operator error does not result in an unmonitored release. In the unlikely event that the valve is inadvertently left open, or partially open, the flow element detects flow and initiates an alarm for operator action. Also, a portion of the flow continues to flow through the radiation monitor sample chamber. Because the monitor output depends

on radionuclide concentration and not flow rate, there is no impact on radiation monitor sensitivity from reduced flow conditions. Prior to opening VLV-531 to establish the alternate flow path, the tanks (ATK-006A and ATK-006B) will be sampled and water volume verified by level indicator to confirm that the contents meet the discharge specifications. Therefore, there is no impact on the annual liquid release and the annual dose to the members of the public if the bypass valve is inadvertently left fully-open. If the monitor reaches the high setpoint, it sends signals to initiate pump shutdown, valve closure and operator actions.

11.2.3.1 Radioactive Effluent Releases and Dose Calculation in Normal Operation

Replace the last six paragraphs in DCD Subsection 11.2.3.1 with the following.

NAPS COL 11.2(2)
NAPS COL 11.2(4)
NAPS ESP COL 11.1-1
NAPS DEP 9.2(1)

The annual average release of radionuclides is estimated by the PWR-GALE Code (Ref. 11.2-13) with the reactor coolant activities that are described in Section 11.1. The version of the code is a proprietary modified version of the NRC PWR-GALE code reflecting the design specifics of US-APWR design (Ref. 11.2-27). The parameters used by the PWR-GALE Code are provided in Table 11.2-9R, and the calculated effluents for expected releases are provided in Table 11.2-10R. The calculated effluents for maximum releases are provided in Table 11.2-11R. The inputs and results provided in these tables reflect the boric acid evaporator departure. The detergent waste effluent is not considered because handling of contaminated laundry is contracted to off-site services.

As with Units 1 and 2, the effluents from Unit 3 are released into the discharge canal, providing a minimum dilution factor of 1000. The discharge canal feeds into the Waste Heat Treatment Facility and the North Anna Reservoir, the two bodies of water comprising Lake Anna, providing further dilution. However, no credit is taken for dilution downstream of the discharge canal.

The calculated effluent concentrations in the discharge canal from Units 1, 2, and 3 are compared to the concentration limits of 10 CFR 20, Appendix B (Ref. 11.2-8) in Tables 11.2-12R and 11.2-13R for expected and maximum releases, respectively.

The calculation uses the discharge canal flow of 100,000 gpm as dilution water. Considering the contributions from Unit 3 as well as existing Units 1 and 2, the sum of the fractions of the ratios to the concentration limits of 10 CFR 20 Appendix B are 2.1E-02 (with expected releases) and 3.1E-01 (with maximum defined fuel defects). These values are less than the allowable value of 1.0.

The individual doses are evaluated with the LADTAP II Code (Ref. 11.2-14). The parameters used in the LADTAP II Code are listed in Table 11.2-14R. Based on these parameters, the maximum total body dose is 5.9E-01 mrem/yr (child) and the maximum organ dose is 7.4E-01 mrem/yr (child's liver), as shown in Table 11.2-15R. These values are less than the criteria of 3 and 10 mrem/yr, respectively, as specified in 10 CFR 50 Appendix I (Ref. 11.2-2).

Table 11.2-201 compares the liquid effluent doses to those calculated in the ESPA. The total Unit 3 doses from all liquid effluent pathways remain within the ESP values. Table 11.3-202 compares the total site doses from all sources to the limits in 40 CFR 190 (Ref. 11.2-20). Since 40 CFR 190 is more restrictive than 10 CFR 20.1302 (Ref. 11.2-19), compliance with the former also demonstrates compliance with the latter. The population doses are summarized in Table 11.3-203.

11.2.3.2 Radioactive Effluent Releases Due to Liquid Containing Tank Failures

NAPS COL 11.2(3)
NAPS DEP 9.2(1)

Replace the second and third paragraphs in DCD Subsection 11.2.3.2 with the following.

A tank failure analysis is performed in accordance with the guidance of BTP 11-6 (Ref. 11.2-17). For the analysis, the holdup tank and the waste holdup tank were selected because they contain the largest amount of radioactivity. A screening analysis was conducted using the holdup tank and waste holdup tank inventories to determine the limiting tank. The results of this analysis indicate the holdup tank is the limiting tank. The tank failure is modeled based on the entire contents of the holdup tank directly released unmitigated to the groundwater.

Replace the first two sentences in the fourth paragraph in DCD Subsection 11.2.3.2 with the following.

Table 11.2-16R shows input parameters for the RATAF code (Ref. 11.2-27) used to determine the source terms for the holdup tank and the waste holdup tank. Tables 2.4-206 and 2.4-206a provide the resulting nuclide concentrations in each tank.

Replace the first two sentences in the last paragraph in DCD Subsection 11.2.3.2 with the following.

The evaluation of potential radioactive effluent releases to groundwater due to failure of the holdup tank is provided in Section 2.4.13. Releases from this tank result in concentrations at the nearest unrestricted potable water supply that are within the limits of 10 CFR 20, Appendix B (Ref 11.2-8).

11.2.4 Testing and Inspection Requirements

NAPS COL 11.2(7)

Add the following paragraphs at the end of DCD Section 11.2.4.

A coatings program that facilitates the as low as reasonably achievable (ALARA) objective of promoting decontamination in radiologically controlled areas outside containment will be implemented prior to initial plant startup.

The program will conform to the guidance in RG 1.54, recognizing that more recent standards may be used if referenced in Section 11.2 or as specified in Table 1.9-202. The program controls refurbishment, repair, and replacement of coating in accordance with the manufacturer's product data sheets and good painting practices in accordance with applicable industry standards.

11.2.5 Combined License Information

Replace the content of DCD Subsection 11.2.5 with the following.

STD COL 11.2(1)

11.2(1) ***The mobile and temporary liquid radwaste processing equipment***

This combined license (COL) item is addressed in Subsection 11.2.1.6.

NAPS COL 11.2(2)

11.2(2) ***Site-specific information of the LWMS***

This COL item is addressed in Subsections 11.2.2 and 11.2.3.1.

NAPS COL 11.2(3)

11.2(3) ***The liquid containing tank failure***

This COL item is addressed in Subsection 11.2.3.2.

NAPS COL 11.2(4)

11.2(4) ***The site-specific dose calculation***

This COL item is addressed in Subsection 11.2.3.1, Table 11.2-9R, Table 11.2-10R, Table 11.2-11R, Table 11.2-12R, Table 11.2-13R, Table 11.2-14R, Table 11.2-15R, and Table 11.2-201.

NAPS COL 11.2(5)

11.2(5) ***Site-specific cost benefit analysis***

This COL item is addressed in Subsection 11.2.1.5.

NAPS COL 11.2(6)

11.2(6) ***Piping and instrumentation diagrams***

This COL item is addressed in Subsection 11.2.2 and Figure 11.2-201.

NAPS COL 11.2(7)

11.2(7) ***The implementation milestones for the coatings program used as the LWMS***

This COL item is addressed in Subsection 11.2.4.

STD COL 11.2(8)

11.2(8) ***The mobile/portable LWMS connections***

This COL item is addressed in Subsection 11.2.1.6.

11.2.6 References

Add the following references after the last reference in DCD subsection 11.2.6.

11.2-201 North Anna Power Station, Units 1 and 2, Updated Final Safety Analysis Report, Revision 45.

11.2-202 OMB Circular A-94, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,” October 29, 1992, Office of Management and Budget.

NAPS DEP 9.2(1)

Table 11.2-7R Decontamination Factors

Resin Type or Component	Tritium	Anion	Cs/Rb	Other
Mixed bed purification system ($LiBO_3$)	1	100	2	50
Evaporator condensate	1	5	1	10
Radwaste	1	100(10)	2(10)	100(10)
SG Blowdown	1	100(10)	10(10)	100(10)
Cation bed	1	1(1)	10(10)	10(10)
Anion bed	1	100(10)	1(1)	1(1)
Boron Recycle System Degasifier Feed Demineralizer	1	10	2	10

Note:
1. The numbers in the brackets are DFs for the second column (when used).
2. Decontamination factors (DFs) of all filters are 1.
3. The demineralizer in the boron recycle system of the referenced DCD is renamed Degasifier Feed Demineralizer. The DFs assumed for the demineralizer are unchanged since there is no change in the demineralizer design.

Evaporator	Tritium	Iodine	Other
Boric acid recovery	1	100	1,000

NAPS COL 11.2(4)

Table 11.2-9R Input Parameters for the PWR-GALE Code (Sheet 1 of 2)

	Design Parameter	Design Value
	Core thermal power (MWt)	4,451
	Reactor coolant mass (lb)	6.46E+05
	Reactor coolant letdown flow rate (gpm)	180
	CVCS cation demineralizer flow rate (gpm)	7
	Number of SGs	4
	Total main steam flow rate (lb/hr)	2.02E+07
	Secondary coolant mass in SG (lb)	1.35E+05
	Total SG blowdown flow rate (lb/hr)	1.554E+05
	Blowdown treatment method	0
	Regeneration time of condensate polishing system	N/A
	Fraction of feedwater through the condensate polishing system	0
	Reactor coolant leak rate to the containment for noble gas (1/d)(1)	0.0002
	Decontamination factor for detergent waste	1.0
	Shim Bleed	
	Shim bleed flow rate (gpd)	2,875
NAPS DEP 9.2(1)	Decontamination factor for I	~~5.0E+03~~ 1.0E+06
NAPS DEP 9.2(1)	Decontamination factor for Cs and Rb	~~2.0E+03~~ 4.0E+02
	Decontamination factor for others	1.0E+05
	Collection time (days)	20
NAPS DEP 9.2(1)	Process and discharge time (days)	~~2~~ 4
	Fraction of waste to be discharged	1.0

NAPS COL 11.2(4)

Table 11.2-9R Input Parameters for the PWR-GALE Code (Sheet 1 of 2) *(continued)*

	Coolant Drain	
	Coolant drainage flow rate (gpd)	900
	Fraction of reactor coolant activity	0.1
NAPS DEP 9.2(1)	Decontamination factor for I	~~5.0E+03~~ 1.0E+06
NAPS DEP 9.2(1)	Decontamination factor for Cs and Rb	~~2.0E+03~~ 4.0E+02
	Decontamination factor for others	1.0E+05
	Collection time (days)	20
NAPS DEP 9.2(1)	Process and discharge time (days)	~~2~~ 4
	Fraction of waste to be discharged	1.0
	Dirty Waste	
	Dirty drainage flow rate (gpd)	2,023
	Fraction of reactor coolant activity	0.18
	Decontamination factor for I	1.0E+05
	Decontamination factor for Cs and Rb	2.0E+02
	Decontamination factor for others	1.0E+04
NAPS DEP 9.2(1)	Collection time (days)	~~5~~ 2
	Process and discharge time (days)	0
	Fraction of waste to be discharged	1.0

Notes:

1. This value is based on 10 gpd of leakage inside containment (to containment sump) (see Table 11.2-2) and reactor coolant mass.
2. The basis of the PWR-GALE source term calculation uses a built-in plant capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. The difference in capacity factor has no impact on the calculated liquid effluent release and resultant dose, but there is a minor impact on the gaseous effluent releases and resultant doses. However, the calculated values have sufficient margin to the acceptance criteria to cover any possible US APWR capacity factor between 80% and 100%.

NAPS COL 11.2(4)

Table 11.2-9R Input Parameters for the PWR-GALE Code (Sheet 2 of 2)

Blowdown Waste

Fraction of the blowdown stream processed	1.0
Decontamination factor for I	1.0E+02
Decontamination factor for Cs and Rb	1.0E+02
Decontamination factor for others	1.0E+03
Collection time	N/A
Process and discharge time	N/A
Fraction of waste to be discharged	0
Regenerant Waste	N/A

NAPS COL 11.2(4)

Table 11.2-9R Input Parameters for the PWR-GALE Code (Sheet 2 of 2) *(continued)*

Gaseous Waste Management System and HVAC System

Continuous gas stripping of full letdown flow	None
Holdup time for Xe (days)	45
Holdup time for Kr (days)	2.55
Fill time of decay tanks for gas stripper	N/A
Gas waste system: high-efficiency particulate air (HEPA) filter	None
Auxiliary building: Charcoal filter	None
Auxiliary building: HEPA filter	None
Containment volume (ft^3)	2.74E+06
Containment atmosphere internal cleanup rate (ft^3/min)	0
Removal efficiency of charcoal filter (%)	0
Removal efficiency of HEPA filter (%)	0
Containment high volume purge:	
Number of purges per year (in addition to two shutdown purges)	0
Removal efficiency of charcoal filter (%)	0
Removal efficiency of HEPA filter (%)	99
Containment low volume purge rate (ft^3/min)	2,000
Removal efficiency of charcoal filter (%)	70
Removal efficiency of HEPA filter (%)	99
Fraction of iodine released from blowdown tank vent	0
Fraction of iodine removed from main condenser air ejector release	0

Notes:

1. This value is based on 10 gpd of leakage inside containment (to containment sump) (see Table 11.2-2) and reactor coolant mass.
2. The basis of the PWR-GALE source term calculation uses a built-in plant capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. The difference in capacity factor has no impact on the calculated liquid effluent release and resultant dose, but there is a minor impact on the gaseous effluent releases and resultant doses. However, the calculated values have sufficient margin to the acceptance criteria to cover any possible US APWR capacity factor between 80% and 100%.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-10R Liquid Releases Calculated by PWR-GALE Code (Ci/yr) (Sheet 1 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste(3)	TOTAL Releases(1)
Corrosion and Activation Products						
Na-24	0.00000	~~0.00029~~ 0.00065	0.00002	~~0.00031~~ 0.00067	~~0.00000~~ N/A	~~4.70E-03~~ **7.20E-03**
P-32	0.00000	0.00000	0.00000	0.00000	~~0.00018~~ N/A	~~1.80E-04~~ 0.00E+00
Cr-51	0.00000	0.00008	0.00000	~~0.00008~~ 0.00009	~~0.00470~~ N/A	~~6.00E-03~~ 9.00E-04
Mn-54	0.00000	0.00004	0.00000	0.00005	~~0.00380~~ N/A	~~4.50E-03~~ 5.00E-04
Fe-55	0.00000	0.00003	0.00000	0.00003	~~0.00720~~ N/A	~~7.70E-03~~ 4.00E-04
Fe-59	0.00000	0.00001	0.00000	0.00001	~~0.00220~~ N/A	~~2.30E-03~~ 1.00E-04
Co-58	0.00000	0.00012	0.00000	0.00013	~~0.00790~~ N/A	~~9.80E-03~~ 1.40E-03
Co-60	0.00000	0.00001	0.00000	0.00002	~~0.01400~~ N/A	~~1.40E-02~~ 0.00E+00
Ni-63	0.00000	0.00000	0.00000	0.00000	~~0.00170~~ N/A	~~1.70E-03~~ 0.00E+00
Zn-65	0.00000	0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~2.20E-04~~ 1.60E-04
W-187	0.00000	~~0.00002~~ 0.00004	0.00000	~~0.00002~~ 0.00004	~~0.00000~~ N/A	~~3.50E-04~~ **4.80E-04**
Np-239	0.00000	~~0.00003~~ 0.00005	0.00000	~~0.00004~~ 0.00005	~~0.00000~~ N/A	~~5.30E-04~~ 5.40E-04
Fission Products						
Br-84	0.00000	0.00000	0.00000	0.00000	N/A	1.50E-05
Rb-88	0.00000	~~0.00187~~ 0.00468	0.00000	~~0.00187~~ 0.00468	~~0.00000~~ N/A	~~2.80E-02~~ **5.00E-02**
Sr-89	0.00000	0.00000	0.00000	0.00000	~~0.00009~~ N/A	~~1.50E-04~~ 4.00E-05
Sr-90	0.00000	0.00000	0.00000	0.00000	~~0.00001~~ N/A	~~1.80E-05~~ 7.00E-06

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs. Those values exceeding the corresponding ESP values in ESP-ER Table 5.4-6 are shown in bold.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For site-specific application, contaminated laundry is contracted for off-site services.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-10R Liquid Releases Calculated by PWR-GALE Code (Ci/yr) (Sheet 1 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	TOTAL Releases[1]
Sr-91	0.00000	~~0.00000~~ 0.00001	0.00000	~~0.00000~~ 0.00001	~~0.00000~~ N/A	~~6.80E-05~~ 1.10E-04
Y-91m	0.00000	~~0.00000~~ 0.00001	0.00000	~~0.00000~~ 0.00001	~~0.00000~~ N/A	~~4.40E-05~~ **7.20E-05**
Y-91	0.00000	0.00000	0.00000	0.00000	~~0.00008~~ N/A	~~9.00E-05~~ 8.00E-06
Y-93	0.00000	~~0.00002~~ 0.00005	0.00000	~~0.00002~~ 0.00005	~~0.00000~~ N/A	~~3.10E-04~~ 5.00E-04
Zr-95	0.00000	0.00001	0.00000	0.00001	~~0.00110~~ N/A	~~1.30E-03~~ 1.00E-04
Nb-95	0.00000	0.00001	0.00000	0.00001	~~0.00190~~ N/A	~~2.00E-03~~ 1.00E-04
Mo-99	0.00000	~~0.00011~~ 0.00015	0.00000	~~0.00011~~ 0.00015	~~0.00006~~ N/A	~~1.70E-03~~ 1.64E-03
Tc-99m	0.00000	~~0.00011~~ 0.00014	0.00000	~~0.00011~~ 0.00015	~~0.00000~~ N/A	~~1.70E-03~~ 1.60E-03
Ru-103	0.00001	0.00020	0.00000	0.00021	~~0.00029~~ N/A	~~3.40E-03~~ 2.21E-03
Rh-103m	0.00001	0.00020	0.00000	0.00021	~~0.00000~~ N/A	~~3.10E-03~~ 2.30E-03
Ru-106	0.00010	0.00243	0.00005	~~0.00257~~ 0.00258	~~0.00890~~ N/A	~~4.70E-02~~ 2.71E-02
Rh-106	0.00010	0.00243	0.00005	~~0.00257~~ 0.00258	~~0.00000~~ N/A	~~3.90E-02~~ 2.80E-02
Ag-110m	0.00000	~~0.00003~~ 0.00004	0.00000	0.00004	~~0.00120~~ N/A	~~1.80E-03~~ 4.00E-04
Ag-110	0.00000	0.00000	0.00000	0.00000	~~0.00000~~ N/A	~~7.20E-05~~ 5.20E-05
Sb-124	0.00000	0.00000	0.00000	0.00000	~~0.00043~~ N/A	~~4.30E-04~~ 0.00E+00
Te-129m	0.00000	~~0.00000~~ 0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~7.80E-05~~ 5.70E-05

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs. Those values exceeding the corresponding ESP values in ESP-ER Table 5.4-6 are shown in bold.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For site-specific application, contaminated laundry is contracted for off-site services.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-10R Liquid Releases Calculated by PWR-GALE Code (Ci/yr) (Sheet 1 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste(3)	TOTAL Releases(1)
Te-129	0.00000	~~0.00002~~ 0.00005	0.00000	~~0.00002~~ 0.00005	~~0.00000~~ N/A	~~3.10E-04~~ **4.90E-04**
Te-131m	0.00000	~~0.00002~~ 0.00003	0.00000	~~0.00002~~ 0.00003	~~0.00000~~ N/A	~~2.50E-04~~ **3.10E-04**
Te-131	0.00000	~~0.00000~~ 0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~7.60E-05~~ **1.10E-04**
I-131	~~0.00002~~ 0.00000	0.00001	0.00000	~~0.00002~~ 0.00001	~~0.00160~~ N/A	~~2.00E-03~~ 1.00E-04
Te-132	0.00000	~~0.00003~~ 0.00004	0.00000	~~0.00003~~ 0.00004	~~0.00000~~ N/A	~~4.70E-05~~ **4.40E-04**
I-132	0.00000	~~0.00001~~ 0.00002	0.00001	~~0.00002~~ 0.00003	~~0.00000~~ N/A	~~3.10E-04~~ 3.60E-04
I-133	~~0.00001~~ 0.00000	~~0.00002~~ 0.00004	0.00003	~~0.00005~~ 0.00007	~~0.00000~~ N/A	~~8.10E-04~~ 7.30E-04
I-134	0.00000	0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~8.90E-05~~ 1.50E-04
Cs-134	~~0.00002~~ 0.00011	0.00005	0.00000	~~0.00007~~ 0.00016	~~0.01100~~ N/A	~~1.20E-02~~ 2.00E-03
I-135	0.00000	~~0.00002~~ 0.00004	0.00003	~~0.00005~~ 0.00008	~~0.00000~~ N/A	~~7.80E-04~~ 8.40E-04
Cs-136	~~0.00030~~ 0.00133	~~0.00112~~ 0.00121	0.00000	~~0.00141~~ 0.00253	~~0.00037~~ N/A	~~2.20E-02~~ **2.66E-02**
Cs-137	~~0.00003~~ 0.00016	0.00008	0.00000	~~0.00011~~ 0.00023	~~0.01600~~ N/A	~~1.80E-02~~ 2.00E-03

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs. Those values exceeding the corresponding ESP values in ESP-ER Table 5.4-6 are shown in bold.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For site-specific application, contaminated laundry is contracted for off-site services.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-10R Liquid Releases Calculated by PWR-GALE Code (Ci/yr) (Sheet 2 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste(3)	TOTAL Releases(1)
Ba-137m	~~0.00003~~ 0.00015	0.00000	0.00000	~~0.00003~~ 0.00015	~~0.00000~~ N/A	~~4.60E-04~~ 1.60E-03
Ba-140	0.00001	~~0.00031~~ 0.00034	0.00001	~~0.00033~~ 0.00035	~~0.00091~~ N/A	~~5.80E-03~~ 3.79E-03
La-140	0.00001	~~0.00051~~ 0.00063	0.00001	~~0.00053~~ 0.00065	~~0.00000~~ N/A	~~8.00E-03~~ 6.90E-03
Ce-141	0.00000	0.00000	0.00000	0.00000	~~0.00023~~ N/A	~~2.90E-04~~ 5.00E-05
Ce-143	0.00000	~~0.00003~~ 0.00005	0.00000	~~0.00003~~ 0.00006	~~0.00000~~ N/A	~~5.00E-04~~ **6.00E-04**
Pr-143	0.00000	~~0.00001~~ 0.00000	0.00000	~~0.00001~~ 0.00000	~~0.00000~~ N/A	~~7.90E-05~~ 3.60E-05
Ce-144	0.00000	0.00011	0.00000	0.00011	~~0.00390~~ N/A	~~5.60E-03~~ 1.20E-03
Pr-144	0.00000	0.00011	0.00000	0.00011	~~0.00000~~ N/A	~~1.70E-03~~ 1.20E-03
~~All others~~	~~0.00000~~	~~0.00000~~	~~0.00000~~	~~0.00000~~	~~0.00000~~	~~1.20E-05~~
Total (except H-3)	~~0.00065~~ 0.00199	~~0.01053~~ 0.01426	0.00025	~~0.01143~~ 0.01649	~~0.08975~~ N/A	~~2.60E-01~~ 1.80E-01
H-3 release						**1.60E+03**

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs. Those values exceeding the corresponding ESP values in ESP-ER Table 5.4-6 are shown in bold.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For site-specific application, contaminated laundry is contracted for off-site services.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-11R Liquid Releases with Maximum Defined Fuel Defects (Ci/yr) (Sheet 1 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	Total Releases[1]
Corrosion and Activation Products						
Na-24	0.00000	~~0.00029~~ 0.00065	0.00002	~~0.00031~~ 0.00067	~~0.00000~~ N/A	~~3.20E-04~~ 6.79E-04
P-32	0.00000	0.00000	0.00000	0.00000	~~0.00018~~ N/A	~~1.80E-04~~ 0.00E+00
Cr-51	0.00000	0.00008	0.00000	0.00008	~~0.00470~~ N/A	~~4.78E-03~~ 8.11E-05
Mn-54	0.00000	0.00004	0.00000	0.00004	~~0.00380~~ N/A	~~3.84E-03~~ 4.06E-05
Fe-55	0.00000	0.00003	0.00000	0.00003	~~0.00720~~ N/A	~~7.23E-03~~ 3.04E-05
Fe-59	0.00000	0.00001	0.00000	0.00001	~~0.00220~~ N/A	~~2.21E-03~~ 1.01E-05
Co-58	0.00000	0.00012	0.00000	0.00012	~~0.00790~~ N/A	~~8.02E-03~~ 1.22E-04
Co-60	0.00000	0.00001	0.00000	0.00001	~~0.01400~~ N/A	~~1.40E-02~~ 1.01E-05
Ni-63	0.00000	0.00000	0.00000	0.00000	~~0.00170~~ N/A	~~1.70E-03~~ 0.00E+00
Zn-65	0.00000	0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~1.03E-05~~ 1.01E-05
W-187	0.00000	~~0.00002~~ 0.00004	0.00000	~~0.00002~~ 0.00004	~~0.00000~~ N/A	~~2.06E05~~ 4.06E-05
Np-239	0.00000	~~0.00003~~ 0.00005	0.00000	~~0.00003~~ 0.00005	~~0.00000~~ N/A	~~3.09E-05~~ 5.07E-05
Fission Products						
Br-84	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Rb-88	0.00000	~~0.03849~~ 0.09364	0.00000	~~0.03849~~ 0.09364	~~0.00000~~ N/A	~~3.97E-02~~ 9.77E-02
Sr-89	0.00000	0.00000	0.00000	0.00000	~~0.00009~~ N/A	~~9.00E-05~~ 0.00E+00
Sr-90	0.00000	0.00000	0.00000	0.00000	~~0.00001~~ N/A	~~1.00E-05~~ 0.00E+00
Sr-91	0.00000	~~0.00000~~ 0.00001	0.00000	~~0.00000~~ 0.00001	~~0.00000~~ N/A	~~0.00E+00~~ 1.01E-05
Y-91m	0.00000	~~0.00000~~ 0.00001	0.00000	~~0.00000~~ 0.00001	~~0.00000~~ N/A	~~0.00E+00~~ 1.01E-05

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-11R Liquid Releases with Maximum Defined Fuel Defects (Ci/yr) (Sheet 1 of 2) *(continued)*

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[(3)]	Total Releases[(1)]
Y-91	0.00000	0.00000	0.00000	0.00000	~~0.00008~~ N/A	~~8.00E-05~~ 0.00E+00
Y-93	0.00000	0.00000	0.00000	0.00000	~~0.00000~~ N/A	~~0.00E+00~~ 0.00E+00
Zr-95	0.00000	0.00001	0.00000	0.00001	~~0.00110~~ N/A	~~1.11E-03~~ 1.01E-05
Nb-95	0.00000	0.00002	0.00000	0.00002	~~0.00190~~ N/A	~~1.92E-03~~ 2.03E-05
Mo-99	0.00000	~~0.01333~~ 0.01818	0.00000	~~0.01333~~ 0.01818	~~0.00006~~ N/A	~~1.38E-02~~ 1.84E-02
Tc-99m	0.00000	~~0.00527~~ 0.00671	0.00000	~~0.00527~~ 0.00671	~~0.00000~~ N/A	~~5.44E-03~~ 6.80E-03
Ru-103	0.00000	0.00001	0.00000	0.00001	~~0.00029~~ N/A	~~3.00E-04~~ 1.01E-05
Rh-103m	0.00000	0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~1.03E-05~~ 1.01E-05
Ru-106	0.00000	0.00001	0.00000	0.00001	~~0.00890~~ N/A	~~8.91E-03~~ 1.01E-05
Rh-106	0.00000	0.00001	0.00000	0.00001	~~0.00000~~ N/A	~~1.03E-05~~ 1.01E-05
Ag-110m	0.00000	0.00000	0.00000	0.00000	~~0.00120~~ N/A	~~1.20E-03~~ 0.00E+00
Ag-110	0.00000	0.00000	0.00000	0.00000	~~0.00000~~ N/A	~~0.00E+00~~ 0.00E+00
Sb-124	0.00000	0.00000	0.00000	0.00000	~~0.00043~~ N/A	~~4.30E-04~~ 0.00E+00
Te-129m	0.00000	~~0.00000~~ 0.00057	0.00000	~~0.00000~~ 0.00057	~~0.00000~~ N/A	~~0.00E+00~~ 5.78E-04
Te-129	0.00000	~~0.00000~~ 0.00001	0.00000	~~0.00000~~ 0.00001	~~0.00000~~ N/A	~~0.00E+00~~ 1.01E-05

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For site-specific application, contaminated laundry is contracted for off-site services.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-11R Liquid Releases with Maximum Defined Fuel Defects (Ci/yr) (Sheet 2 of 2)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste(3)	Total Releases(1)
Te-131m	0.00000	0.00033 0.00050	0.00000	0.00033 0.00050	0.00000 N/A	3.40E-04 5.07E-04
Te-131	0.00000	0.00000 0.00001	0.00000	0.00000 0.00001	0.00000 N/A	0.00E+00 1.01E-05
I-131	0.02891 0.00000	0.01445	0.00000	0.04336 0.01445	0.00160 N/A	4.63E-02 1.46E-02
Te-132	0.00000	0.00526 0.00702	0.00000	0.00526 0.00702	0.00000 N/A	5.43E-03 7.12E-03
I-132	0.00000	0.00015 0.00030	0.00015	0.00030 0.00045	0.00000 N/A	3.09E-04 4.56E-04
I-133	0.00163 0.00000	0.00327 0.00655	0.00491	0.00981 0.01146	0.00000 N/A	1.01E-02 1.16E-02
I-134	0.00000	0.00005	0.00000	0.00005	0.00000 N/A	5.16E-05 5.07E-05
Cs-134	0.73457 4.04015	1.83643	0.00000	2.57100 5.87658	0.01100 N/A	2.66E+00 5.96E+00
I-135	0.00000	0.00083 0.00167	0.00125	0.00208 0.00292	0.00000 N/A	2.15E-03 2.96E-03
Cs-136	0.12019 0.53286	0.44873 0.48478	0.00000	0.56892 1.01764	0.00037 N/A	5.87E-01 1.03E+00
Cs-137	0.43698 2.33056	1.16528	0.00000	1.60226 3.49584	0.01600 N/A	1.67E+00 3.54E+00
Ba-137m	0.20917 1.04586	0.00000	0.00000	0.20917 1.04586	0.00000 N/A	2.16E-01 1.06E+00
Ba-140	0.00000	0.00010 0.00011	0.00000	0.00010 0.00011	0.00091 N/A	1.01E-03 1.12E-04
La-140	0.00000	0.00002	0.00000	0.00002	0.00000 N/A	2.06E-05 2.03E-05
Ce-141	0.00000	0.00000	0.00000	0.00000	0.00023 N/A	2.30E-04 0.00E+00
Ce-143	0.00000	0.00000	0.00000	0.00000	0.00000 N/A	0.00E+00
Pr-143	0.00000	0.00000	0.00000	0.00000	0.00000 N/A	0.00E+00
Ce-144	0.00000	0.00001	0.00000	0.00001	0.00390 N/A	3.91E-03 1.01E-05
Pr-144	0.00000	0.00001	0.00000	0.00001	0.00000 N/A	1.03E-05 1.01E-05

NAPS COL 11.2(4)
NAPS DEP 9.2(1)

Table 11.2-11R Liquid Releases with Maximum Defined Fuel Defects (Ci/yr) (Sheet 2 of 2) *(continued)*

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste(3)	Total Releases(1)
Total (Except H-3)	~~1.53145~~ 7.94943	~~3.53272~~ 3.64013	0.00633	~~5.07050~~ 11.59589	~~0.08975~~ N/A	~~5.32E+00~~ 1.18E+01
H-3 release						1.60E+03

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-12R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases) (Sheet 1 of 2)

Isotope(1)	Discharge Concentration (μCi/ml)(2)(4) Unit 3(7)	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)(3)(5)	Fraction of Concentration Limit(6)
Na-24	3.62E-11	—	3.6E-11	5.0E-05	7.2E-07
~~P-32~~			~~8.77E-12~~	~~9.00E-06~~	~~9.74E-07~~
Cr-51	4.59E-12	5.9E-12	1.0E-11	5.0E-04	2.1E-08
Mn-54	3.21E-12	3.1E-12	6.3E-12	3.0E-05	2.1E-07
Fe-55	3.02E-12	1.6E-11	1.9E-11	1.0E-04	1.9E-07
Fe-59	5.19E-13	4.4E-12	4.9E-12	1.0E-05	4.9E-07
Co-58	7.48E-12	6.8E-11	7.5E-11	2.0E-05	3.8E-06
Co-60	—	2.3E-11	2.3E-11	3.0E-06	7.7E-06
Zn-65	9.93E-13	—	9.9E-13	5.0E-06	2.0E-07
W-187	2.41E-12	—	2.4E-12	3.0E-05	8.0E-08
Np-239	2.71E-12	3.0E-12	5.7E-12	2.0E-05	2.9E-07
Br-83	—	2.7E-12	2.7E-12	9.0E-04	3.0E-09
Br-84	7.53E-14	4.0E-13	4.8E-13	4.0E-04	1.2E-09
Rb-86	—	3.3E-13	3.3E-13	7.0E-06	4.7E-08
Rb-88	2.51E-10	2.3E-11	2.7E-10	4.0E-04	6.9E-07
Sr-89	2.09E-13	1.5E-12	1.7E-12	8.0E-06	2.1E-07
Sr-90	6.02E-14	1.0E-13	1.6E-13	5.0E-07	3.2E-07
Y-90	—	7.9E-14	7.9E-14	7.0E-06	1.1E-08
Sr-91	5.52E-13	7.7E-13	1.3E-12	2.0E-05	6.6E-08
Y-91m	3.62E-13	2.5E-13	6.1E-13	2.0E-03	3.1E-10
Y-91	4.21E-14	2.9E-13	1.3E-10 3.3E-13	8.0E-06	4.2E-08
Y-93	2.51E-12	4.0E-14	2.6E-12	2.0E-05	1.3E-07
Zr-95	5.31E-13	5.7E-13	1.1E-12	2.0E-05	5.5E-08
Nb-95	5.14E-13	6.8E-13	1.2E-12	3.0E-05	4.0E-08
Mo-99	8.24E-12	2.1E-10	2.2E-10	2.0E-05	1.1E-05
Tc-99m	8.03E-12	1.1E-10	1.2E-10	1.0E-03	1.2E-07

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-12R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases) (Sheet 1 of 2) *(continued)*

	Discharge Concentration (μCi/ml)(2)(4)			Effluent Concentration Limit	Fraction of Concentration
Isotope(1)	Unit 3(7)	Units 1 & 2	Total	(μCi/ml)(3)(5)	Limit(6)
Ru-103	1.14E-11	1.6E-13	1.2E-11	3.0E-05	3.9E-07
Rh-103m	1.15E-11	8.8E-14	1.2E-11	6.0E-03	1.9E-09
Ru-106	1.79E-10	8.1E-13	1.8E-10	3.0E-06	6.0E-05
Ag-110m	2.50E-12	—	2.5E-12	6.0E-06	4.2E-07
Te-125m	—	7.9E-14	7.9E-14	2.0E-05	4.0E-09
Te-127m	—	9.7E-13	9.7E-13	9.0E-06	1.1E-07
Te-127	—	1.6E-12	1.6E-12	1.0E-04	1.6E-08
Te-129m	2.92E-13	4.1E-12	4.4E-12	7.0E-06	6.3E-07
Te-129	2.46E-12	1.9E-12	4.4E-12	4.0E-04	1.1E-08
Te-131m	1.56E-12	4.8E-12	6.4E-12	8.0E-06	7.9E-07
Te-131	5.52E-13	4.8E-13	1.0E-12	8.0E-05	1.3E-08
I-131	5.03E-13	1.3E-09	1.3E-09	1.0E-06	1.3E-03
Te-132	2.21E-12	5.2E-11	5.4E-11	9.0E-06	6.0E-06
I-132	1.81E-12	1.6E-10	1.6E-10	1.0E-04	1.6E-06
I-133	3.67E-12	1.4E-09	1.4E-09	7.0E-06	2.0E-04

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-12R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases) (Sheet 1 of 2) *(continued)*

Isotope(1)	Discharge Concentration (μCi/ml)(2)(4) Unit 3(7)	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)(3)(5)	Fraction of Concentration Limit(6)

Notes:

1. Br-85, Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. ~~Annual average discharge concentration based on release of average daily discharge for 292 days per year with 12,9000 gpm dilution flow. (See Section 10.4.5).~~ Unit 3 annual average discharge concentration based on release of average daily discharge for 292 days per year with 100,000 gpm dilution flow. Concentrations for Units 1 & 2 are obtained from NAPS UFSAR (Reference 11.2-201), Table 11.2-17.
3. 10 CFR 20 Appendix B, Table 2.
4. DCD Discharge Concentration column has been replaced with 3 site-specific columns (Unit 3, Units 1 & 2, and Total).
5. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
6. DCD values for Fraction of Concentration Limit column have been replaced with site-specific values and revised to one decimal place.
7. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-12R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases) (Sheet 2 of 2)

Isotope[1]	Discharge Concentration (μCi/ml)[2][4] Unit 3[7]	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)[3][5]	Fraction of Concentration Limit[6]
I-134	7.53E-13	2.9E-11	3.0E-11	4.0E-04	7.4E-08
Cs-134	1.46E-11	2.9E-10	3.0E-10	9.0E-07	3.4E-04
I-135	4.22E-12	4.8E-10	4.8E-10	3.0E-05	1.6E-05
Cs-136	1.34E-10	4.6E-11	1.8E-10	6.0E-06	3.0E-05
Cs-137	1.72E-11	2.8E-10	3.0E-10	1.0E-06	3.0E-04
Ba-140	1.91E-11	6.1E-13	2.0E-11	8.0E-06	2.5E-06
La-140	3.47E-11	3.8E-11	3.5E-11	9.0E-06	3.9E-06
Ce-141	2.56E-13	2.9E-13	5.5E-13	3.0E-05	1.8E-08
Ce-143	3.01E-12	4.8E-14	3.1E-12	2.0E-05	1.5E-07
Pr-143	1.82E-13	1.2E-13	3.0E-13	2.0E-05	1.5E-08
Ce-144	7.62E-12	1.7E-12	9.3E-12	3.0E-06	3.1E-06
Pr-144	6.03E-12	1.6E-12	7.6E-12	6.0E-04	1.3E-08
H-3	1.35E-05	5.5E-06	1.9E-05	1.0E-03	1.9E-02

Notes:

1. Br-85, Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. ~~Annual average discharge concentration based on release of average daily discharge for 292 days per year with 12,9000 gpm dilution flow. (See Section 10.4.5).~~ Unit 3 annual average discharge concentration based on release of average daily discharge for 292 days per year with 100,000 gpm dilution flow. Concentrations for Units 1 & 2 are obtained from NAPS UFSAR (Reference 11.2-201), Table 11.2-17.
3. 10 CFR 20 Appendix B, Table 2.
4. DCD Discharge Concentration column has been replaced with 3 site-specific columns (Unit 3, Units 1 & 2, and Total).
5. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
6. DCD values for Fraction of Concentration Limit column have been replaced with site-specific values and revised to one decimal place.
7. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-12R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases) (Sheet 2 of 2) *(continued)*

Isotope[(1)]	Discharge Concentration (μCi/ml)[(2)(4)] Unit 3[(7)]	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)[(3)(5)]	Fraction of Concentration Limit[(6)]
TOTAL	1.35E-05	5.5E-06	1.9E-05		2.1E-02

Notes:

1. Br-85, Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. Annual average discharge concentration based on release of average daily discharge for 292 days per year with 12,9000 gpm dilution flow. (See Section 10.4.5). Unit 3 annual average discharge concentration based on release of average daily discharge for 292 days per year with 100,000 gpm dilution flow. Concentrations for Units 1 & 2 are obtained from NAPS UFSAR (Reference 11.2-201), Table 11.2-17.
3. 10 CFR 20 Appendix B, Table 2.
4. DCD Discharge Concentration column has been replaced with 3 site-specific columns (Unit 3, Units 1 & 2, and Total).
5. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
6. DCD values for Fraction of Concentration Limit column have been replaced with site-specific values and revised to one decimal place.
7. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-13R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Maximum Releases) (Sheet 1 of 2)

Isotope[1]	Discharge Concentration (μCi/ml)[2][4]			Effluent Concentration Limit (μCi/ml)[3][5]	Fraction of Concentration Limit[6]
	Unit 3[7]	Units 1 & 2	Total		
Na-24	3.41E-12	—	3.4E-12	5.0E-05	6.8E-08
P-32			8.77E-12	9.00E-06	9.74E-07
Cr-51	4.14E-13	2.3E-11	2.3E-11	5.0E-04	4.7E-08
Mn-54	2.60E-13	3.9E-11	3.9E-11	3.0E-05	1.3E-06
Fe-55	2.29E-13	—	2.3E-13	1.0E-04	2.3E-09
Fe-59	5.24E-14	2.6E-11	2.6E-11	1.0E-05	2.6E-06
Co-58	6.51E-13	7.4E-10	7.4E-10	2.0E-05	3.7E-05
Co-60	8.14E-14	6.0E-11	6.0E-11	3.0E-06	2.0E-05
Zn-65	6.27E-14	—	6.3E-14	5.0E-06	1.3E-08
W-187	2.04E-13	—	2.0E-13	3.0E-05	6.8E-09
Np-239	2.55E-13	—	2.5E-13	2.0E-05	1.3E-08
Rb-88	4.91E-10	—	4.9E-10	4.0E-04	1.2E-06
Sr-89	—	1.1E-10	1.1E-10	8.0E-06	1.4E-05
Sr-90	—	1.2E-11	1.2E-11	5.0E-07	2.4E-05
Y-90	—	1.3E-11	1.3E-11	7.0E-06	1.9E-06
Sr-91	5.07E-14	1.9E-11	1.9E-11	2.0E-05	9.5E-07
Y-91m	5.07E-14	—	5.1E-14	2.0E-03	2.5E-11
Y-91	—	1.3E-10	1.3E-10	8.0E-06	1.6E-05
Zr-95	5.36E-14	2.1E-11	2.1E-11	2.0E-05	1.1E-06
Nb-95	1.04E-13	2.2E-11	2.2E-11	3.0E-05	7.4E-07
Mo-99	9.24E-11	9.9E-08	9.9E-08	2.0E-05	5.0E-03
Tc-99m	3.41E-11	8.5E-08	8.5E-08	1.0E-03	8.5E-05
Ru-103	5.21E-14	—	5.2E-14	3.0E-05	1.7E-09
Rh-103m	5.07E-14	—	5.1E-14	6.0E-03	8.5E-12
Ru-106	6.68E-14	—	6.7E-14	3.0E-06	2.2E-08
Te-129m	2.97E-12	—	3.0E-12	7.0E-06	4.2E-07

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-13R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Maximum Releases) (Sheet 1 of 2)

Isotope[1]	Discharge Concentration (μCi/ml)[2][4]			Effluent Concentration Limit (μCi/ml)[3][5]	Fraction of Concentration Limit[6]
	Unit 3[7]	Units 1 & 2	Total		
Te-129	5.07E-14	—	5.1E-14	4.0E-04	1.3E-10
Te-131m	2.55E-12	—	2.5E-12	8.0E-06	3.2E-07
Te-131	5.07E-14	—	5.1E-14	8.0E-05	6.3E-10
I-131	7.34E-11	5.6E-08	5.6E-08	1.0E-06	5.6E-02
Te-132	3.58E-11	4.8E-09	4.8E-09	9.0E-06	5.4E-04
I-132	2.29E-12	8.5E-09	8.5E-09	1.0E-04	8.5E-05
I-133	5.83E-11	6.2E-08	6.2E-08	7.0E-06	8.9E-03
I-134	2.55E-13	1.2E-09	1.2E-09	4.0E-04	3.0E-06
Cs-134	4.35E-08	1.8E-08	6.2E-08	9.0E-07	6.8E-02

Notes:

1. Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. ~~Annual average discharge concentration based on release of average daily discharge for 292 days per year with 12,9000 gpm dilution flow. (See Section 10.4.5).~~ Unit 3 annual average discharge concentration based on release of average daily discharge for 292 days per year with 100,000 gpm dilution flow. Concentrations for Units 1 & 2 are obtained from NAPS UFSAR (Reference 11.2-201), Table 11.2-14.
3. 10 CFR 20 Appendix B, Table 2.
4. DCD Discharge Concentration column has been replaced with 3 site-specific columns (Unit 3, Units 1 & 2, and Total).
5. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
6. DCD values for Fraction of Concentration Limit column have been replaced with site-specific values and revised to one decimal place.
7. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

NAPS COL 11.2(4)
NAPS DEP 9.2(1)
NAPS ESP COL 11.1-1

Table 11.2-13R Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Maximum Releases) (Sheet 2 of 2)

Isotope(1)	Discharge Concentration (μCi/ml)(2)(4) Unit 3(7)	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)(3)(5)	Fraction of Concentration Limit(6)
I-135	1.49E-11	3.6E-09	3.6E-09	3.0E-05	1.2E-04
Cs-136	5.20E-09	2.6E-09	7.8E-09	6.0E-06	1.3E-03
Cs-137	3.05E-08	1.2E-07	1.5E-07	1.0E-06	1.5E-01
Ba-140	5.65E-13	9.2E-11	9.3E-11	8.0E-06	1.2E-05
La-140	1.02E-13	4.8E-11	4.8E-11	9.0E-06	5.3E-06
Ce-144	6.41E-14	1.8E-11	1.8E-11	3.0E-06	6.0E-06
Pr-144	5.07E-14	—	5.1E-14	6.0E-04	8.5E-11
H-3	1.35E-05	5.5E-06	1.9E-05	1.0E-03	1.9E-02
Total	1.36E-05	6.0E-06	2.0E-05		3.1E-01

Notes:

1. Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. ~~Annual average discharge concentration based on release of average daily discharge for 292 days per year with 12,9000 gpm dilution flow. (See Section 10.4.5).~~ Unit 3 annual average discharge concentration based on release of average daily discharge for 292 days per year with 100,000 gpm dilution flow. Concentrations for Units 1 & 2 are obtained from NAPS UFSAR (Reference 11.2-201), Table 11.2-14.
3. 10 CFR 20 Appendix B, Table 2.
4. DCD Discharge Concentration column has been replaced with 3 site-specific columns (Unit 3, Units 1 & 2, and Total).
5. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
6. DCD values for Fraction of Concentration Limit column have been replaced with site-specific values and revised to one decimal place.
7. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

NAPS COL 11.2(4)

Table 11.2-14R Input Parameters for the LADTAP II Code

Parameter	Value
Midpoint of Plant Life (yr)	~~30~~ 20
Reactor effluent discharge rate (gpm)	~~12,900~~ 100
Water type selection	Freshwater
Reconcentration model index	0 (no model)
Shore-width factor	~~0.2~~ 0.3 — Lake
~~Dilution factor - aquatic food and boating~~	~~10~~
~~Dilution factor – shoreline and swimming~~	~~10~~
~~Dilution factor – drinking water~~	~~10~~
~~Dilution factor for irrigation water usage location for the current food product~~	~~10~~
Dilution factor for receptors — All	1000
Transit time to receptors — All	0
Irrigation rate (Liter/m^2-month)	~~31~~ None — Lake water is not used for irrigation
~~Animal considered for milk pathway~~	~~Cow~~
~~Fraction of animal feed not contaminated~~	~~0~~
~~Fraction of animal water not contaminated~~	~~0~~
Source terms	~~Table 11.2-10~~ Table 11.2-10R
50 mile population in 2040	2.83E+06
Sport fishing harvest in 2040 (kg/yr)	2.66E+05
Commercial fishing harvest in 2040 (kg/yr)	None
Sport invertebrate harvest in 2040 (kg/yr)	None
Commercial invertebrate harvest in 2040 (kg/yr)	None
Population using Lake Anna for drinking water supply in 2040	2.21E+04
Shoreline usage for individual (hr/yr)	300
Swimming for individual (hr/yr)	200

NAPS COL 11.2(4)

Table 11.2-14R Input Parameters for the LADTAP II Code

Parameter	Value
Boating for individual (hr/yr)	500
Shoreline usage for population (hr/yr)	1.31E+06
Swimming for population (hr/yr)	8.76E+05
Boating for population (hr/yr)	2.19E+06
Other parameters	RG 1.109

NAPS COL 11.2(4)
NAPS ESP COL 11.1-1

Table 11.2-15R Individual Dose from Liquid Effluents

		~~Annual~~ Unit 3 Doses (mrem/yr)						
PATHWAY	SKIN	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Drinking								
Adult	—	~~8.69E-03~~ 2.5E-03	~~4.91E-01~~ 3.6E-01	~~4.88E-01~~ 3.5E-01	~~4.89E-01~~ 3.5E-01	~~4.83E-01~~ 3.5E-01	~~4.79E-01~~ 3.5E-01	~~5.11E-01~~ 3.7E-01
Teenager	—	~~8.32E-03~~ 2.4E-03	~~3.49E-01~~ 2.5E-01	~~3.43E-01~~ 2.5E-01	~~3.47E-01~~ 2.5E-01	~~3.42E-01~~ 2.5E-01	~~3.39E-01~~ 2.5E-01	~~3.61E-01~~ 2.6E-01
Child	—	~~2.38E-02~~ 6.8E-03	~~6.70E-01~~ 4.8E-01	~~6.52E-01~~ 4.8E-01	~~6.69E-01~~ 4.8E-01	~~6.56E-01~~ 4.8E-01	~~6.48E-01~~ 4.8E-01	~~6.69E-01~~ 4.9E-01
Infant	—	~~2.50E-02~~ 7.7E-03	~~6.64E-01~~ 4.8E-01	~~6.39E-01~~ 4.7E-01	~~6.71E-01~~ 4.7E-01	~~6.44E-01~~ 4.7E-01	~~6.37E-01~~ 4.7E-01	~~6.49E-01~~ 4.8E-01
Fish								
Adult	—	~~6.53E-01~~ 9.5E-02	~~7.31E-01~~ 2.6E-01	~~5.35E-01~~ 1.9E-01	~~1.70E-02~~ 9.7E-03	~~2.66E-01~~ 1.2E-01	~~8.67E-02~~ 3.1E-02	~~1.82E-01~~ 4.3E-02
Teenager	—	~~6.97E-01~~ 9.8E-02	~~7.47E-01~~ 2.6E-01	~~3.34E-01~~ 1.5E-01	~~1.39E-02~~ 7.5E-03	~~2.66E-01~~ 1.2E-01	~~9.72E-02~~ 3.3E-02	~~1.34E-01~~ 3.2E-02
Child	—	~~8.78E-01~~ 1.2E-01	~~6.51E-01~~ 2.2E-01	~~1.68E-01~~ 9.7E-02	~~1.24E-02~~ 6.4E-03	~~2.23E-01~~ 9.7E-02	~~7.69E-02~~ 2.6E-02	~~5.46E-02~~ 1.5E-02
Invertebrate								
Adult	—	1.3E-02	3.7E-02	2.5E-02	2.4E-03	2.0E-02	4.9E-03	8.2E-02
Teenager	—	1.3E-02	3.7E-02	2.0E-02	1.9E-03	2.0E-02	4.8E-03	6.3E-02
Child	—	1.7E-02	3.2E-02	1.4E-02	1.7E-03	1.7E-02	4.0E-03	2.7E-02

NAPS COL 11.2(4)
NAPS ESP COL 11.1-1

Table 11.2-15R Individual Dose from Liquid Effluents

~~Annual~~ Unit 3 Doses (mrem/yr)

PATHWAY	SKIN	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Shoreline								
Adult	~~8.61E-04~~ 4.1E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03	~~7.34E-04~~ 3.5E-03
Teenager	~~4.81E-03~~ 4.1E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03	~~4.10E-03~~ 3.5E-03
Child	~~1.00E-03~~ 4.1E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03	~~8.56E-04~~ 3.5E-03
Infant	4.1E-03	3.5E-03	3.5E-03	3.5E-03	3.5E-03	3.5E-03	3.5E-03	3.5E-03
~~**Irrigated Foods: Vegetables**~~								
~~Adult~~	—	~~1.22E-02~~	~~3.51E-01~~	~~3.74E-01~~	~~3.36E-01~~	~~3.41E-01~~	~~3.36E-01~~	~~3.76E-01~~
~~Teenager~~	—	~~2.02E-02~~	~~4.36E-01~~	~~4.21E-01~~	~~4.12E-01~~	~~4.20E-01~~	~~4.12E-01~~	~~4.62E-01~~
~~Child~~	—	~~4.78E-02~~	~~6.92E-01~~	~~6.57E-01~~	~~6.52E-01~~	~~6.64E-01~~	~~6.51E-01~~	~~6.88E-01~~
~~**Irrigated Foods: Leafy Vegetables**~~								
~~Adult~~	—	~~1.55E-03~~	~~4.34E-02~~	~~4.28E-02~~	~~4.20E-02~~	~~4.21E-02~~	~~4.14E-02~~	~~4.67E-02~~
~~Teenager~~	—	~~1.40E-03~~	~~2.92E-02~~	~~2.82E-02~~	~~2.80E-02~~	~~2.81E-02~~	~~2.75E-02~~	~~3.10E-02~~
~~Child~~	—	~~2.48E-03~~	~~3.48E-02~~	~~3.30E-02~~	~~3.33E-02~~	~~3.33E-02~~	~~3.26E-02~~	~~3.46E-02~~
~~**Irrigated Foods: Milk**~~								
~~Adult~~	—	~~5.94E-03~~	~~2.09E-01~~	~~2.07E-01~~	~~2.02E01~~	~~2.03E-01~~	~~2.01E-01~~	~~2.01E-01~~
~~Teenager~~	—	~~1.06E-02~~	~~2.77E-01~~	~~2.67E-01~~	~~2.64E-01~~	~~2.66E-01~~	~~2.62E-01~~	~~2.62E-01~~
~~Child~~	—	~~2.52E-02~~	~~4.39E-01~~	~~4.17E-01~~	~~4.19E-01~~	~~4.20E-01~~	~~4.14E-01~~	~~4.12E-01~~

Table 11.2-15R Individual Dose from Liquid Effluents

Annual Unit 3 Doses (mrem/yr)

PATHWAY	SKIN	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Irrigated Foods: Meat								
Adult	—	4.04E-03	7.20E-02	7.21E-02	7.09E-02	7.75E-02	7.10E-02	2.83E-01
Teenager	—	3.38E-03	4.32E-02	4.30E-02	4.23E-02	4.78E-02	4.24E-02	1.75E-01
Child	—	6.33E-03	5.22E-02	5.20E-02	5.11E-02	5.48E-02	5.12E-02	1.32E-01
Swimming								
Adult	0.0E+00	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04
Teenager	0.0E+00	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04
Child	0.0E+00	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04
Infant	0.0E+00	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04	2.9E-04
Boating								
Adult	0.0E+00	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04
Teen	0.0E+00	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04
Child	0.0E+00	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04
Infant	0.0E+00	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04	3.7E-04
Total								
Adult	8.61E-04 4.1E-03	6.86E-01 1.1E-01	1.90E+00 6.5E-01	1.69E+00 5.7E-01	1.16E+00 3.7E-01	1.41E+00 5.0E-01	1.22E+00 3.9E-01	1.60E+00 5.0E-01
Teen	4.81E-03 4.1E-03	7.45E-01 1.2E-01	1.89E+00 5.5E-01	1.44E+00 4.2E-01	1.11E+00 2.6E-01	1.37E+00 3.9E-01	1.18E+00 2.9E-01	1.43E+00 3.6E-01

NAPS COL 11.2(4)
NAPS ESP COL 11.1-1

Table 11.2-15R Individual Dose from Liquid Effluents

	Annual Unit 3 Doses (mrem/yr)							
PATHWAY	**SKIN**	**BONE**	**LIVER**	**T.BODY**	**THYROID**	**KIDNEY**	**LUNG**	**GI-LLI**
Child	1.00E-03 4.1E-03	9.84E-01 1.5E-01	2.54E+00 7.4E-01	1.98E+00 5.9E-01	1.84E+00 4.9E-01	2.06E+00 6.0E-01	1.87E+00 5.1E-01	1.99E+00 5.4E-01
Infant	— 4.1E-03	2.50E-02 1.2E-02	6.64E-01 4.8E-01	6.39E-01 4.7E-01	6.71E-01 4.8E-01	6.44E-01 4.8E-01	6.37E-01 4.7E-01	6.49E-01 4.8E-01
				Maximum(1)				
Dose	4.1E-03	1.5E-01	7.4E-01	5.9E-01	4.9E-01	6.0E-01	5.1E-01	5.4E-01
Group	All	Child	Child	Child	Child	Child	Child	Child

Notes:

1. The last two rows identify the maximum dose for each organ and the age group receiving the dose. The maximum total body and organ doses are within 10 CFR 50, Appendix I criteria of 3 and 10 mrem/yr, respectively.

NAPS COL 11.2(3)
NAPS DEP 9.2(1)

Table 11.2-16R Parameters for Calculation of Source Term for Liquid Containing Tank Failures(4)(5)(6)

Tank	Volume of Tank (gal)(1)	Flow Rate (gpd)	Fraction of Reactor Primary Coolant Activity (PCA)	Fraction of PCA in Tank(3)	Tank Factor(2)(3)
Holdup Tank	1.2E+5	Shim Bleed: 2875 Coolant Drain: 900	Shim Bleed: 1.0 Coolant Drain: 0.1	0.79	1.0 (All Nuclides)
Waste Holdup Tank	3.0E+04	2023 (Note 7)	(Note 7)		1.0 (All nuclides)
Boric Acid Tank	6.6E+04	Shim Bleed: 2875 Coolant Drain: 900	Shim Bleed: 1.0 Coolant Drain: 0.1		1.0(Tritium) 0.2(Anion) 0.04(Cs,Rb) 0.2(Others)

NAPS COL 11.2(3)
NAPS DEP 9.2(1)

Table 11.2-16R Parameters for Calculation of Source Term for Liquid Containing Tank Failures(4)(5)(6) *(continued)*

Tank	Volume of Tank (gal)(1)	Flow Rate (gpd)	Fraction of Reactor Primary Coolant Activity (PCA)	Fraction of PCA in Tank(3)	Tank Factor(2)(3)

Notes:

1. It is assumed that water equivalent to 80% of the tank volume is discharged and the volume of water contributing to dilution is 4.4E + 10 gl for defining the hydrological dilution factor of each tank.
   Hydrological Dilution Factor = 4.4E+10 / (Tank Volume x 0.8)
2. Tank factor is the ratio considering the removal effect by demineralizers or other treatment prior to the tank.
3. The TFs of evaporators express the increase in concentration or radionuclides in the evaporator bottoms resulting from evaporator operation. The value of TF for evaporator is 0.02. Holdup tank fraction is based on 2875 gpd of shim bleed with 100% PCA concentrations and 900 gpd of coolant drain with 10% of PCA concentrations, same as Table 11.2-9R.
4. The basis of the RATAF source term calculation uses a built-in plant capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations due to liquid containing tank failures.
5. Dilution factor (1.00E-20) and travel time (0 days) input parameters do not directly affect the concentrations of the tanks. Because RATAF code only display results for significant concentrations at the critical receptor, these parameters were set in order to display all the nuclides described in Table 11.2-17. Tables 2.4-206 and 2.4-206a.
6. Other RATAF input parameters not described in this table are the same as PWR-GALE input parameters described in Table 11.2-9 Table 11.2-9R.
7. Mixture Case for WHT: Shim bleed flow rate (for HT and BAT), 2875 gpd; Shim bleed PCA (for HT and BAT), 1; Drains flow rate (for HT and BAT), 900 gpd; Drains PCA (for HT and BAT), 0.1; WHT volume, 119688.3 gal; Bottom tank, no; Tank factors DFI=10, DFCS=2, DFO=10. Dirty waste only WHT: the source terms in DCD Table 11.2-17 are applicable. The WHT source term for each nuclide shown in Table 2.4-206a is the higher value from the mixture, or dirty waste only case for each nuclide.

   DFI: Decontamination Factor for Iodine — HT: Holdup Tank
   DFCS: Decontamination Factor for Cesium — BAT: Boric Acid Tank
   DFO: Decontamination Factor for other nuclides

NAPS COL 11.2(4)
NAPS ESP VAR 11.2-1
NAPS ESP COL 11.1-1

Table 11.2-201 Comparison of Individual Doses from Liquid Effluents to ESP

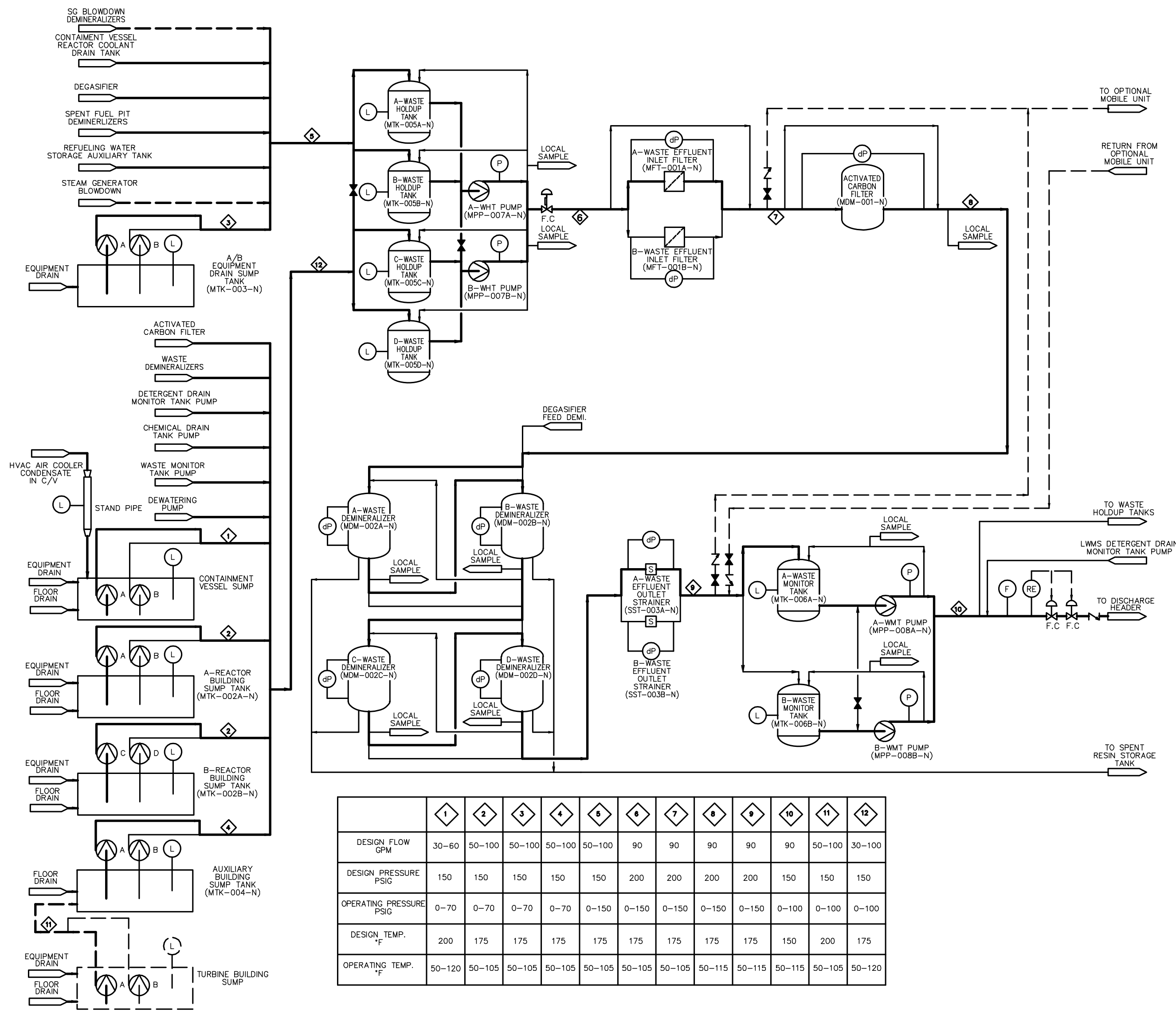
	ESP Dose (mrem/yr)(1)			Unit 3 Dose (mrem/yr)(2)		
Pathway	**Total Body**	**Thyroid**	**Bone**	**Total Body**	**Thyroid**	**Bone**
Fish	5.1E-01	NA	2.3E+00	9.7E-02	**6.4E-03**	1.2E-01
Invertebrate	6.6E-02	NA	1.5E-01	1.4E-02	**1.7E-03**	1.7E-02
Drinking	2.0E-01	6.5E-01	2.7E-02	**4.8E-01**	4.8E-01	6.8E-03
Shoreline	3.0E-02	3.0E-02	3.0E-02	3.5E-03	3.5E-03	3.5E-03
Swimming	3.2E-04	3.2E-04	3.2E-04	2.9E-04	2.9E-04	2.9E-04
Boating	4.0E-04	4.0E-04	4.0E-04	3.7E-04	3.7E-04	3.7E-04
Total	8.1E-01	6.8E-01	2.5E+00	5.9E-01	4.9E-01	1.5E-01
Group(3)	Adult	Infant	Child	Child	Child	Child

Notes:

1. ESP doses are from ESP-ER Table 5.4-8. Thyroid doses for fish and invertebrate are not applicable because infants do not eat these foods.
2. Unit 3 doses that exceed the corresponding ESP values are shown in bold.
3. The last row identifies the age group receiving the maximum dose for each organ.

NAPS DEP 9.2(1)

Figure 11.2-1R Liquid Waste Processing System Process Flow Diagram (Sheet 1 of 3)



	1	2	3	4	5	6	7	8	9	10	11	12
DESIGN FLOW GPM	30–60	50–100	50–100	50–100	50–100	90	90	90	90	90	50–100	30–100
DESIGN PRESSURE PSIG	150	150	150	150	150	200	200	200	200	150	150	150
OPERATING PRESSURE PSIG	0–70	0–70	0–70	0–70	0–150	0–150	0–150	0–150	0–150	0–100	0–100	0–100
DESIGN TEMP. °F	200	175	175	175	175	175	175	175	175	150	200	175
OPERATING TEMP. °F	50–120	50–105	50–105	50–105	50–105	50–105	50–105	50–115	50–115	50–115	50–105	50–120

Figure 11.2-201 LWMS P&ID (Sheet 1 of 8)

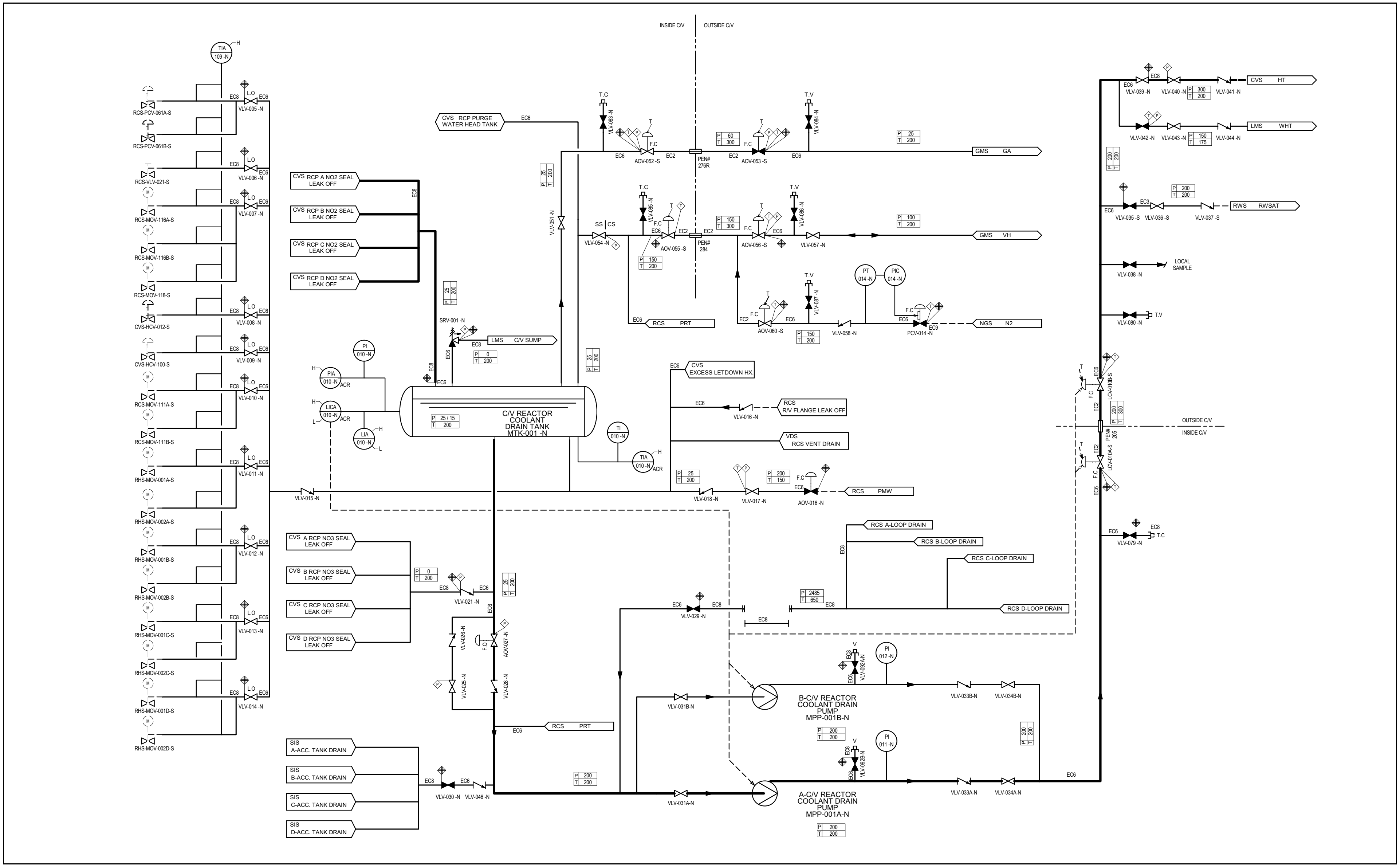
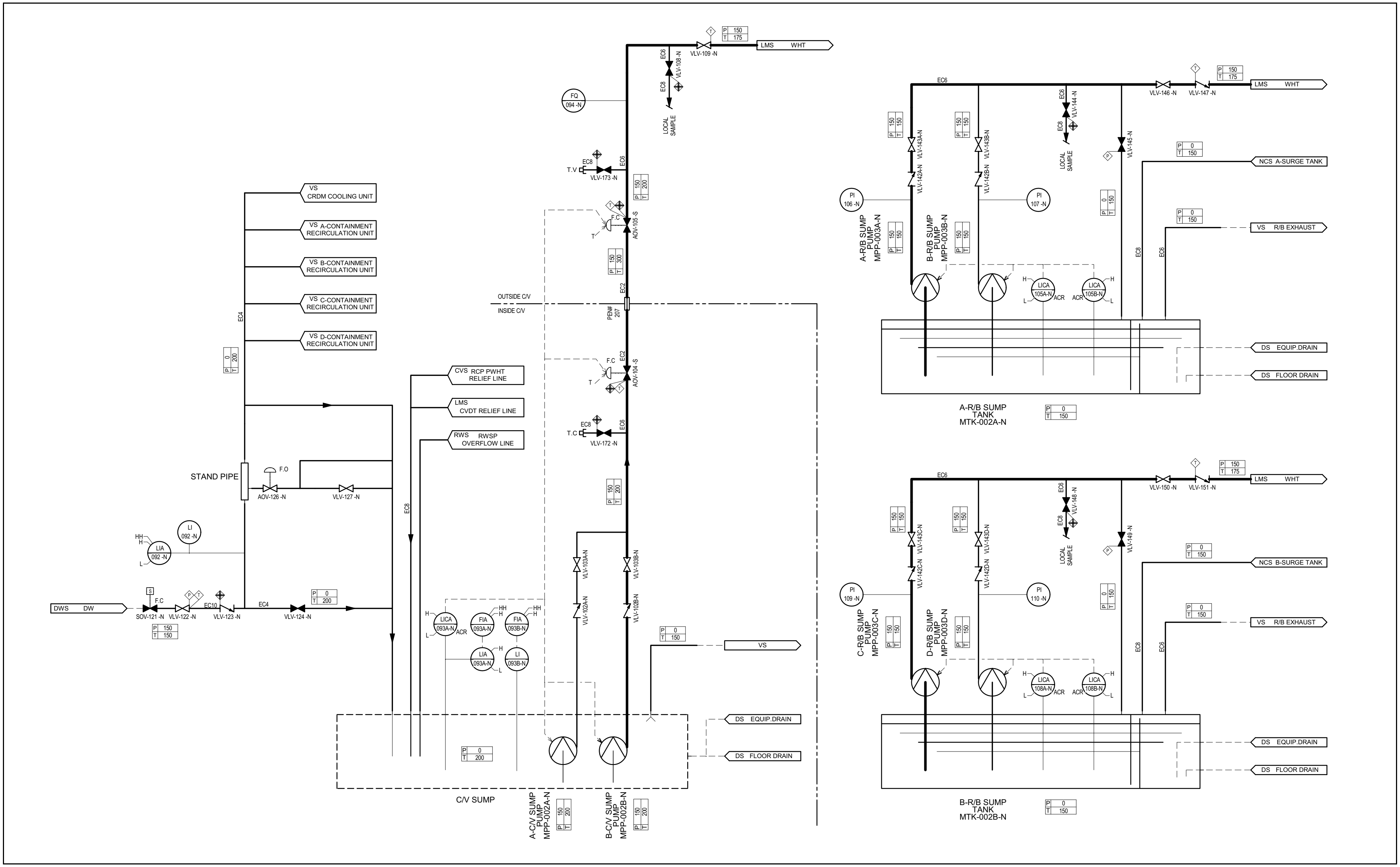
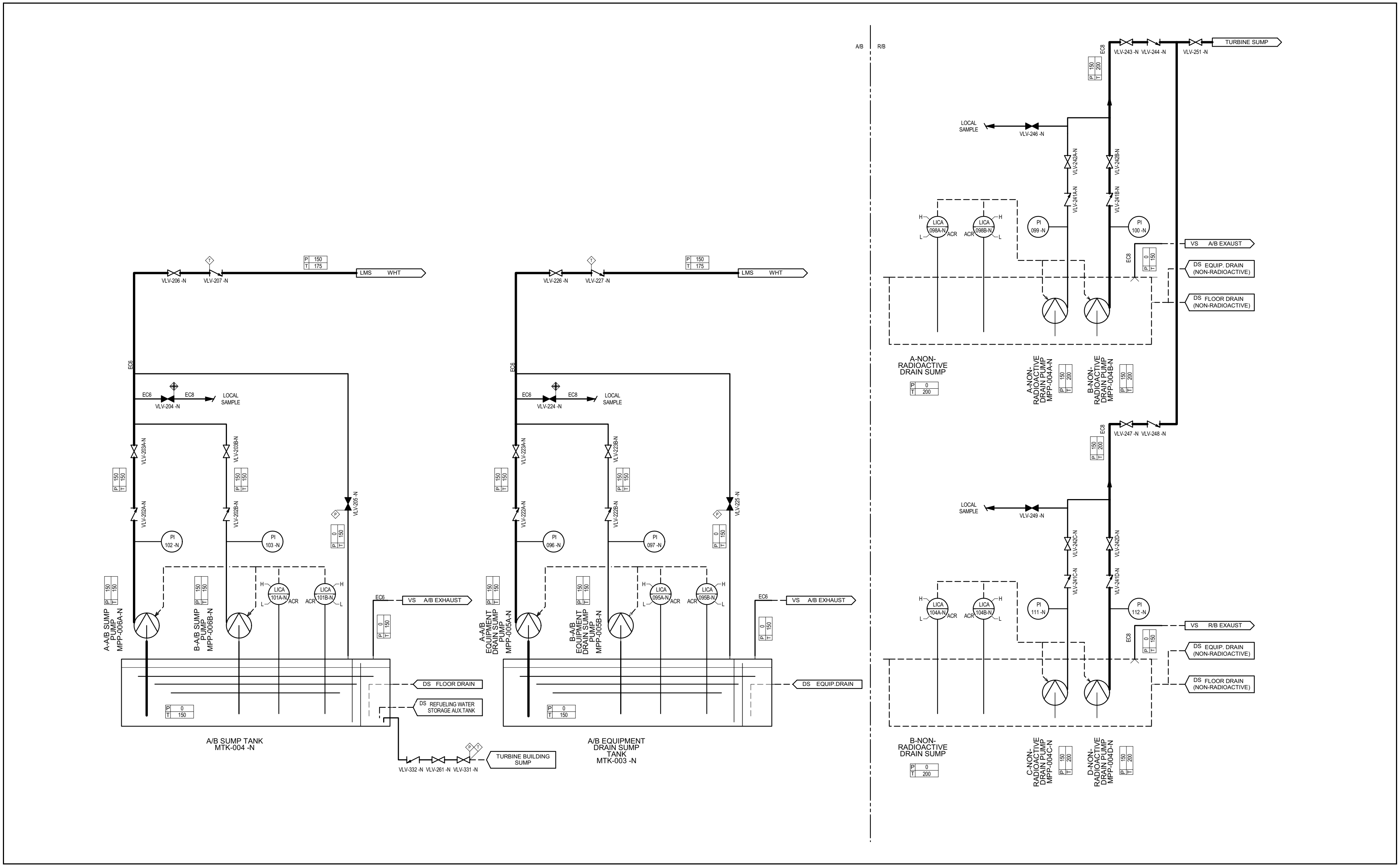


Figure 11.2-201 LWMS P&ID (Sheet 2 of 8)



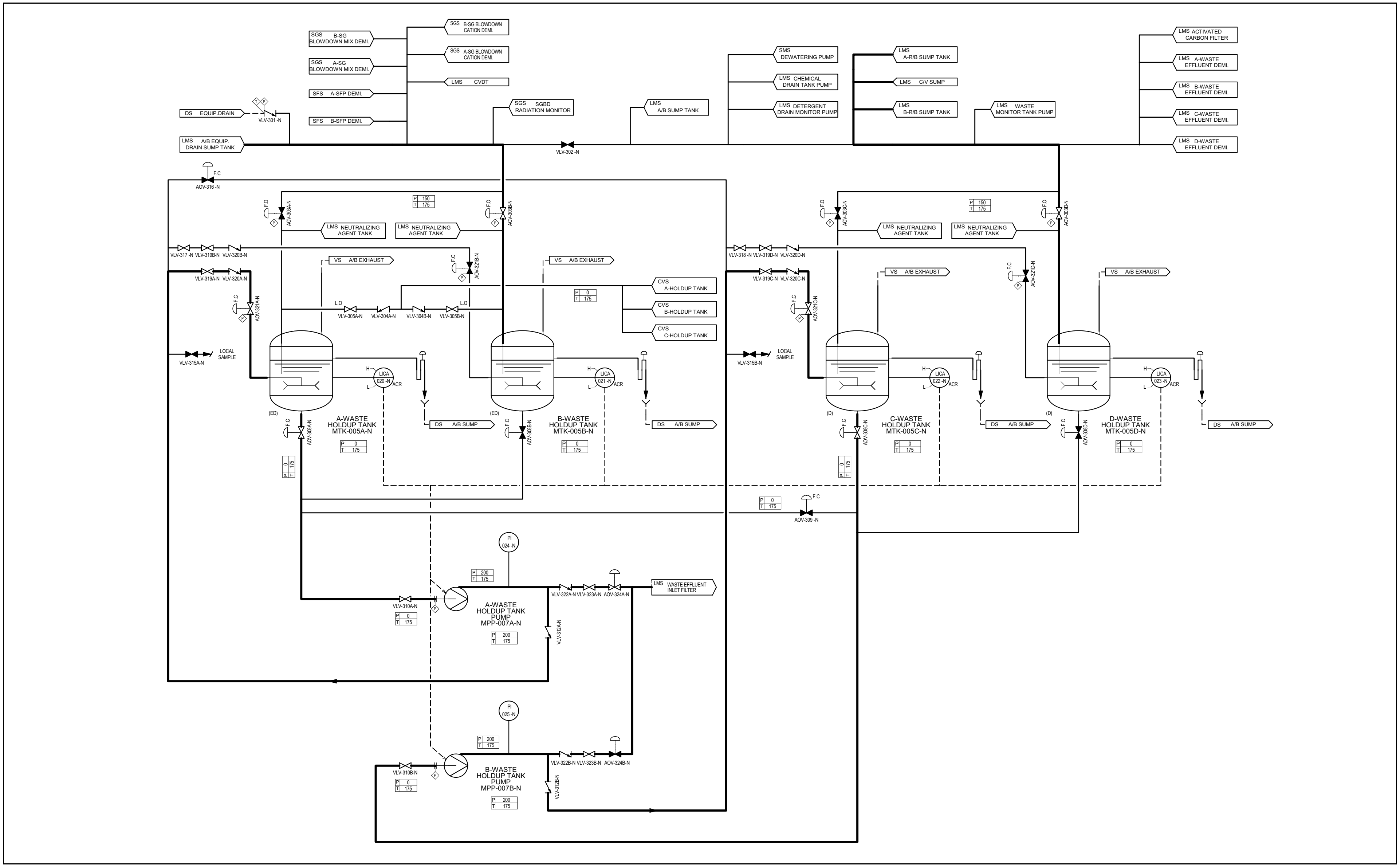
NAPS COL 11.2(6)

Figure 11.2-201 LWMS P&ID (Sheet 3 of 8)



NAPS COL 11.2(6)

Figure 11.2-201 LWMS P&ID (Sheet 4 of 8)



NAPS COL 11.2(6)

Figure 11.2-201 LWMS P&ID (Sheet 5 of 8)

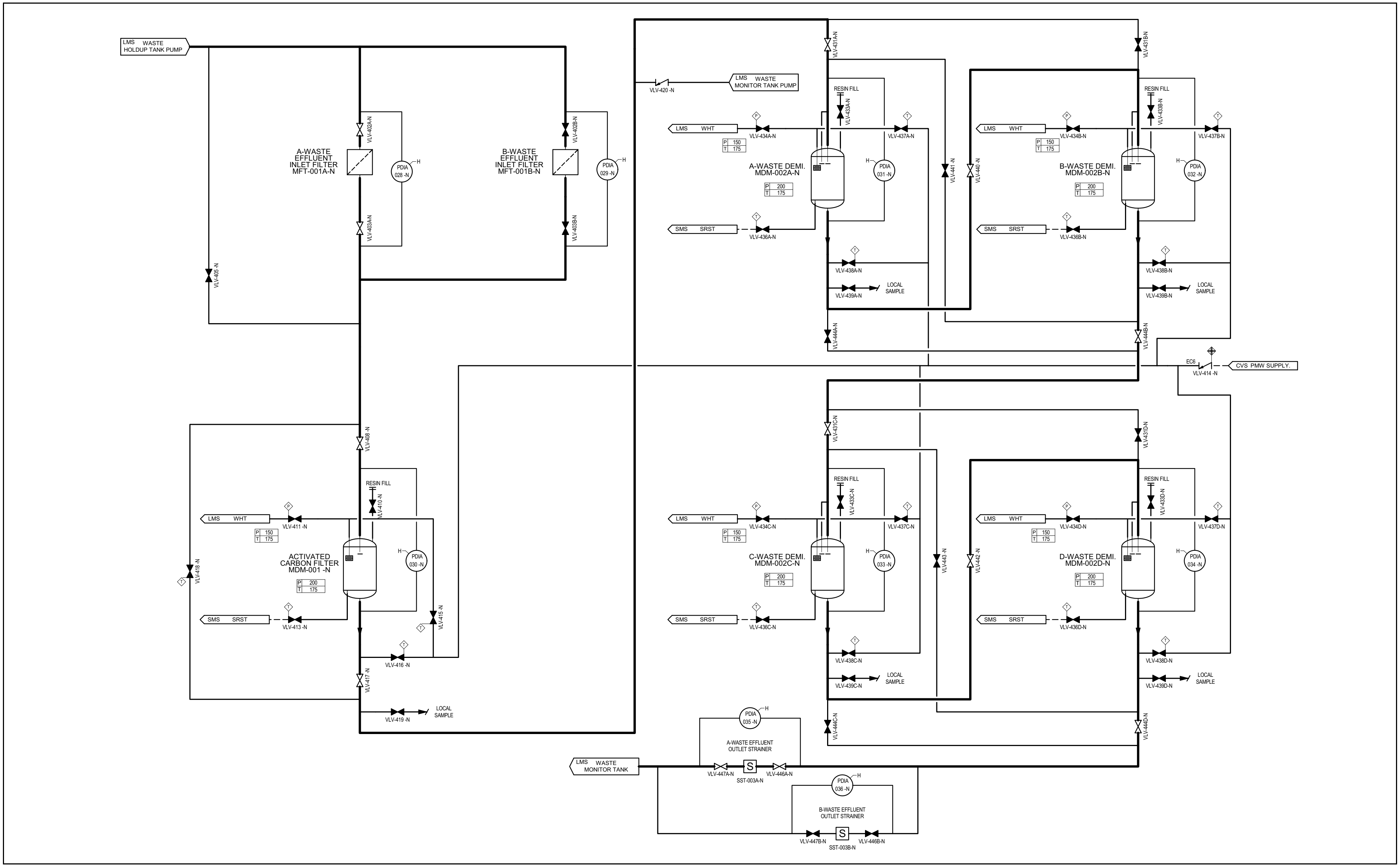
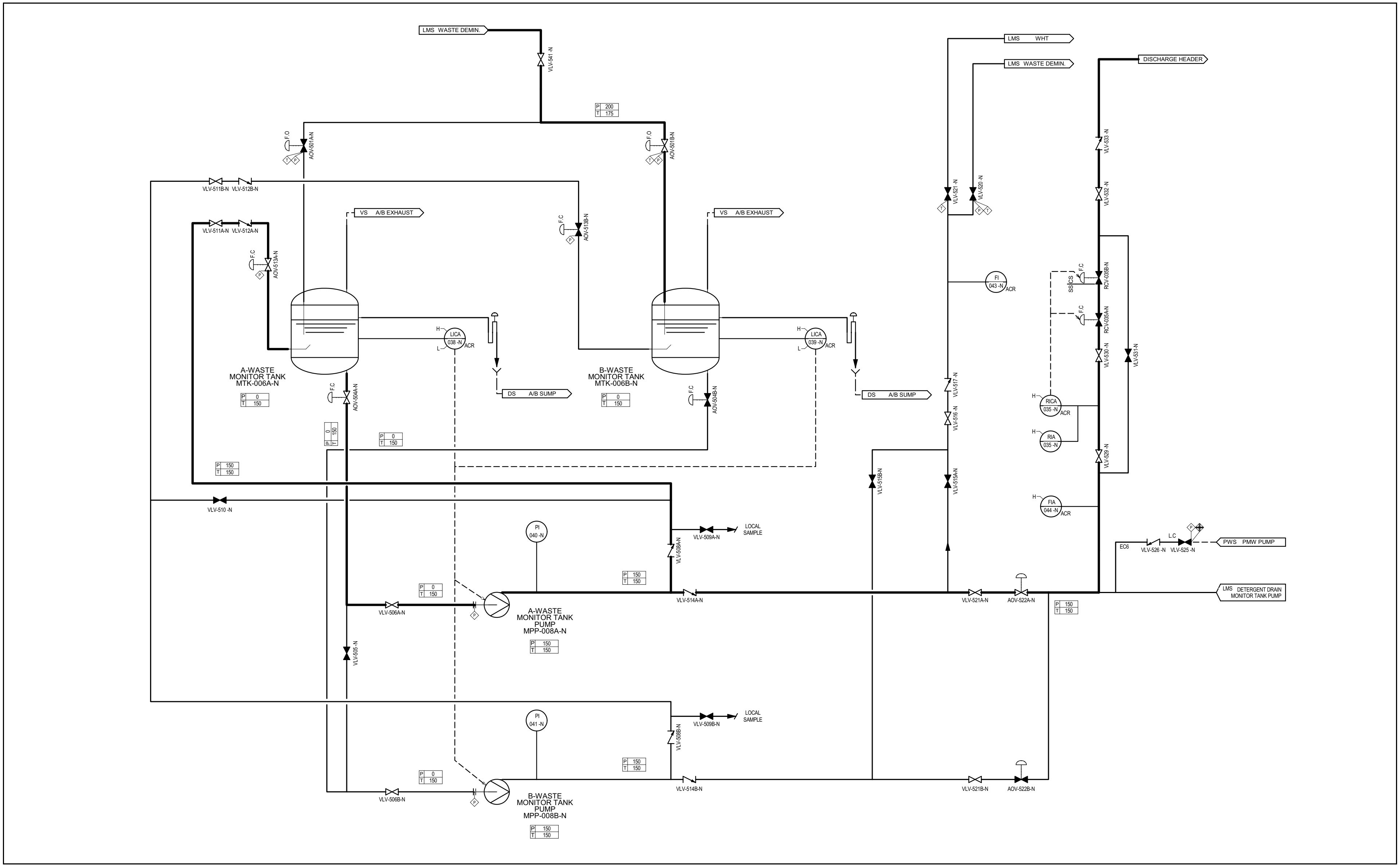
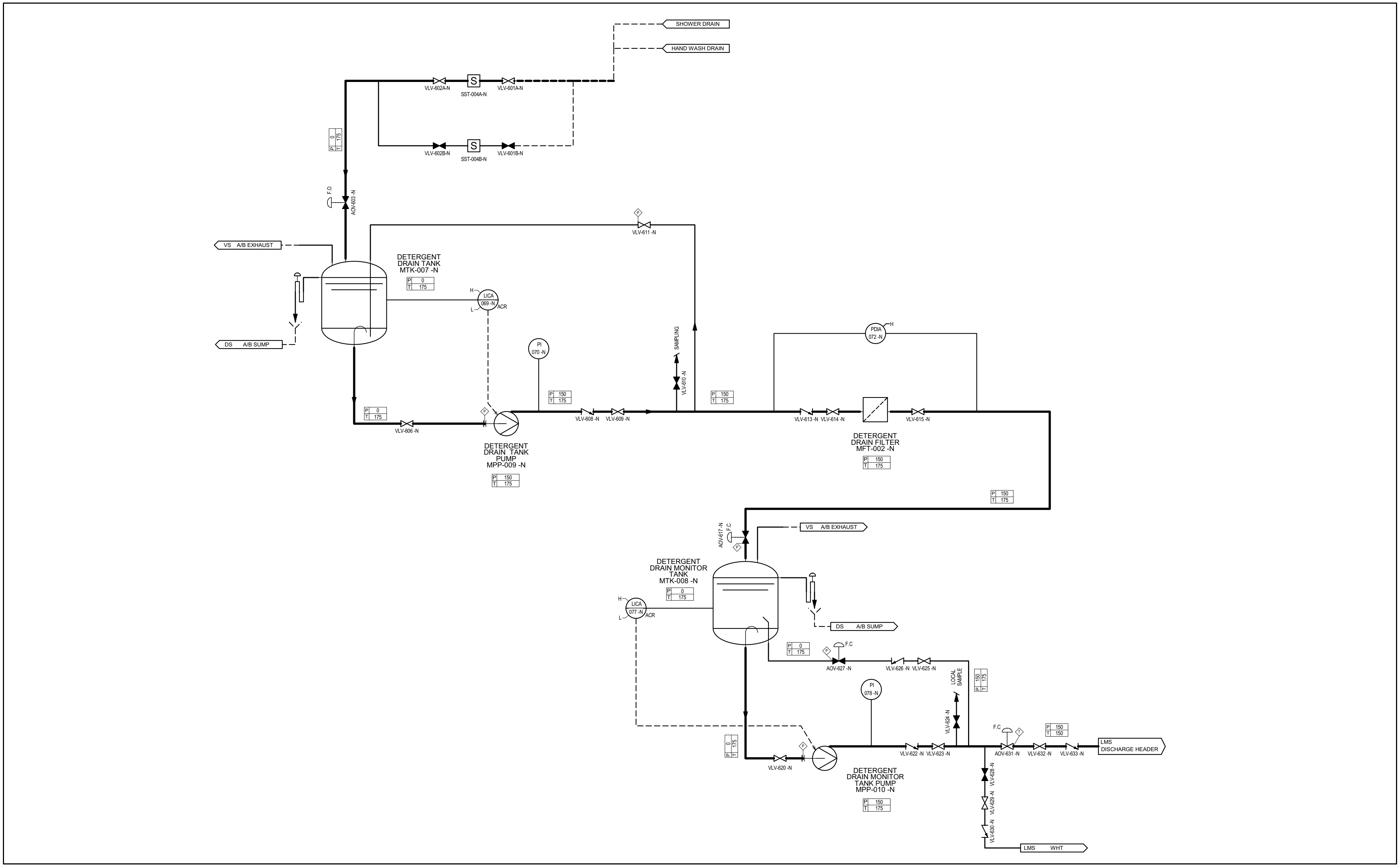


Figure 11.2-201 LWMS P&ID (Sheet 6 of 8)

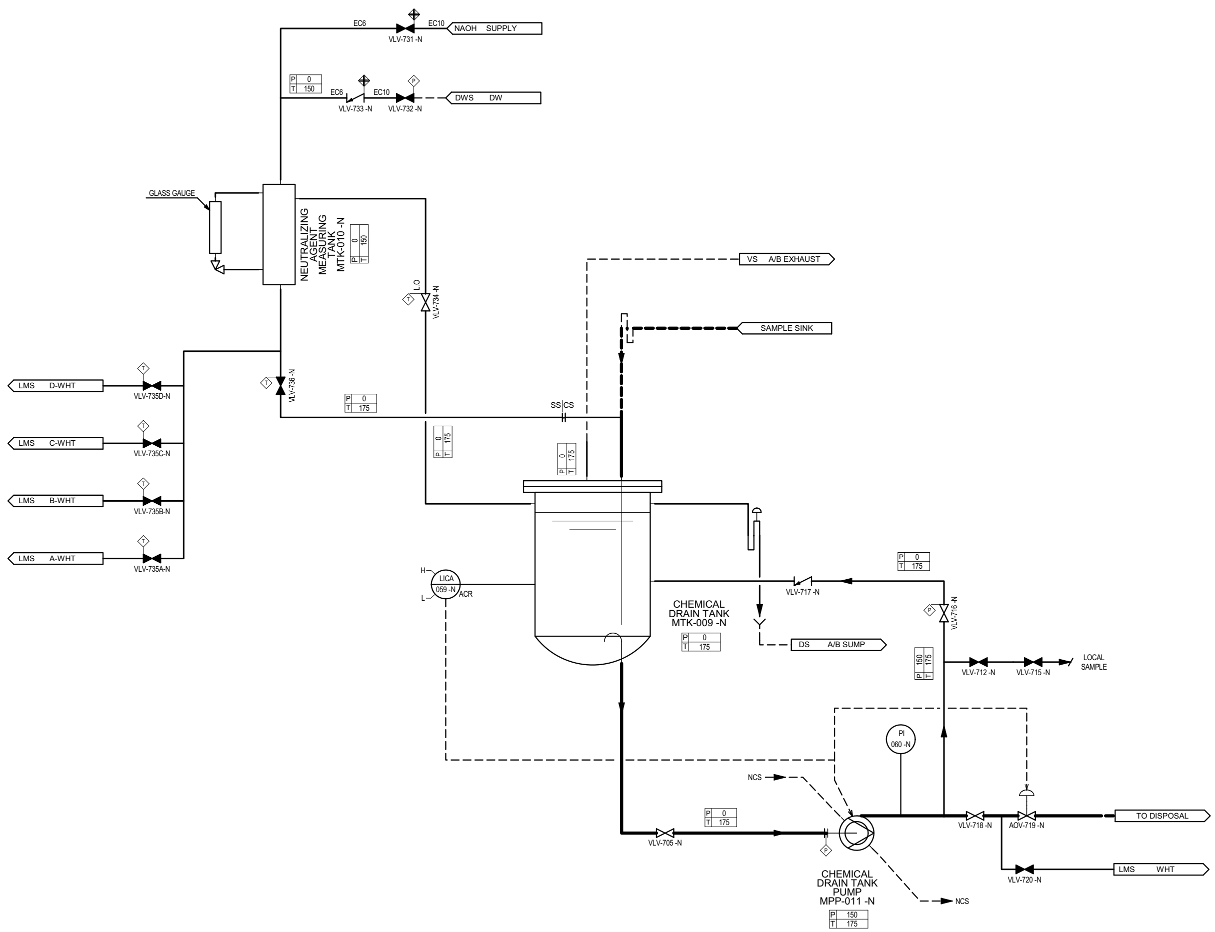


NAPS COL 11.2(6)

Figure 11.2-201 LWMS P&ID (Sheet 7 of 8)



NAPS COL 11.2(6) **Figure 11.2-201 LWMS P&ID (Sheet 8 of 8)**



11.3 Gaseous Waste Management System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.3.1.5 Site-Specific Cost Analysis

NAPS COL 11.3(8)
NAPS ESP COL 11.1-1

Replace the third paragraph in DCD Subsection 11.3.1.5 with the following.

The methodology for performing cost-benefit analysis for the radwaste system is presented in Section 11.2.1.5.

The value of $1000 per person-rem is prescribed in 10 CFR 50, Appendix I.

If it is conservatively assumed that each radwaste treatment system augment is a “perfect” technology that reduces the effluent dose by 100 percent, the annual cost of the augment can be determined and the lowest annual cost can be considered a threshold value. The lowest-cost option for augments is a steam generator flash tank vent to main condenser at $6650 per year, which yields a threshold value of 6.65 person-rem whole body or thyroid dose from gaseous effluents.

The total body and thyroid doses to the population for the gaseous effluents from Unit 3 are given in Table 11.3-203. None of the augments provided in RG 1.110 is found to be cost beneficial in reducing the annual population doses of 5.4 person-rem total body and 5.8 person-rem thyroid.

The lowest cost augment for the gaseous radwaste system is the steam generator flash tank vent to main condenser, with a minimum annual cost of $6650. The total body and thyroid gaseous population doses for Unit 3 are 5.4 and 5.8 person-rem, respectively. These correspond to equivalent annual benefits of $5400 and $5800 for reducing total body and thyroid doses, respectively. Because the cost of the least costly gaseous augment exceeds the benefit, no gaseous augments are justified.

11.3.2 System Description

STD COL 11.3(9)

Add the following text at the end of the second paragraph in DCD Subsection 11.3.2.

The piping and instrumentation diagrams (P&IDs) for the gaseous waste management system (GWMS) are provided in Figure 11.3-201 (Sheets 1 through 3).

NAPS COL 11.3(3)

Replace the last sentence in the last paragraph in DCD Subsection 11.3.2 with the following.

The release point of the vent stack is at an elevation of 519' 5" NAVD88 (520'3" NGVD29), which is the same height as the top of the containment. See Subsection 2.3.5 for a description of the release point assumptions for determining atmospheric dispersion factors.

11.3.3.1 Radioactive Effluent Releases and Dose Calculation in Normal Operation

NAPS DEP 9.2(1)

Replace the second sentence of the second paragraph in DCD Subsection 11.3.3.1 with the following.

The main sources of plant radioactive gaseous inputs to the GWMS are the waste gases from the VCT, containment vessel reactor coolant drain tank, degasifier, and HTs.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Replace the last three paragraphs in DCD Subsection 11.3.3.1 with the following.

The release rates and isotopic compositions are calculated using the PWR-GALE Code, NUREG-0017 (Ref. 11.3-1). The version of the code is a proprietary, modified version of the NRC PWR-GALE code that reflects the design specifics of US-APWR design (Ref. 11.3-28). Other parameters for the PWR-GALE Code calculation are listed in Section 11.1 and Section 11.2.3.1. The results of the PWR-GALE calculation are tabulated in DCD Table 11.3-5. In Tables 11.3-6R and 11.3-7R, the effluent concentrations at the EAB from Units 1, 2, and 3 are compared to the concentration limits of 10 CFR 20. The comparison indicates that the overall expected release is a small fraction (0.38%) of the concentration limit and the maximum release is 18% of the concentration limit.

Tables 11.3-6R and 11.3-7R include tritium contribution from an additional pathway. Since Lake Anna serves as the source of makeup water for the Unit 3 cooling tower, it is assumed that the tritium in Lake Anna is released to the environment as gaseous effluent via cooling tower evaporation. Tables 11.2-12R and 11.2-13R show that the maximum tritium concentration in Lake Anna from the operation of Units 1, 2, and 3 is 1.9E-5 μCi/ml. Multiplying this concentration by the maximum cooling tower evaporation rate of 16,695 gpm or 3.32E+13 ml/yr yields a release of 630 Ci/yr. Adding this value to the normal US-APWR release of 180 Ci/yr (DCD Table 11.3-5) results in a total tritium release of 810 Ci/yr, as shown in Tables 11.3-6R and 11.3-7R.

The maximum individual doses at the nearest EAB, residence, garden, and meat animal are calculated using the GASPAR II Code (Ref. 11.3-17). The parameters for the GASPAR II Code calculation are tabulated in Table 11.3-8R. The receptor yielding the maximum doses is the nearest residence. Calculated doses are tabulated in Table 11.3-9R. The gamma dose in air is 5.1E-02 mrad/yr and the beta dose in air is 4.0E-01 mrad/yr, which are less than the criteria of 10 mrad/yr and 20 mrad/yr, respectively, in 10 CFR 50, Appendix I. The doses to the total body and skin are 1.3E-01 and 4.2E-01 mrem/yr, less than the 10 CFR 50, Appendix I criteria of 5 and 15 mrem/yr, respectively. The dose due to iodines and particulates is 1.1E+00 mrem/yr to the child’s bone, meeting the 10 CFR 50, Appendix I criterion of 15 mrem/yr.

Table 11.3-201 compares the gaseous effluent doses to those calculated in the ESPA. The total Unit 3 doses from all gaseous effluent pathways remain within the ESP values. Table 11.3-202 compares the total site doses from all sources to the limits in 40 CFR 190. Since 40 CFR 190 is more restrictive than 10 CFR 20.1302, compliance with the former also demonstrates compliance with the latter. The population doses are summarized in Table 11.3-203.

11.3.7 Combined License Information

Replace the content of DCD Subsection 11.3.7 with the following.

11.3(1) ***Deleted from the DCD.***

11.3(2) ***Deleted from the DCD.***

NAPS COL 11.3(3)

11.3(3) ***Onsite vent stack design parameters***

This COL item is addressed in Subsection 11.3.2.

11.3(4) ***Deleted from the DCD.***

11.3(5) ***Deleted from the DCD.***

NAPS COL 11.3(6)

11.3(6) ***Site-specific dose calculation***

NAPS COL 11.3(6)

This COL item is addressed in Subsection 11.3.3.1, Table 11.3-6R, Table 11.3-7R, Table 11.3-8R, Table 11.3-9R, Table 11.3-201, Table 11.3-202, and Table 11.3-203.

11.3(7) ***Deleted from the DCD.***

NAPS COL 11.3(8)

11.3(8) ***Site-specific cost-benefit analysis***

This COL item is addressed in Subsection 11.3.1.5.

STD COL 11.3(9)
NAPS COL 11.3(9)

11.3(9) ***Piping and instrumentation diagrams***

This COL item is addressed in Subsection 11.3.2 and Figure 11.3-201.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-6R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Expected Releases)

Isotope	EAB Concentration (μCi/ml)[(1)(3)] Unit 3	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml)[(2)(4)]	Fraction of Concentration Limit[(5)]
I-131	4.00E-16	9.0E-15	9.4E-15	2.0E-10	4.7E-05
I-132	—	1.3E-15	1.3E-15	2.0E-08	6.3E-08
I-133	6.09E-15	8.6E-15	1.5E-14	1.0E-09	1.5E-05
1-134	—	2.0E-16	2.0E-16	6.0E-08	3.3E-09
I-135	—	2.5E-15	2.5E-15	6.0E-09	4.2E-07
Kr-85m	—	2.5E-12	2.5E-12	1.0E-07	2.5E-05
Kr-85	1.33E-10	2.0E-10	3.3E-10	7.0E-07	4.7E-04
Kr-87	—	1.4E-12	1.4E-12	2.0E-08	6.8E-05
Kr-88	—	4.4E-12	4.4E-12	9.0E-09	4.9E-04
Xe-131m	2.47E-11	2.0E-13	2.5E-11	2.0E-06	1.2E-05
Xe-133m	1.90E-13	3.7E-12	3.9E-12	6.0E-07	6.4E-06
Xe-133	—	3.6E-10	3.6E-10	5.0E-07	7.1E-04
Xe-135m	3.81E-13	2.9E-13	6.7E-13	4.0E-08	1.7E-05
Xe-135	1.90E-13	7.3E-12	7.5E-12	7.0E-08	1.1E-04
Xe-137	3.81E-13	—	3.8E-13	1.0E-09	3.8E-04
Xe-138	9.51E-14	7.8E-13	8.8E-13	2.0E-08	4.4E-05
H-3[(6)(7)]	7.71E-11	—	7.71E-11	1.0E-07	7.71E-04
C-14[(6)]	6.94E-13	—	6.9E-13	3.0E-09	2.3E-04
Ar-41[(6)]	3.23E-12	—	3.2E-12	1.0E-08	3.2E-04
Cr-51	5.80E-17	—	5.8E-17	3.0E-08	1.9E-09

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-6R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Expected Releases)

Isotope	EAB Concentration (µCi/ml)[(1)(3)] Unit 3	Units 1 & 2	Total	Effluent Concentration Limit (µCi/ml)[(2)(4)]	Fraction of Concentration Limit[(5)]
Mn-54	4.09E-17	—	4.1E-17	1.0E-09	4.1E-08
Co-57	7.80E-19	—	7.8E-19	9.0E-10	8.7E-10
Co-58	2.19E-15	—	2.2E-15	1.0E-09	2.2E-06
Co-60	8.37E-16	—	8.4E-16	5.0E-11	1.7E-05
Fe-59	7.52E-18	—	7.5E-18	5.0E-10	1.5E-08
Sr-89	2.85E-16	—	2.9E-16	2.0E-10	1.4E-06
Sr-90	1.14E-16	—	1.1E-16	6.0E-12	1.9E-05
Zr-95	9.51E-17	—	9.5E-17	4.0E-10	2.4E-07
Nb-95	2.38E-16	—	2.4E-16	2.0E-09	1.2E-07
Ru-103	7.61E-18	—	7.6E-18	9.0E-10	8.5E-09
Ru-106	7.42E-18	—	7.4E-18	2.0E-11	3.7E-07
Sb-125	5.80E-18	—	5.8E-18	7.0E-10	8.3E-09
Cs-134	2.19E-16	—	2.2E-16	2.0E-10	1.1E-06
Cs-136	8.09E-18	—	8.1E-18	9.0E-10	9.0E-09
Cs-137	3.42E-16	—	3.4E-16	2.0E-10	1.7E-06
Ba-137m	3.42E-16	—	3.4E-16	1.0E-09	3.4E-07
Ba-140	4.00E-17	—	4.0E-17	2.0E-09	2.0E-08

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-6R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Expected Releases)

Isotope	EAB Concentration (μCi/ml) (1)(3) Unit 3	Units 1 & 2	Total	Effluent Concentration Limit (μCi/ml) (2)(4)	Fraction of Concentration Limit(5)
Ce-141	4.00E-18	—	4.0E-18	8.0E-10	5.0E-09
Total	2.4E-10	5.8E-10	8.2E-10		3.8E-03

Notes:

1. X/Q=1.6E-05 s/m3 (See Section 2.3.5) is used in this calculation.Based on undecayed and undepleted EAB χ/Q of 3.0E-06 sec/m3 (Table 2.3-16R) for Unit 3. For Units 1 and 2, the releases are from NAPS UFSAR (Reference 11.2-201), Table 11.3-3, and the χ/Q is 3.3E-06 sec/m3 (Reference 11.2-201, Section 2.3.5.1).
2. 10 CFR 20 Appendix B, Table 2.
3. DCD Discharge Concentration column has been replaced with 3 columns for EAB Concentration (Unit 3, Units 1 & 2, and Total).
4. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
5. DCD values for Fraction of Concentration Limit column have been revised to one decimal place.
6. Entries have been revised to appear in a different position in the Isotope column than the DCD entries and associated values have been replaced.
7. Unit 3 concentration for H-3 includes the contribution from the Unit 3 cooling tower evaporation pathway.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-7R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Maximum Releases)

Isotope	EAB Concentration (µCi/ml) (1)(3) Unit 3	Units 1 & 2	Total	Effluent Concentration Limit (µCi/ml) (2)(4)	Fraction of Concentration Limit (5)
I-131	5.80E-13	2.3E-13	8.1E-13	2.0E-10	4.1E-03
I-132	—	4.6E-14	4.6E-14	2.0E-08	2.3E-06
I-133	9.89E-13	2.8E-13	1.3E-12	1.0E-09	1.3E-03
I-134	—	1.7E-14	1.7E-14	6.0E-08	2.8E-07
I-135	—	1.2E-13	1.2E-13	6.0E-09	1.9E-05
Kr-85m	—	7.0E-11	7.0E-11	1.0E-07	7.0E-04
Kr-85	4.36E-08	1.3E-09	4.5E-08	7.0E-07	6.4E-02
Kr-87	—	4.0E-11	4.0E-11	2.0E-08	2.0E-03
Kr-88	—	1.3E-10	1.3E-10	9.0E-09	1.4E-02
Xe-131m	1.51E-10	1.8E-12	1.5E-10	2.0E-06	7.7E-05
Xe-133m	1.08E-11	1.0E-10	1.1E-10	6.0E-07	1.9E-04
Xe-133	—	9.2E-09	9.2E-09	5.0E-07	1.8E-02
Xe-135m	2.04E-12	6.9E-12	8.9E-12	4.0E-08	2.2E-04
Xe-135	2.66E-11	2.1E-10	2.4E-10	7.0E-08	3.4E-03
Xe-137	1.92E-12	—	1.9E-12	1.0E-09	1.9E-03
Xe-138	9.45E-13	2.2E-11	2.3E-11	2.0E-08	1.1E-03
H-3 (6)(7)	7.71E-11	—	7.71E-11	1.0E-07	7.7E-04
C-14 (6)	6.94E-13	—	6.9E-13	3.0E-09	2.3E-04
Ar-41 (6)	3.23E-12	—	3.2E-12	1.0E-08	3.2E-04
Cr-51	5.80E-17	—	5.8E-17	3.0E-08	1.9E-09

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-7R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Maximum Releases)

Isotope	EAB Concentration (µCi/ml) (1)(3) Unit 3	Units 1 & 2	Total	Effluent Concentration Limit (µCi/ml) (2)(4)	Fraction of Concentration Limit(5)
Mn-54	4.09E-17	—	4.1E-17	1.0E-09	4.1E-08
Co-57	7.80E-19	—	7.8E-19	9.0E-10	8.7E-10
Co-58	2.19E-15	—	2.2E-15	1.0E-09	2.2E-06
Co-60	8.37E-16	—	8.4E-16	5.0E-11	1.7E-05
Fe-59	7.52E-18	—	7.5E-18	5.0E-10	1.5E-08
Sr-89	7.23E-15	—	7.2E-15	2.0E-10	3.6E-05
Sr-90	2.11E-15	—	2.1E-15	6.0E-12	3.5E-04
Zr-95	1.68E-16	—	1.7E-16	4.0E-10	4.2E-07
Nb-95	5.69E-16	—	5.7E-16	2.0E-09	2.8E-07
Ru-103	5.74E-19	—	5.7E-19	9.0E-10	6.4E-10
Ru-106	1.64E-20	—	1.6E-20	2.0E-11	8.2E-10
Sb-125	5.80E-18	—	5.8E-18	7.0E-10	8.3E-09
Cs-134	8.03E-12	—	8.0E-12	2.0E-10	4.0E-02
Cs-136	3.25E-15	—	3.3E-15	9.0E-10	3.6E-06
Cs-137	4.92E-12	—	4.9E-12	2.0E-10	2.5E-02
Ba-137m	2.36E-12	—	2.4E-12	1.0E-09	2.4E-03
Ba-140	1.32E-17	—	1.3E-17	2.0E-09	6.6E-09

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-7R Comparison of Calculated Offsite Airborne Concentrations with 10 CFR 20 (Maximum Releases)

Isotope	EAB Concentration (µCi/ml)[(1)(3)] Unit 3	EAB Concentration (µCi/ml)[(1)(3)] Units 1 & 2	EAB Concentration (µCi/ml)[(1)(3)] Total	Effluent Concentration Limit (µCi/ml)[(2)(4)]	Fraction of Concentration Limit[(5)]
Ce-141	1.74E-17	—	1.7E-17	8.0E-10	2.2E-08
Total	4.39E-08	1.1E-08	5.5E-08		1.8E-01

Notes:

1. X/Q=1.6E-05 s/m^3 (See Section 2.3.5) is used in this calculation.Based on undecayed and undepleted EAB χ/Q of 3.0E-06 sec/m^3 (Table 2.3-16R) for Unit 3. For Units 1 and 2, the releases are from NAPS UFSAR (Reference 11.2-201), Table 11.3-2, and the χ/Q is 3.3E-06 sec/m^3 (Reference 11.2-201, Section 2.3.5.1).
2. 10 CFR 20 Appendix B, Table 2.
3. DCD Discharge Concentration column has been replaced with 3 columns for EAB Concentration (Unit 3, Units 1 & 2, and Total).
4. DCD values for Effluent Concentration Limit column have been replaced with values showing only one decimal place.
5. DCD values for Fraction of Concentration Limit column have been revised to one decimal place.
6. Entries have been revised to appear in a different position in the Isotope column than the DCD entries and associated values have been replaced.
7. Unit 3 concentration for H-3 includes the contribution from the Unit 3 cooling tower evaporation pathway.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-8R Input Parameters for the GASPAR II Code

Parameter		Value
X/Q (s/m^3)	at EAB	1.6E-05(1)
	at offsite food production area	5.0E-06(2)
D/Q (at site boundary) (1/m^2)		4.0E-08
Distance to site boundary (m)		800
Atmospheric dispersion and ground deposition factors for individual receptors		Table 2.3-16R
Atmospheric dispersion and ground deposition factors for 50-mile region		Tables 2.3-209, -211, -213, and -215
Distances to receptors		Table 2.3-16R
Midpoint of plant life (s)(yr)		9.46E+08(30yr) 20
Fraction of the year that leafy vegetables are grown.		1.0 0.5
Fraction of the year that milk cows are on pasture.		1.0 0.67
Fraction of the maximum individual's vegetable intake that is from his own garden.		0.76
Fraction of milk-cow feed intake that is from pasture while on pasture.		1.0
Average absolute humidity over the growing season (g/m^3).		8.0
Fraction of the year that beef cattle are on pasture.		1.0 0.67
Fraction of beef-cattle feed intake that is from pasture while the cattle are on pasture		1.0
Animal considered for milk pathway		Cow None for individual Cow for population
Milk production within 50 miles in 2040 (L/yr)		7.2E+08
Meat production within 50 miles in 2040 (kg/yr)		1.7E+09
Vegetable production within 50 miles in 2040 (kg/yr)		5.4E+08
Source term		DCD Table 11.3-5 (Sheet 1 to 3) Plus H-3 at 630 Ci/yr from cooling tower evaporation.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-8R Input Parameters for the GASPAR II Code

Parameter	Value
Population distribution within 50 miles in 2040	ESP-SSAR Figures 2.1-8 and 2.1-13
Other parameters	RG 1.109

~~Notes:~~

1. ~~For gamma dose in air, beta dose in air, dose to total body, dose from ground, and dose due to inhalation (see Section 2.3.5).~~
2. ~~For dose from food (Vegetable, meat, and cow milk) pathway (see Section 2.3.5)~~

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-9R Calculated Dose from Gaseous Effluents (Sheets 1 of 2)

Type of Dose	Dose(1)		
	ESP(2)	**Unit 3(3)**	**Limit(4)**
Gamma dose in air (mrad/yr)	3.2E+00	5.1E-02	10
Beta dose in air (mrad/yr)	4.8E+00	4.0E-01	20
Dose to total body (mrem/yr)	2.4E+00	1.3E-01	5
Dose to skin (mrem/yr)	6.2E+00	4.2E-01	15
Dose due to iodines and particulates - Bone (mrem/yr)	1.2E+01	1.1E+00	15

Notes:

1. ~~Doses due to noble gases that include Ar-41.~~DCD Dose column and values have been replaced.
2. ESP doses are from ESP-ER Table 5.4-10. The dose due to iodines and particulates is at the nearest garden and is to the thyroid, the organ receiving the maximum ESP dose. Other ESP doses are at the site boundary.
3. Doses are at the nearest residence. The air, total body, and skin doses are external doses. The dose due to iodines and particulates is from all pathways.
4. 10 CFR 50 Appendix I criteria.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-9R Calculated Doses from Gaseous Effluents (Sheets 2 of 2)

	Unit 3 Dose to each organ[1] (mrem/yr)							
Pathway	**Total Body**	**GI-Tract**	**Bone**	**Liver**	**Kidney**	**Thyroid**	**Lung**	**Skin [2]**
Plume	3.3E-02	3.3E-02	3.3E-02	3.3E-02	3.3E-02	3.3E-02	3.6E-02	3.1E-01
Ground	9.7E-02	9.7E-02	9.7E-02	9.7E-02	9.7E-02	9.7E-02	9.7E-02	1.1E-01
Vegetable								
Adult	3.0E-01	3.0E-01	1.1E+00	2.9E-01	2.8E-01	3.4E-01	2.8E-01	NA
Teen	4.2E-01	4.3E-01	1.7E+00	4.3E-01	4.1E-01	4.9E-01	4.0E-01	NA
Child	8.8E-01	8.7E-01	4.1E+00	9.0E-01	8.6E-01	1.0E+00	8.5E-01	NA
Meat								
Adult	8.1E-02	9.2E-02	3.1E-01	8.1E-02	8.0E-02	8.2E-02	8.0E-02	NA
Teen	6.3E-02	7.0E-02	2.6E-01	6.4E-02	6.3E-02	6.4E-02	6.3E-02	NA
Child	1.1E-01	1.1E-01	4.9E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	NA
Cow Milk								
Adult		1.17E-01	5.33E-01	1.78E-01	1.32E-01	5.10E-01	1.14E-01	
Teen		1.98E-01	9.54E-01	3.09E-01	2.29E-01	8.28E-01	2.00E-01	
Child		4.39E-01	2.27E+00	6.38E-01	5.02E-01	1.72E+00	4.53E-01	
Infant		8.82E-01	4.26E+00	1.27E+00	9.87E-01	4.02E+00	9.14E-01	
Inhalation								
Adult	7.2E-02	7.3E-02	4.3E-03	7.3E-02	7.2E-02	9.4E-02	8.3E-02	NA
Teen	7.3E-02	7.3E-02	5.1E-03	7.3E-02	7.3E-02	1.0E-01	8.9E-02	NA
Child	6.4E-02	6.4E-02	6.0E-03	6.5E-02	6.5E-02	1.0E-01	7.7E-02	NA
Infant	3.7E-02	3.7E-02	2.7E-03	3.8E-02	3.7E-02	7.1E-02	4.6E-02	NA
Total								
Adult	5.8E-01	6.0E-01	1.5E+00	5.8E-01	5.6E-01	6.5E-01	5.7E-01	4.2E-01
Teen	6.9E-01	7.0E-01	2.1E+00	7.0E-01	6.7E-01	7.9E-01	6.8E-01	4.2E-01
Child	1.2E+00	1.2E+00	4.7E+00	1.2E+00	1.2E+00	1.4E+00	1.2E+00	4.2E-01
Infant	1.7E-01	1.7E-01	1.3E-01	1.7E-01	1.7E-01	2.0E-01	1.8E-01	4.2E-01

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-9R Calculated Doses from Gaseous Effluents (Sheets 2 of 2)

	Unit 3 Dose to each organ(1) (mrem/yr)							
Pathway	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin (2)
Maximum(3)								
Dose	1.2E+00	1.2E+00	4.7E+00	1.2E+00	1.2E+00	1.4E+00	1.2E+00	4.2E-01
Group	Child	Child	Child	Child	Child	Child	Child	All

Notes:

1. Doses due to iodine, particulate, H-3 and C-14. Doses are at the nearest residence, the receptor receiving the maximum offsite dose. All DCD values have been replaced with Unit 3 values.
2. Skin dose is not applicable (NA) for internal pathways (vegetable, meat, inhalation).
3. The last two rows identify the maximum dose for each organ and the age group receiving the dose.
4. There are no milk animals within 5 miles of the plant.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1
NAPS ESP VAR 11.3-1

Table 11.3-201 Comparison of Individual Doses from Gaseous Effluents to ESP

		ESP Dose (1) (mrem/yr)			Unit 3 Dose (2) (mrem/yr)		
Location (3)	**Pathway**	**Total Body**	**Thyroid**	**Skin**	**Total Body**	**Thyroid**	**Skin**
EAB	Plume/Ground	2.1E+00	NA	6.2E+00	1.2E-01	**1.2E-01**	3.5E-01
	Inhalation						
	Adult	3.0E-01	1.6E+00	NA	5.6E-02	7.2E-02	NA
	Teen	3.1E-01	2.0E+00	NA	5.6E-02	7.8E-02	NA
	Child	2.7E-01	2.3E+00	NA	5.0E-02	7.7E-02	NA
	Infant	1.6E-01	2.0E+00	NA	2.9E-02	5.4E-02	NA
Nearest Garden	Vegetable						
	Adult	4.4E-01	4.9E+00	NA	3.0E-01	3.4E-01	NA
	Teen	5.7E-01	6.6E+00	NA	4.2E-01	4.9E-01	NA
	Child	1.1E+00	1.3E+01	NA	8.8E-01	1.0E+00	NA
Nearest Meat Animal	Meat						
	Adult	6.7E-02	1.5E-01	NA	**8.1E-02**	8.2E-02	NA
	Teen	4.9E-02	1.1E-01	NA	**6.3E-02**	6.4E-02	NA
	Child	7.9E-02	1.7E-01	NA	**1.1E-01**	1.1E-01	NA
Nearest Residence	Plume/Ground	1.4E+00	NA	4.0E+00	1.3E-01	**1.3E-01**	4.2E-01
	Inhalation						
	Adult	2.0E-01	1.0E+00	NA	7.2E-02	9.4E-02	NA
	Teen	2.0E-01	1.3E+00	NA	7.3E-02	1.0E-01	NA
	Child	1.8E-01	1.5E+00	NA	6.4E-02	1.0E-01	NA
	Infant	1.0E-01	1.3E+00	NA	3.7E-02	7.1E-02	NA

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1
NAPS ESP VAR 11.3-1

Table 11.3-201 Comparison of Individual Doses from Gaseous Effluents to ESP

		ESP Dose (1) (mrem/yr)			Unit 3 Dose (2) (mrem/yr)		
Location (3)	**Pathway**	**Total Body**	**Thyroid**	**Skin**	**Total Body**	**Thyroid**	**Skin**
Nearest Garden/ Meat Animal/ Residence	All						
	Adult	1.6E+00	4.9E+00	4.0E+00	5.8E-01	6.5E-01	4.2E-01
	Teen	1.6E+00	6.6E+00	4.0E+00	6.9E-01	7.9E-01	4.2E-01
	Child	1.6E+00	1.3E+01	4.0E+00	1.2E+00	1.4E+00	4.2E-01
	Infant	1.5E+00	1.3E+00	4.0E+00	1.7E-01	2.0E-01	4.2E-01

Notes:

1. ESP doses are from ESP-ER Table 5.4-9. The ESP doses shown in the last four rows are the maximum of garden, meat animal, and residence doses.
2. Unit 3 doses that exceed the corresponding ESP values are shown in bold.
3. For both Unit 3 and the ESP, the nearest EAB is at 0.88 mile ESE. For Unit 3, all other receptors are assumed to be located at 0.74 mile ESE (Table 2.3-16R). The nearest ESP receptors are at 0.94 mile NE for garden, 1.37 mile SE for meat animal, and 0.96 mile NNE for residence (ESP-ER Table 5.4-9). The doses shown in the last four rows are obtained by adding the garden, meat animal, and residence doses.
4. Doses are denoted as not applicable where there is no dose for the given pathway and age group.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1
NAPS ESP VAR 11.3-2

Table 11.3-202 Comparison of Site Doses with 40 CFR 190 Limits

Type of Dose	Dose (mrem/yr)							
	ESP Site Total (1)	Unit 3 (2)			Units 1 and 2 (3)	ISFSI (4)	Site Total (5)	40 CFR 190 Limit
		Liquid	Gas	Total				
Total Body	6.8E+00	5.9E-01	1.2E+00	1.8E+00	**1.4E+00**	**3.6E+00**	6.7E+00	25
Thyroid	2.7E+01	4.9E-01	1.4E+00	1.9E+00	**1.5E+00**	**3.6E+00**	7.0E+00	75
Bone	1.2E+01	1.5E-01	4.7E+00	4.8E+00	**1.5E+00**	**3.6E+00**	9.9E+00	25

Note:

1. ESP doses are from ESP-ER Table 5.4-11.
2. Unit 3 liquid and gaseous effluent doses are from Tables 11.2-15R and 11.3-9R, respectively.
3. Doses from Units 1 and 2 are based on liquid and gaseous effluents and an assumed direct radiation total dose from both units of 1 mrem/yr.
4. The ISFSI dose is based on the ISFSI fully loaded with 84 casks.
5. Doses that exceed the corresponding ESP values are shown in bold.

NAPS COL 11.3(6)
NAPS ESP COL 11.1-1

Table 11.3-203 Population Doses within 50 Miles

	Dose (person-rem/yr)		
	ESP [1]	Unit 3	
Pathway	Total Body	Total Body	Thyroid
Liquid	8.6E+00	6.2E+00	4.2E+00
Gaseous			
Noble Gases	3.5E+00	1.0E-01	1.0E-01
Iodines and Particulates	1.4E+00	6.3E-01	9.9E-01
H-3 and C-14	1.4E+01	4.7E+00	4.7E+00
Total	1.9E+01	5.4E+00	5.8E+00
Total	2.8E+01	1.2E+01	1.0E+01
Natural Background [2]	9.2E+05	9.2E+05	—

Notes:

1. ESP doses are from ESP-ER Table 5.4-12.
2. Natural background dose is based on a dose rate of 325 mrem and 2040 population of 2.83E6.

Figure 11.3-1R Gaseous Waste Management System Process Flow Diagram (Sheet 1 of 3)

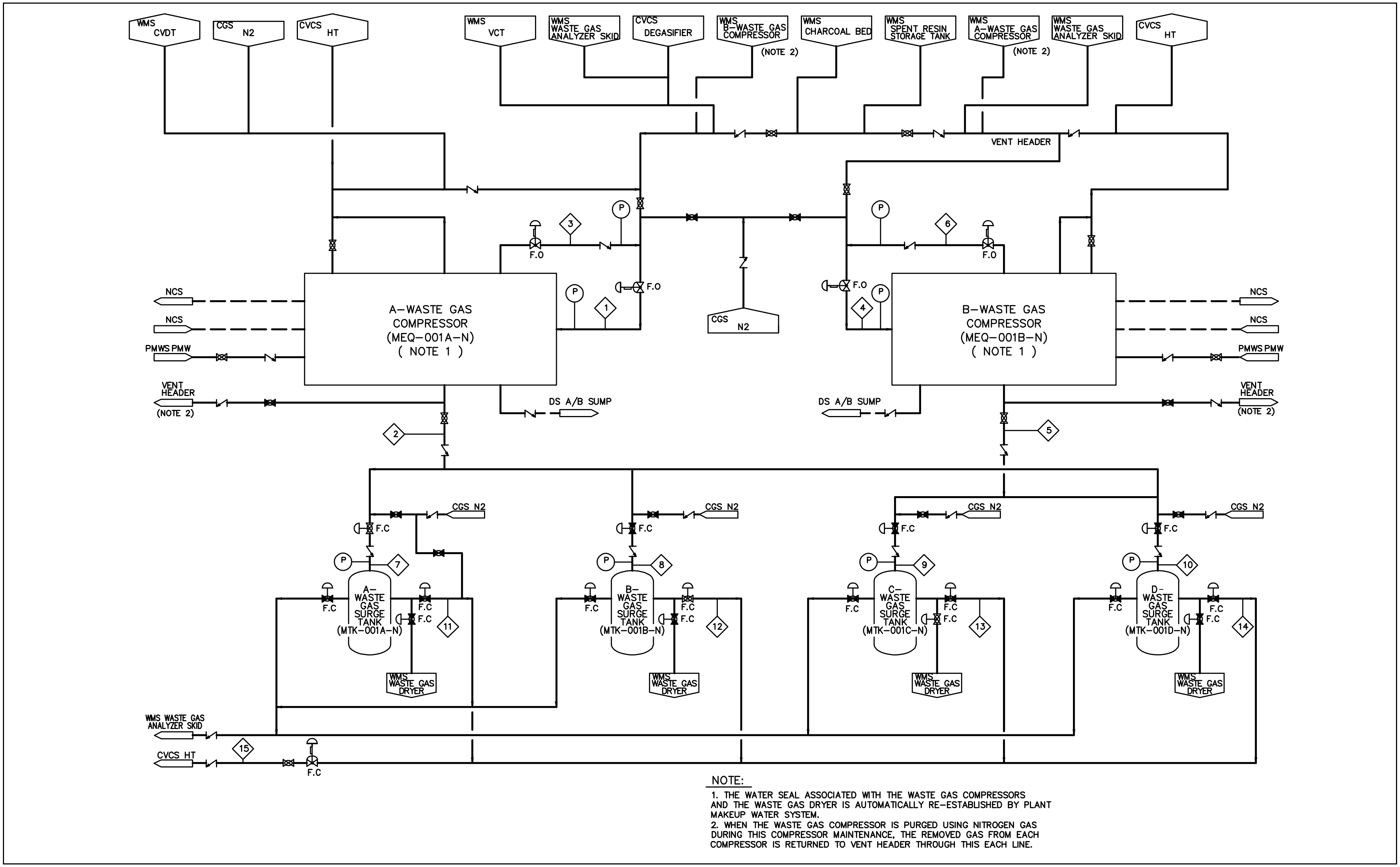


Figure 11.3-1R Gaseous Waste Management System Process Flow Diagram (Sheet 2 of 3)

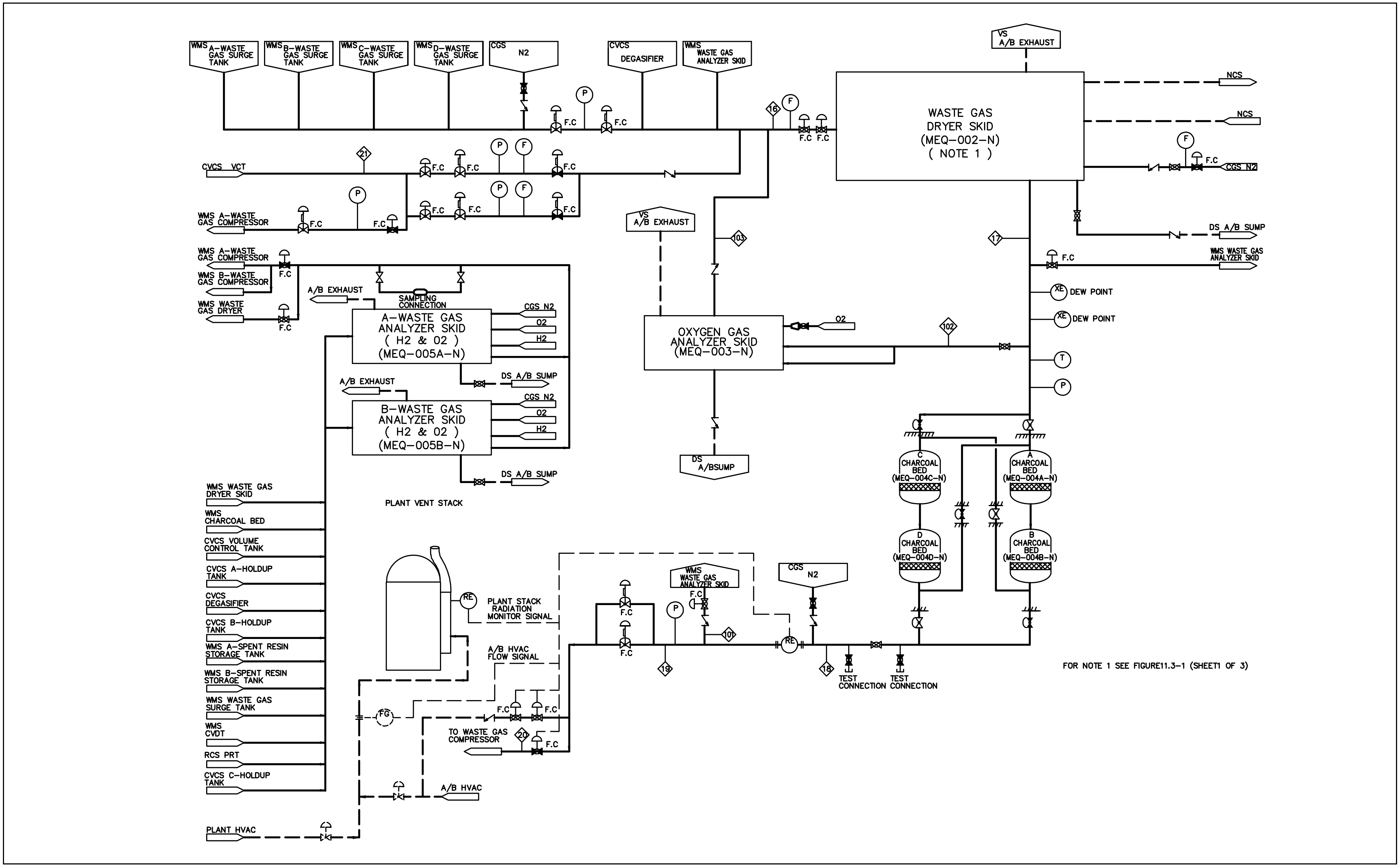
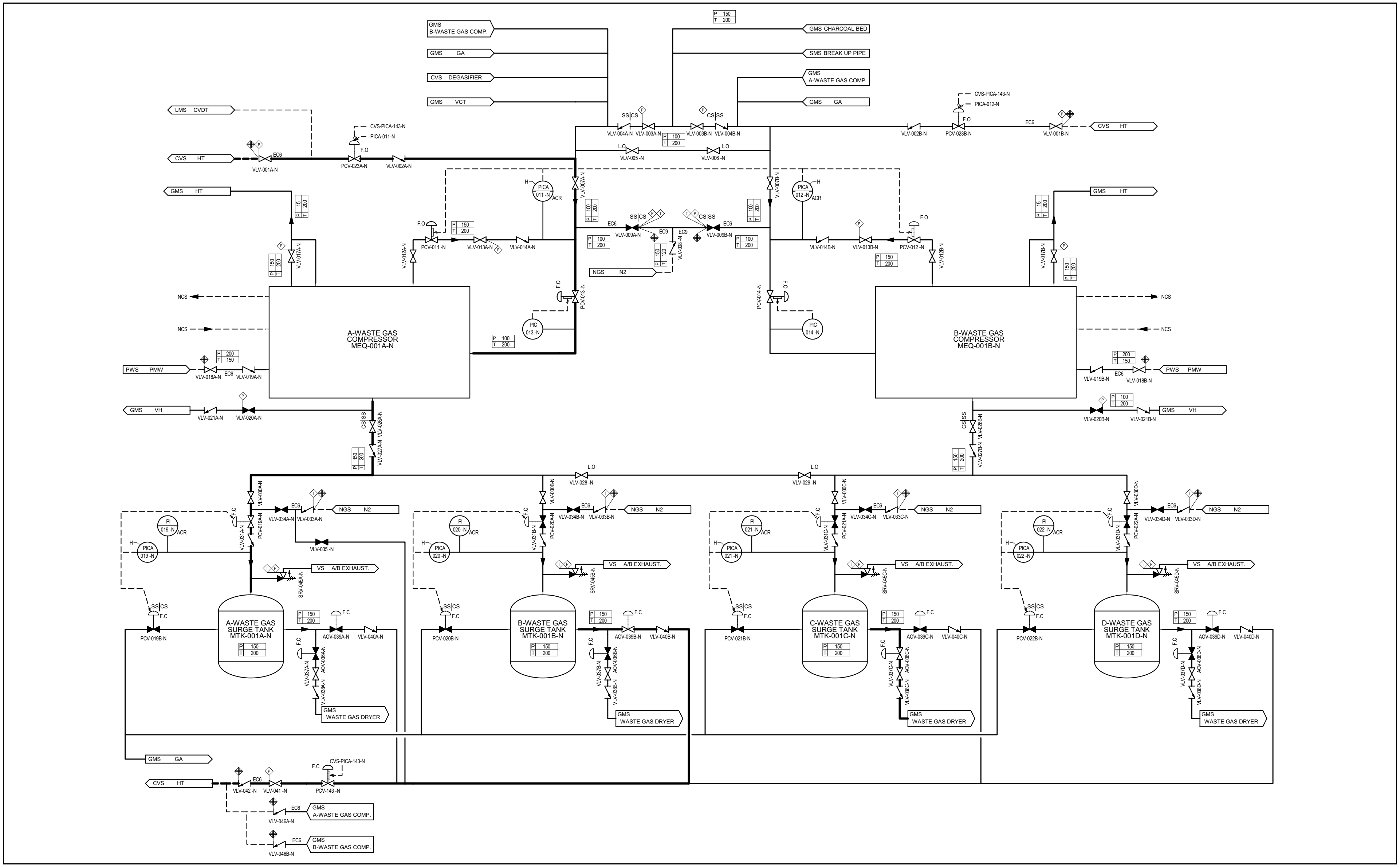


Figure 11.3-201 Gaseous Waste Management System P&ID (Sheet 1 of 3)



NAPS COL 11.3(9)

Figure 11.3-201 Gaseous Waste Management System P&ID (Sheet 2 of 3)

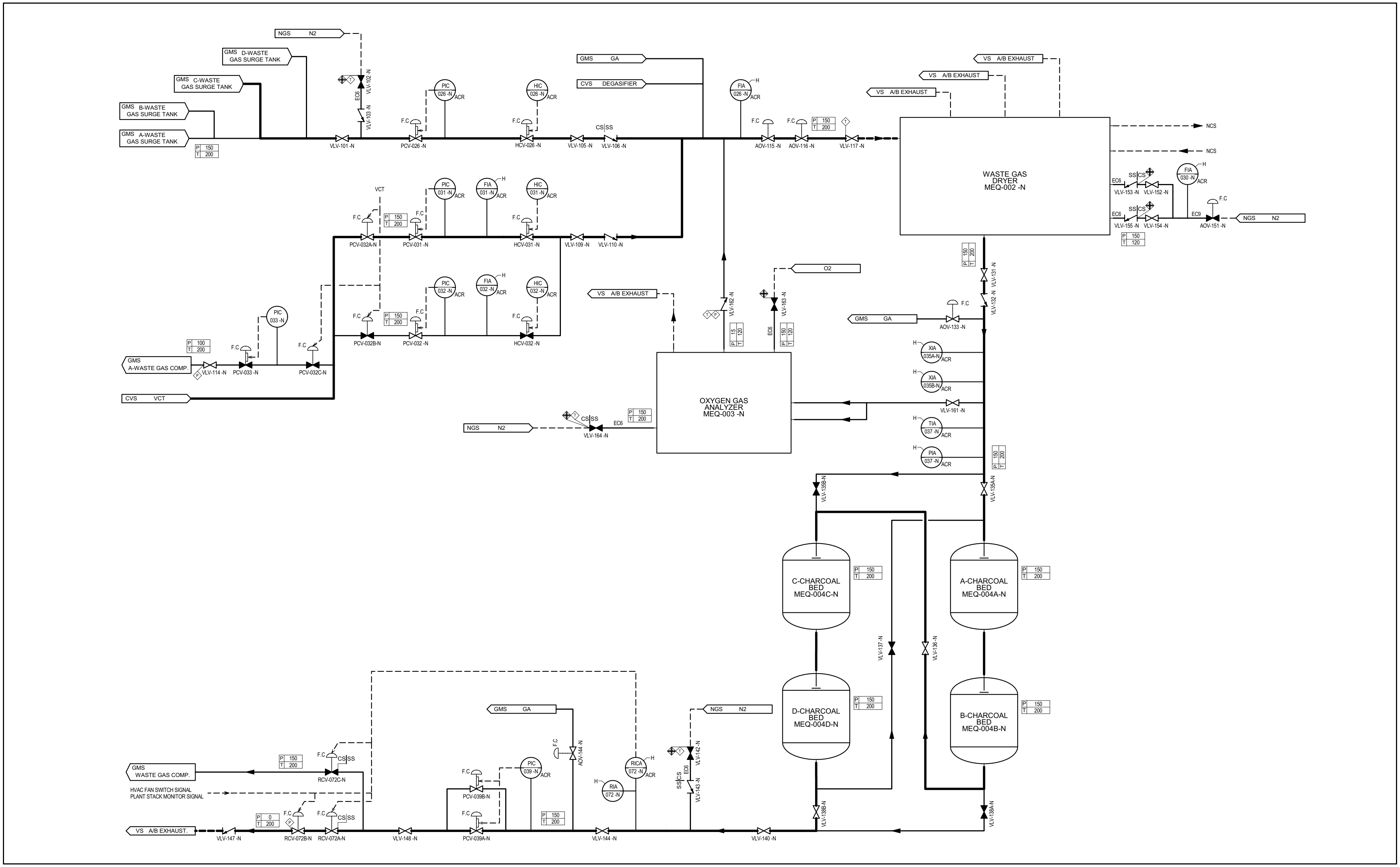
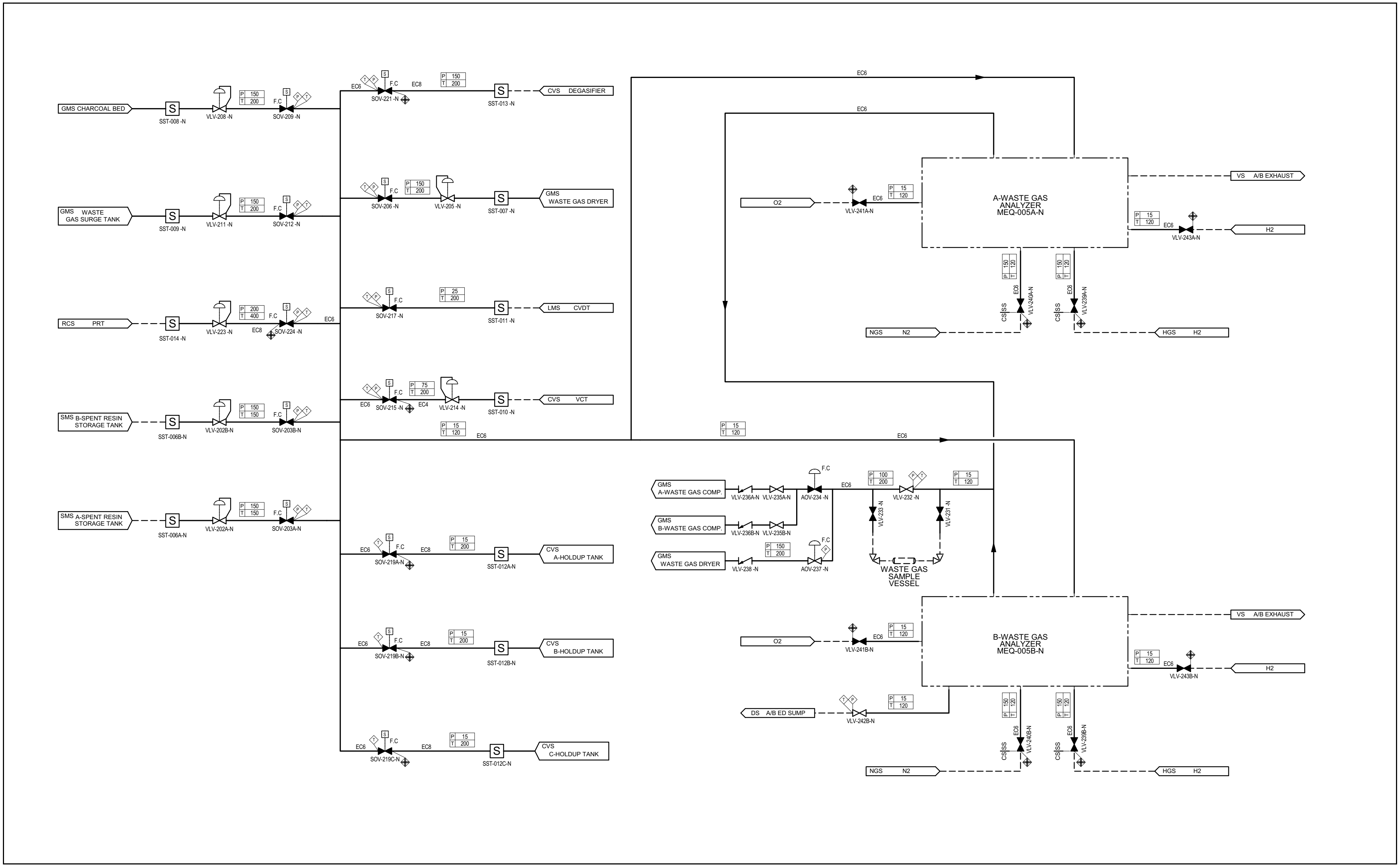


Figure 11.3-201 Gaseous Waste Management System P&ID (Sheet 3 of 3)



11.4 Solid Waste Management System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.4.1.3 Other Design Considerations

STD COL 11.4(5) Replace the fourth bullet in DCD Subsection 11.4.1.3 with the following.

- The current design provides collection and packaging of potentially contaminated clothing for offsite processing and/or disposal. Laundry services are performed offsite at appropriate vendor facilities. Waste resulting from these processes is forwarded directly from the vendor's location to the disposal facility or returned to the long-term storage facility, as appropriate.

11.4.1.5 Site-Specific Cost-Benefit Analysis

STD COL 11.4(6) Replace the second paragraph in DCD Subsection 11.4.1.5 with the following.

The solid waste management system (SWMS) is designed to handle spent resin, sludge, oily waste, spent filters, and dry active waste including contaminated clothing, broken equipment, and maintenance items that cannot be easily decontaminated and reused. The SWMS provides staging areas and handling equipment for waste packaging and storage for the above wastes. Any liquid and gaseous wastes resulting from the solid waste handling operation are collected and returned to LWMS and GWMS, for processing. As such, there is no unique direct release pathway from the solid waste handling operation to the environment, and a cost benefit analysis for the SWMS is included in the consideration of the LWMS and GWMS.

11.4.1.6 Mobile or Temporary Equipment

STD COL 11.4(5)
STD COL 11.4(7)
STD COL 11.4(10)

Replace the last sentence in the paragraph in DCD Subsection 11.4.1.6 with the following.

The de-watering station is contracted for vendor services.

Process piping connections for the de-watering station have connectors different from the utility connectors to prevent cross-connection and contamination. The use of mobile or temporary equipment will require

applicable regulatory requirements and guidance such as 10 CFR 50.34a, 10 CFR 20.1406 and RG 1.143 to be addressed. As such the purchase or lease contracts for any temporary and mobile equipment will specify the applicable criteria.

11.4.2.1.1 Dry Active Wastes

STD COL 11.4(1)

Replace the last paragraph in DCD Subsection 11.4.2.1.1 with the following.

Descriptions of wastes other than normally accumulated non-radioactive wastes such as wasted activated carbon from GWMS charcoal beds, solid wastes coming from component (Steam generator, Reactor vessel etc.) replacement activities, and other unusual cases will be described in the process control program and will be implemented in accordance with the milestone listed in Table 13.4-201.

11.4.2.2.1 Spent Resin Handling and De-watering Subsystem

STD COL 11.4(8)

Replace the last sentence in the second paragraph in DCD Subsection 11.4.2.2.1 with the following.

The P&ID for the SWMS is provided in Figure 11.4-201.

11.4.2.3 Packaging, Storage, and Shipping

NAPS COL 11.4(1)

Replace the last sentence of the fourth paragraph in DCD Subsection 11.4.2.3 with the following paragraph.

Class B and C waste is stored in the Interim Radwaste Waste Storage Facility (IRSF). See Appendix 11AA for details. If additional storage capacity for Class B and C waste is required, further temporary storage would be developed in accordance with NUREG-0800, Standard Review Plan 11.4, Appendix 11.4-A.

11.4.3.2 Process Control Program

STD COL 11.4(3)

Replace the content of DCD Subsection 11.4.3.2 with the following.

This subsection adopts NEI 07-10A, Generic FSAR Template for Process Control Program (Reference 11.4-23). The Process Control Program (PCP) describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid

waste. The purpose of the PCP is to provide the necessary controls such that the final disposal waste product meets applicable federal regulations (10 CFR Parts 20, 50, 61, 71, and 49 CFR Part 173), state regulations, and disposal site waste form requirements for burial at a low level waste disposal site that is licensed in accordance with 10 CFR Part 61. Waste processing (solidification and/or dewatering) equipment and services may be provided by third-party vendors. The process used in the existing design meets the applicable requirements of the PCP. Table 13.4-201 provides the milestone for PCP implementation.

Additional onsite radioactive solid waste storage is provided and is discussed in Subsection 11.4.2.3.

11.4.4.5 Mobile De-watering System

STD COL 11.4(4)
STD COL 11.4(7)

Replace the last sentence in DCD Subsection 11.4.4.5 with the following.

The temporary mobile de-watering station installed in the SWMS is vendor supplied and operated within the specific requirements and layout based on vendor specifications. The temporary mobile de-watering system includes the necessary connections and fittings to the interface with the plant piping. The connectors are uniquely designed to prevent inadvertent cross connection between the radioactive and non-radioactive plant piping. The piping also includes backflow inhibitors. Liquid effluent from the temporary mobile de-watering station is routed to the Liquid Waste Management System and the non-condensables are vented to the A/B ventilation system. An operating procedure will be provided prior to fuel load to ensure proper operation of the temporary mobile de-watering station to prevent the contamination of non-radioactive piping or uncontrolled releases of radioactivity into the environment so that the guidance and information in Inspection and Enforcement (IE) Bulletin 80-10 (Ref. 11.4-29) is followed.

Applicable regulatory requirements and guidance, such as Regulatory Guide 1.143, are addressed by lease or purchase agreements associated with the use of a mobile dewatering subsystem for spent resin dewatering. The lease or purchase agreements include applicable criteria such as testing, inspection, interfacing requirements, operating procedures, and vendor oversight.

11.4.6 Testing and Inspection Requirements

NAPS COL 11.4(9)

Add the following paragraphs at the end of DCD Section 11.4.6.

A coatings program that facilitates the ALARA objective of promoting decontamination in radiologically controlled areas outside containment will be implemented prior to initial plant startup.

The program will conform to the guidance in RG 1.54, recognizing that more recent standards may be used if referenced in Section 11.4 or as specified in Table 1.9-202. The program controls refurbishment, repair, and replacement of coating in accordance with the manufacturer's product data sheets and good painting practices in accordance with applicable industry standards.

11.4.8 Combined License Information

Replace the content of DCD Subsection 11.4.8 with the following.

STD COL 11.4(1)
NAPS COL 11.4(1)

11.4(1) ***Plant-specific needs for onsite waste storage***

This COL item is addressed in Subsections 11.4.2.1.1 and 11.4.2.3, Appendix 11AA, and Section 13.8.

11.4(2) ***Deleted from the DCD***

STD COL 11.4(3)

11.4(3) ***Plan for the process control program describing the process and effluent monitoring and sampling program***

This COL item is addressed in Subsection 11.4.3.2.

STD COL 11.4(4)

11.4(4) ***Mobile/portable SWMS connections***

This COL item is addressed in Subsection 11.4.4.5.

STD COL 11.4(5)

11.4(5) ***Offsite laundry facility processing and/or a mobile compaction***

This COL item is addressed in Subsections 11.4.1.3 and 11.4.1.6.

STD COL 11.4(6)

11.4(6) ***Site-specific cost benefit analysis***

This COL item is addressed in Subsection 11.4.1.5.

STD COL 11.4(7)

11.4(7) ***Site-specific solid waste processing facility***

This COL item is addressed in Subsections 11.4.1.6 and 11.4.4.5.

STD COL 11.4(8)
NAPS COL 11.4(8)

11.4(8) ***Piping and instrumentation diagrams***

This COL item is addressed in Subsection 11.4.2.2.1 and Figure 11.4-201.

NAPS COL 11.4(9)

11.4(9) ***Coatings program***

This COL item is addressed in Subsection 11.4.6.

STD COL 11.4(10)

11.4(10) ***The mobile/portable SWMS connections***

This COL item is addressed in Subsection 11.4.1.6.

NAPS DEP 9.2(1)

Figure 11.4-3R Process Flow Diagram of SWMS Oil and Sludge Handling System

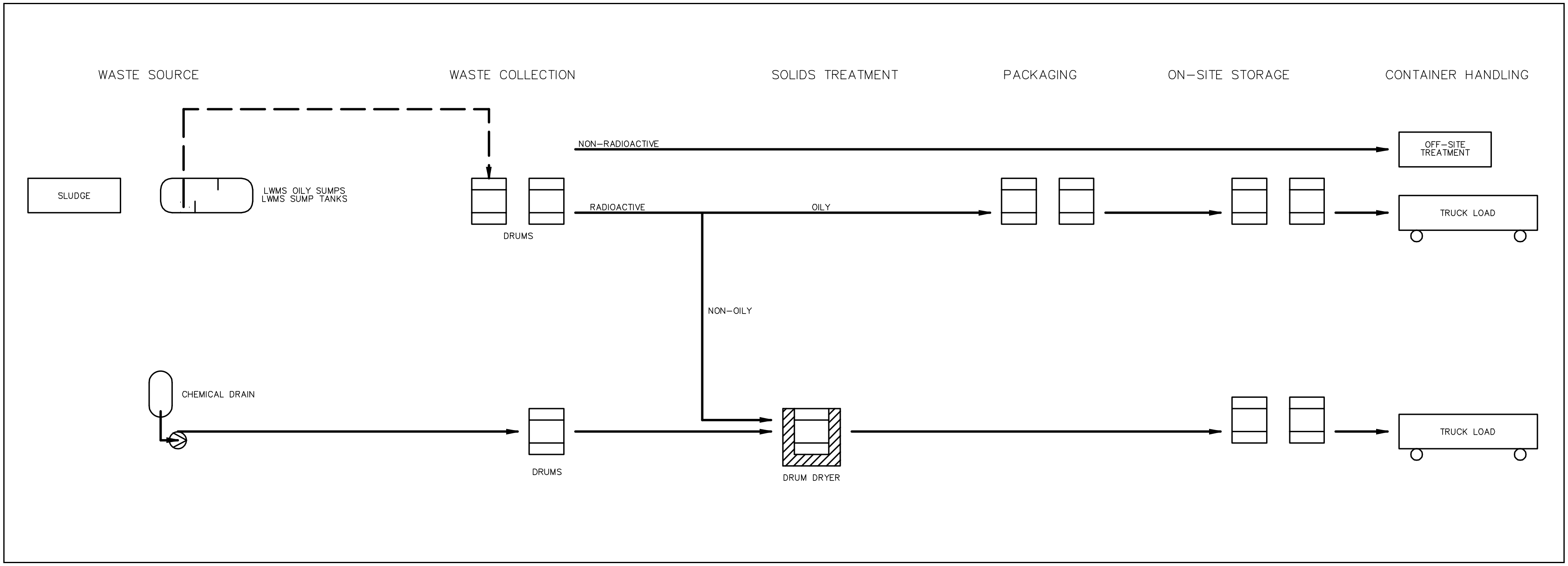
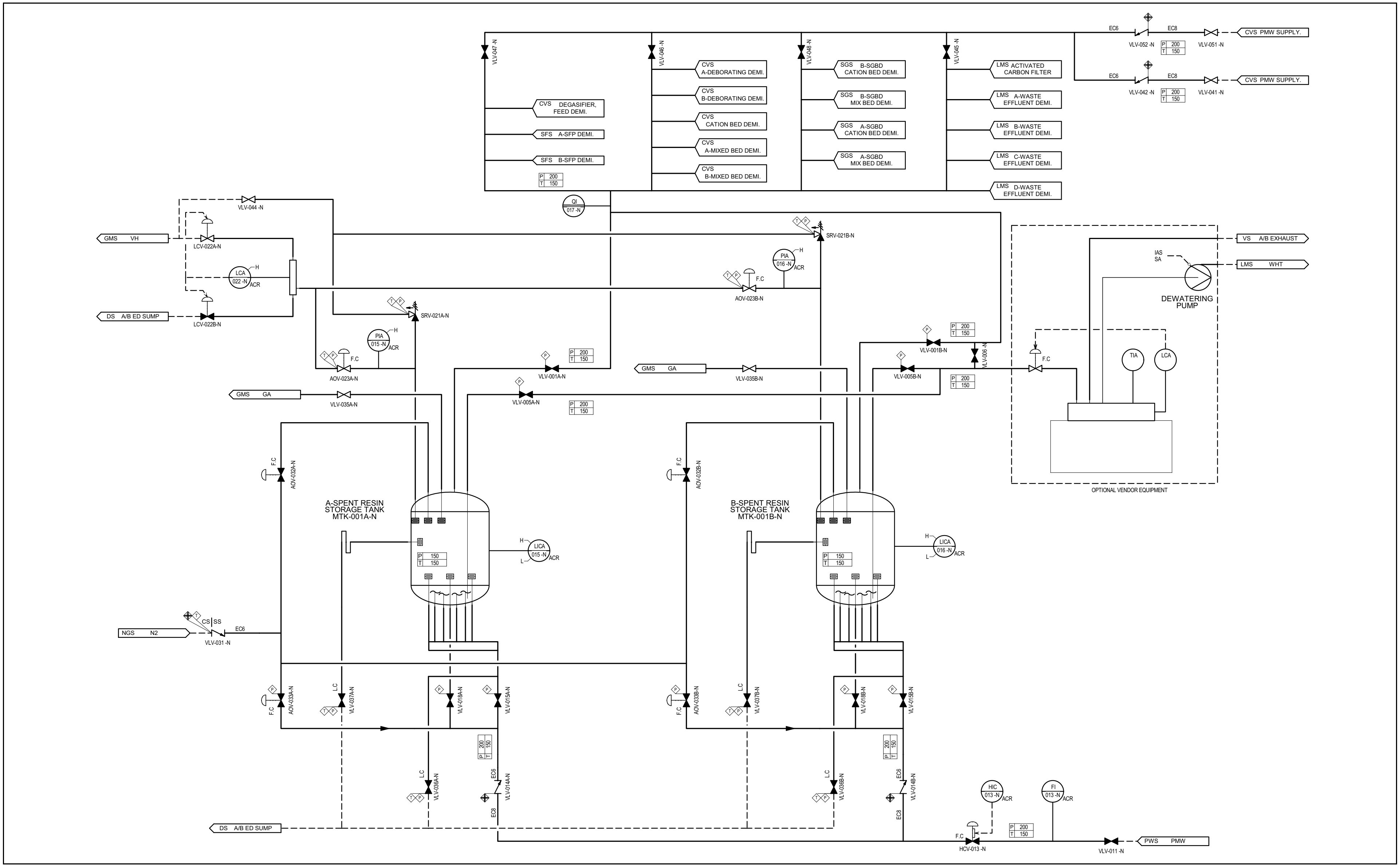


Figure 11.4-201 Solid Waste Management System P&ID



11.5 Process Effluent Radiation Monitoring and Sampling System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.5.2.3.2 Auxiliary Steam Condensate Water Radiation Monitor (RMS-RE-057)

NAPS DEP 9.2(1)

Replace the first sentence in the second paragraph in DCD Subsection 11.5.2.3.2 with the following.

The auxiliary steam condensate water radiation monitor measures the concentration of radioactive material contained in the auxiliary steam system condensate from components such as the degasifier in the CVCS.

NAPS COL 11.5(1)

11.5.2.5.3 Startup Steam Generator Blowdown Heat Exchanger Downstream Radiation Monitor (RMS-RE-037)

The startup steam generator blowdown heat exchanger downstream radiation monitor is a γ monitor; the detection range and other details are summarized in Table 11.5-201, item number 201. A process schematic for this monitor is shown on Figure 11.5-201.

The monitor is located in the Steam Generator Blowdown System (refer to Subsection 10.4.8.2.1) upstream of the waste water release point to the environment. RMS-RE-037 measures the total gamma content in the discharge stream of the Startup Steam Generator Blowdown System. When an abnormally high radiation level is detected, the blowdown line is isolated and the blowdown water is transferred to a waste holdup tank in the LWMS. The monitor is not safety-related and does not perform any safety function. As this is a liquid effluent monitor, its lower range meets the requirement of RG 1.21.

11.5.2.6 Reliability and Quality Assurance

NAPS COL 11.5(4)
NAPS COL 11.5(5)

Replace the first sentence in the third paragraph and the fourth paragraph in DCD Subsection 11.5.2.6 with the following.

The procedures for acquiring and evaluating samples of radioactive effluents, as well as procedures for inspection, calibration, and maintenance of the monitoring and sampling equipment are developed in accordance with RG 1.21 and RG 4.15. The procedures for the

radioactive waste systems are developed in accordance with the QAPD. The analytical procedures are developed in accordance with RG 1.21. These procedures, described in Subsection 13.5.2, are prepared and implemented under the QAP referenced in Chapter 17.

11.5.2.7 Determination of Instrumentation Alarm Setpoints for Effluents

STD COL 11.5(2)

Replace the second sentence in DCD Subsection 11.5.2.7 with the following.

The methodology for the calculation of the alarm setpoints is part of the ODCM described in Subsection 11.5.2.9.

11.5.2.8 Compliance with Effluent Release Requirements

STD COL 11.5(4)
STD COL 11.5(5)

Replace the last sentence in the first paragraph and the second paragraph in DCD Subsection 11.5.2.8 with the following.

Site-specific procedures on equipment inspection, calibration, maintenance, and regulated record keeping, which meet the requirements of 10 CFR 20.1301, 10 CFR 20.1302, and 10 CFR 50 Appendix I, are prepared and implemented under the quality assurance program referenced in Chapter 17.

11.5.2.9 Offsite Dose Calculation Manual

NAPS COL 11.5(1)
NAPS COL 11.5(2)

Replace the first and second paragraphs in DCD Subsection 11.5.2.9 with the following.

Fulfillment of the 10 CFR 50 Appendix I guidelines requires effluent monitor data. A description of the monitor controls and the calculation of the monitor setpoints are part of the ODCM. The ODCM also provides the rationale for compliance with the radiological effluent Technical Specifications and for the calculation of appropriate setpoints for effluent monitors. The ODCM follows the guidance of NEI 07-09A. The ODCM will be re-written to apply to all three units and to conform with the NEI template. The ODCM and radiological effluent Technical Specifications, which reflect the new reactor unit, are implemented in accordance with the milestone listed in Table 13.4-201.

11.5.2.10 Radiological Environmental Monitoring Program

STD COL 11.5(3)

Replace the content of DCD Subsection 11.5.2.10 with the following.

The program is going to be described in the plant Technical Specification and the ODCM, which reflect the new reactor unit, is implemented in accordance with the milestone listed in Table 13.4-201. This program measures direct radiation using thermoluminescent dosimeters as well as analyses of samples of the air, water, vegetation, and fauna in the surrounding area. The guidance outlined in NUREG-1301 (Reference 11.5-21) and NUREG-0133 (Reference 11.5-18) is to be used when developing the radiological environmental monitoring program. The radiological environmental monitoring program follows the guidance of NEI 07-09A.

11.5.2.11 Site-Specific Cost-Benefit Analysis

STD COL 11.5(6)

Replace the content of DCD Subsection 11.5.2.11 with the following.

The results of site-specific cost-benefit analysis are described in Subsections 11.2.1.5 and 11.3.1.5.

11.5.5 Combined License Information

Replace the content of DCD Subsection 11.5.5 with the following.

NAPS COL 11.5(1)

11.5(1) ***Site-specific aspects***

This COL item is addressed in Subsections 11.5.2.5.3 and 11.5.2.9, Table 11.5-201 and Figure 11.5-201.

STD COL 11.5(2)
NAPS COL 11.5(2)

11.5(2) ***Offsite dose calculation manual***

This COL item is addressed in Subsection 11.5.2.7 and 11.5.2.9.

STD COL 11.5(3)

11.5(3) ***Radiological and environmental monitoring program***

This COL item is addressed in Subsection 11.5.2.10.

STD COL 11.5(4)
NAPS COL 11.5(4)

11.5(4) ***Inspection, decontamination, and replacement***

This COL item is addressed in Subsections 11.5.2.6 and 11.5.2.8.

STD COL 11.5(5)
NAPS COL 11.5(5)

11.5(5) ***Analytical procedures***

This COL item is addressed in Subsections 11.5.2.6 and 11.5.2.8.

STD COL 11.5(6)

11.5(6) ***The site-specific cost benefit analysis***

This COL item is addressed in Subsection 11.5.2.11.

NAPS COL 11.5(1)

Table 11.5-201 Effluent Liquid Monitors (Site-Specific)

Item No.	Monitor Number	Service	Type	Range $\mu Ci/m^3$	Calibration Isotopes	Check Source	Safety-Related	Control Function	Quantity	Schematic Number	GA Drawing Number
201	RMS-RE-037	Startup Steam Generator Blowdown Heat Exchanger Downstream Radiation *The concentration of radioactive material discharged from the Startup SGBDS*	γ	1E-7 to 1E-2	Cs-137	Yes	No	Diverse	1	11.5-201	(Note 1)

Note:

1. The monitor is located adjacent to the Startup Steam Generator Blowdown Equipment shown in Figure 1.2-1R (Sheet 1 of 2).

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 11.5-2aR Location of Radiation Monitors at Plant (Power Block at Elevation 261'-1" NAVD88)**

STD CDI

NAPS DEP 10.4(1)

Figure 11.5-2bR Location of Radiation Monitors at Plant (Power Block at Elevation 278'-10" NAVD88)

NAPS DEP 10.4(1) **Figure 11.5-2cR Location of Radiation Monitors at Plant (Power Block at Elevation 291'-0" NAVD88)**

NAPS DEP 10.4(1)

Figure 11.5-2dR Location of Radiation Monitors at Plant (Power Block at Elevation 300'-11" NAVD88)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) Figure 11.5-2eR Location of Radiation Monitors at Plant (Power Block at Elevation 312'-8" NAVD88)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) Figure 11.5-2gR Location of Radiation Monitors at Plant (Power Block at Elevation 337'-7" NAVD88)

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 11.5-2hR Location of Radiation Monitors at Plant (Power Block at Elevation 363'-10" NAVD88)**

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 11.5-2iR Location of Radiation Monitors at Plant (Power Block at Elevation 388'-5" NAVD88)**

Security-Related Information Wiithheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

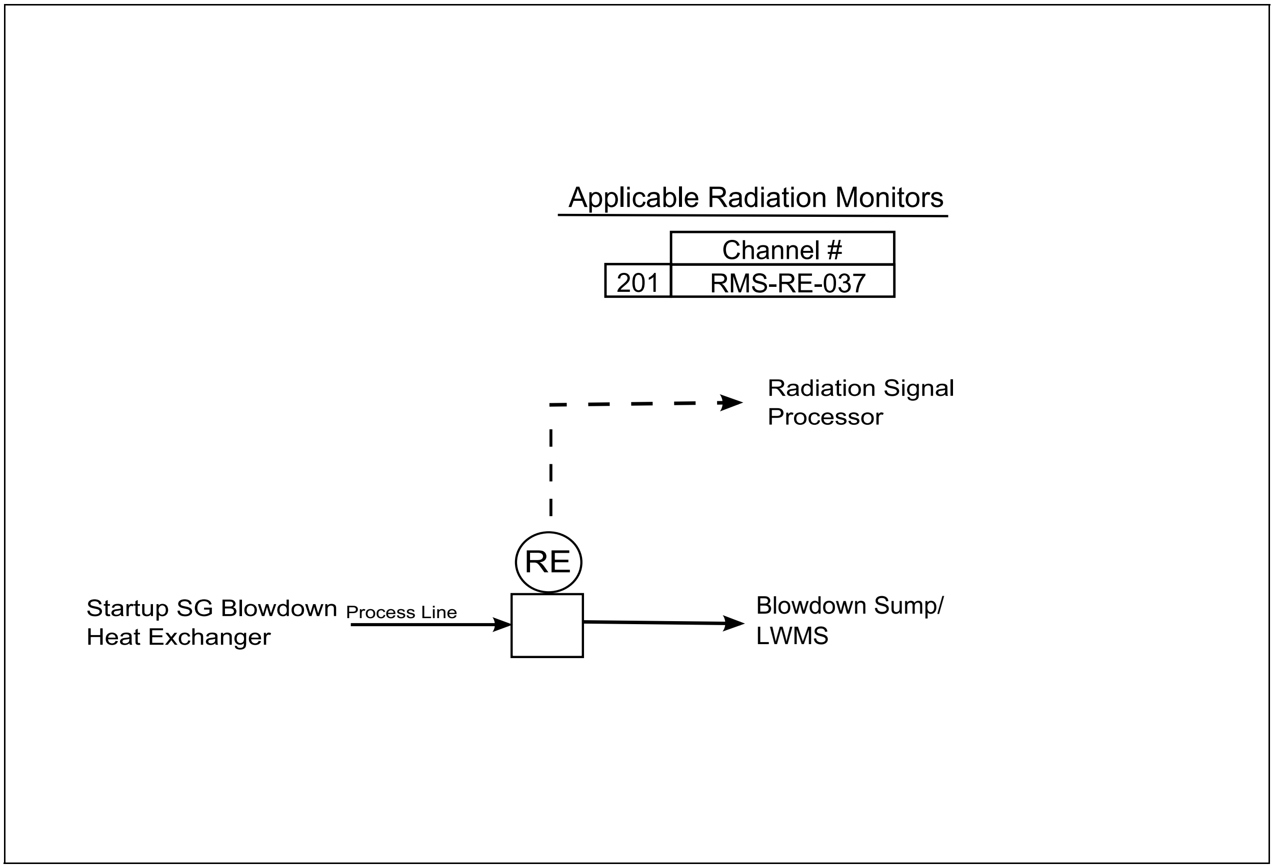
Figure 11.5-2jR Location of Radiation Monitors at Plant (Power Block at Elevation 402'-11" NAVD88)

NAPS DEP 10.4(1) **Figure 11.5-2kR Location of Radiation Monitors at Plant (Power Block at Section A-A (NAVD88 Elevations)**

STD CDI

NAPS COL 11.5(1)

Figure 11.5-201 Typical Process In-Line Radiation Monitor Schematic (Site-Specific)



NAPS COL 11.4(1)

Appendix 11AA Interim Radwaste Storage Facility

The IRSF is designed to safely handle, store, monitor, and control Class B and C stabilized waste generated as a result of normal operation, including AOOs based on the provisions of NRC Standard Review Plan (SRP) NUREG-0800, Section 11.4, Solid Waste Management System, Appendix 11.4-A, Design Guidance for Temporary Storage of Low-Level Radioactive Waste (Ref 11AA-203). The IRSF also incorporates the guidance of GL-81-038 and SECY-94-198 (Refs 11AA-204 and 11AA-205).

11AA.1 Design Basis

Under the guidance of NUREG-0800, the IRSF is designed to safely handle, store, monitor, and control Class B and C stabilized waste, primarily consisting of spent filter elements, spent resin, and spent carbon. The IRSF has the capacity to store the combined volume of Class B and C waste to be generated during 10 years of plant operations, without credit for potential waste minimization techniques and methods other than dewatering. During storage, the IRSF provides the required design features to assure public health and safety and minimal risk to operating personnel. As such, the IRSF is located inside the Unit 3 protected area for material and access control.

The IRSF is divided into three distinct areas: the storage area, the truck bay, and the crane operating and mechanical equipment room.

Waste handling, storing, monitoring, and retrieval is locally operated in the IRSF, with certain alarm signals in the MCR.

11AA.1.1 Design Objectives

The design objectives of the IRSF are as follow:

- Provide sufficient space to safely store Class B/C stabilized waste that would be generated during 10 years of Unit 3 power operation, based on an annual waste generation volume stipulated in DCD Table 11.4-2, and packaged into HDPE high integrity containers (HICs)
- Provide remote waste handling capability to ensure worker radiation exposure is ALARA
- Provide waste container monitoring capability
- Provide radiation monitoring capability

- Provide leak monitoring capability

11AA.1.2 Design Criteria

In order to meet the above objectives, the following specific criteria are satisfied:

- The design and operation of the IRSF assure that the radiological consequences of design basis events (fire, flood, and tornado) do not exceed a small fraction of the 10 CFR 100 dose limit.
- The IRSF has sufficient shielding to maintain the direct radiation from the on-site storage to site boundary sufficiently low as not to exceed 10 CFR 20.1302 limit.
- The IRSF has remote waste handling capability to move waste containers received from a truck into storage vaults or to move waste containers out of storage vaults onto a truck for shipping.
- As hydrogen and other combustible gases are generated from the radiolysis and hydrolysis reactions, the IRSF has a ventilation design to prevent the buildup of these gases to the lower flammability limit.
- The IRSF provides the capability for inspecting the waste container integrity on a periodic basis.
- The IRSF has the capability for monitoring potential leakage from containers in storage. A drainage collection is provided to collect contaminated liquid for shipment to the LWMS for treatment.
- The IRSF includes design features, in accordance with 10 CFR 20.1406, that would minimize, to the extent practicable, contamination of the waste facility and environment; facilitate eventual decommissioning; and minimize the generation of extraneous radioactive waste.
- The IRSF has the capability to monitor radionuclides present in the potential release pathways.
- The total radioactive material inventory limit is established, based on the design of the storage area, dose limits for members of the public, and safety features provided.

11AA.1.3 Other Design Considerations

In addition to the listed design criteria, the following considerations are incorporated into the IRSF design:

- The facility is designed to safely store Class B/C packaged wastes. Class A waste is stored in the Auxiliary Building Solid Waste Management System (SWMS) area.
- The IRSF is operated from the crane operating room for waste receiving and retrieving operation. Priority alarm signals, such as ventilation radiation monitoring, leak detection, smoke and fire detection, are sent to the crane operating room and MCR for operator actions.
- The IRSF is designed with permanently installed equipment (i.e., crane, fans, sumps, and remote monitoring camera, etc.). The IRSF does not have mobile equipment with the exception of required transportation trucks, tank trucks and associated pumps.

11AA.2 **Facility Description**

The IRSF is a stand-alone steel-reinforced concrete building. The IRSF is located inside the plant protected area. Its location and orientation are chosen to not impact any safety related structures, systems and components.

The IRSF is designed for interim storage of Class B/C wastes and does not impact reactor operation. Based on the guidance of NUREG 0800, Appendix 11.4-A, the IRSF is classified as non-safety and non-seismic. The fact that this location of the IRSF is separate and does not impact any safety and/or seismic class I structures and components, further justifies the non-seismic classification. The IRSF and its components are classified as Equipment Class 5 (which is a non-safety equipment class), as described in Section 3.2. The classification of the IRSF equipment is summarized in Table 11AA-201. The IRSF is located above the design basis flood level.

The IRSF is divided into three distinct areas: the storage area, the truck bay, and the crane operating and mechanical equipment room.

Storage Vault Area

The storage area consists of six covered vaults, which provides the capacity for storage of 10 years of generated Class B and C waste. The storage area vault design is shown in Figure 11AA-201. To minimize radiation exposure each vault is shielded with concrete covers. The vault covers are supported by steel-reinforced concrete beams. The vault

covers have ventilation holes to prevent accumulation of hydrogen inside a storage vault.

The vault covers are designed with remote hookup for placement and removal. The facility crane is equipped with a flood light, a set of remote viewing cameras, and a heavy duty grapple device to facilitate vault cover hookup and lifting. During waste container placement, the cover is lifted and placed on an adjacent vault top before waste is placed into the vault for storage.

The vaults, including the walls and floor are coated with an epoxy liner to provide a smooth surface to facilitate decontamination.

Truck Bay

The truck bay is designed so that a truck is driven through and does not need to turn around for waste retrieval operations. The truck bay has two roll-up doors and two personnel access doors, one each at the entrance and the exit (see Figure 11AA-201). The entrance and exit also have curbs to retain drainage within the facility and to prevent rain water from entering the building. The truck bay is partitioned from the storage vault area by a wall that serves to provide shielding and fall protection when vault access is deemed necessary.

A crane maintenance platform is provided to service and maintain the crane.

IRSF Crane Operating Room/Mechanical Equipment Room

The IRSF is equipped with a crane operating room to operate the crane remotely for placement and handling of the waste containers using the remote viewing cameras on the crane. The crane operating room is provided with adequate shield walls and roof to protect personnel and to keep radiation exposure ALARA. The control room is also used for the radiation monitor, the fire alarm panel, ventilation panel, and storage of waste documentation files.

The IRSF crane operating room is provided with heating, ventilation fan, and air conditioning to support IRSF operation.

The mechanical equipment room contains the electrical panels, the valve for the fire suppression system, and appropriate heating and ventilation.

11AA.3 IRSF Operations

11AA.3.1 Packaging, Storage, and Shipment Operations

The Class B/C waste, primarily consisting of spent filters, spent resin, and spent carbon, is packaged and dewatered in the SWMS, as described in Section 11.4, and the container surfaces are decontaminated, if required. The waste is then placed into the SWMS storage area for staging. When scheduled, the waste containers are then transferred to the IRSF for interim storage. Waste containers are loaded onto a shielding cask on a transportation truck using the SWMS crane. The waste container is then transported into the IRSF truck bay. Using the IRSF crane, the waste container is removed from the shielding cask and placed into a designated vault for interim storage. During handling operation and storage, any waste containers requiring decontamination, repacking, and/or any other reprocessing, will be transferred back to the SWMS.

The waste handling operations within the IRSF are performed remotely from the local IRSF crane operating room using cameras on the crane. Alarm signals from radiation monitors, leak detection, and smoke and fire detection will be provided to the crane operating room and MCR.

The Class B/C waste is stored in polyethylene HICs which will not be subject to corrosion from the stored waste.

NAPS COL 12.2(2)

11AA.3.2 Source Term and Shielding

The design basis source term for shielding is based on a full storage area with 48 containers each with a contact dose rate of 350R/hr assuming 100% Co-60, with the corresponding source term shown in Table 11AA-202 and Table 11AA-203. This design basis value is consistent with the industry practices and is conservative because assuming 100% Co-60 results in higher calculated dose rates than an average mixture of isotopes. Shielding is provided by the concrete walls and covers surrounding the waste. The thicknesses of these concrete shield walls are listed in Table 11AA-204. The concrete used for shielding is in accordance with the concrete material specifications discussed in Section 12.3.2.2. The use of individual vaults serves to keep worker and public dose rates ALARA and within the site limits (0.25 mrem/hr for external areas outside the IRSF, 2.5 mrem/hr in the truck bay during storage).

NAPS SUP 12.3(1)

11AA.3.3 **Radiation Zone Maps**

The dose limits for the IRSF are summarized in the radiation zone map in Figure 11AA-202.

NAPS COL 12.2(2)

11AA.3.4 **Personnel Exposure**

The waste containers are placed in shielded vaults to keep personnel radiation exposure ALARA. To minimize radiation dose access to the IRSF is limited by physical control (i.e., locked doors) and administrative control. Plant operating procedures providing guidance for waste handling (in accordance with site radiation protection program) are implemented in order to expedite waste handling operations and to minimize personnel exposure time.

11AA.3.5 **Gas Generation**

The gamma, beta and alpha radiation in the waste material causes the radiolysis reaction of the organic materials, and the hydrolysis of the water trapped in the resins. These reactions generate a small amount of combustible gases inside the waste containers. The combustible gases, consisting of predominantly hydrogen, with a small amount of methane, are generated at a rate about 0.020 to 0.054 liters/hour per container. This rate estimate is based on the gamma, beta and alpha radiation analysis, and the resin gas generation rate G-values data analyzed by the industry (Ref 11AA-202).

Passive ventilation holes are built into the vault covers as escape pathways for the generated gases, primarily hydrogen. Hydrogen, being a lighter gas, tends to be more buoyant and escape from the vault into the building. The IRSF is also equipped with a building exhaust fan mounted on the ceiling to maintain ventilation air flows (see Section 11AA.4.1). This design works in conjunction with the small generation rates and prevents any possibility of hydrogen buildup to the lower flammability limit.

To prevent over-pressurization, each waste container has a vent, which is equipped with a high efficient particulate air (HEPA) filter to vent the gases from the HIC. The gases are vented into the vault and the building, and are exhausted outside through the building exhaust fan via a monitored vent path.

It is not anticipated that any radioactive gas will be released from the HICs, as the waste consists of solid wastes (resin and filters) which have already been dewatered in the SWMS.

11AA.3.6 Malfunction Analysis

The crane and its grapple device are the primary components in the IRSF of which the malfunction could result in radiological contamination and unplanned exposure to workers. If the crane or grapple device failed, the HIC could drop and cause the waste to escape the container, creating a potential for radiation exposure. Therefore the grapple is designed to have a locking mechanism and indication to ensure containers are securely attached for handling. The camera on the crane also provides direct viewing and confirmation of the hoisting operation. The placement of the waste containers into vault is pre-programmed using an indexed crane for precise operations. Procedures and training will provide guidance for operators on proper use of the equipment.

It should be noted that the handling operation may be interrupted by the operator at any time and the process restarted without adverse consequences.

11AA.4 IRSF Subsystems

The IRSF has the following subsystems to support the waste handling operation in the IRSF:

- IRSF HVAC Subsystem
- IRSF Drainage Subsystem
- IRSF Fire Protection Subsystem
- IRSF Radiation Monitoring Subsystem
- IRSF Electrical Subsystem
- IRSF Crane
- IRSF I&C Subsystem

11AA.4.1 IRSF Heating, Ventilation, and Air Conditioning

The truck bay and the vault area are normally not occupied. As such, area heating in these locations is not provided. Heat tracing of the fire water standpipe is provided to prevent freezing.

The IRSF building is equipped with a building exhaust fan sized to ventilate the air inside the building. The IRSF crane operating room is equipped a split type heat pump with auxiliary electric heating. The mechanical equipment room is equipped with a unit heater and is ventilated by an air supply inlet and an exhaust fan.

The mechanical equipment room is equipped with a unit heater and is ventilated by an air supply inlet and an exhaust fan.

11AA.4.2 **IRSF Drainage System**

Two sumps are provided in the IRSF. One small contaminated liquid sump (called the “transfer pit”) is provided to transfer drainage from the vaults to a tank truck. Another truck bay sump called “non-radioactive sump” is provided to collect fire suppression water from the truck bay sprinkler system.

The non-radioactive sump is used to collect non-radioactively contaminated liquid from fire suppression and area cleaning/washing activities. In an emergency situation, such as a container drop accident in which the container loses its integrity in the truck bay area, the non-radioactive sump is also used to collect radioactively contaminated spillage. The non-radioactive sump is equipped with a sump pump and a pump-out connection on the truck bay wall. Water is provided for decontamination of both sumps when required.

The truck bay floor is gently sloped to the non-radioactive sump. Curbs are also provided at the entrance and the exit of the truck bay. The curbs, approximately 6 inches high, are designed to retain excess water when the fire suppression system is activated. These curbs are also provided to prevent rain water from entering the truck bay. In the event that small amounts of water do enter the truck bay over these curbs, they will be drained to the non-radioactive sump. The sump is then sampled and processed or discharged as required.

The slope of the floor of each vault is slightly sloped to a drain hub that connects to an embedded sloped pipe that extends into the truck bay. Each drain is equipped with a normally closed valve located inside the truck bay. A level instrument is installed inside the drain pipe before the drain valve. In the event that a leak occurs, liquid from the drains is collected inside the pipe to a predetermined setpoint; the level switch initiates an alarm in the MCR for operator actions. This design detects any liquid leakages inside each individual vault. Operators will need to

manually collect and test leaked liquid and determine corrective actions, including drainage of the leaked liquid to the transfer pit, from which the liquid is pumped to a tank truck for transportation of the liquid to LWMS for treatment.

In the event of a fire in one of the vaults during waste handling operation, the heat from the fire will activate the sprinkler system nearest to the fire. The sprinkler water is released to flow into the affected vault to suppress the fire. Water is allowed to accumulate in the affected vault to help suppress the fire. The water is later drained via the vault drain piping into the transfer pit and is pumped into a tank truck for transfer to LWMS for treatment.

NAPS COL 9.5(2)

11AA.4.3 Fire Protection System and Fire Hazards Analysis

11AA.4.3.1 Introduction

This section provides content using the same methodology as Section 9A.2 – Fire Hazard Analysis Methodology.

11AA.4.3.2 Fire Hazard Analysis Results

A FHA is conducted for the IRSF and associated fire areas and/or fire zones which are identified in Table 11AA-205 and depicted in Figures 11AA-203.

- IRSF Truck Bay and Storage Vault Area: Fire Area FA7-302
- IRSF Crane Operating Room and Mechanical Equipment Room: Fire Area FA7-303

Table 11AA-206 identifies the type and quantity of combustible materials in each fire zone in the IRSF and provides a summary of the FHA for the associated fire zone. Table 11AA-207 shows the fire zone to fire zone interface which also depicts the fire area to fire area boundaries that must be protected for 3-hour fire rated boundaries.

11AA.4.3.2.1 FA7-303 IRSF Truck Bay and Storage Vault Area

The indoor truck bay is designed for the receipt and shipment of Class B and C waste stored in polyethylene HICs. Adjacent to the truck bay are the storage vaults that will hold this low-level radioactive waste until ready for ultimate disposal to a license disposal facility. The storage vault area is composed of six (6) concrete vaults. The building is constructed using reinforced concrete and other material which result in fire

resistance that provides at least a 3-hour ASTM E-119 (Reference 11AA-201) fire rating.

The individual fire zones of the Truck Bay and Storage Vault Area are depicted in Figure 11AA-203. The following listing identifies the fire zone designation and maximum expected fire loading for each fire zone.

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA7-302-01	IRSF Truck Bay	47,160 Btu/ft^2
FA7-302-02	IRSF Storage Vault Area	275,985 Btu/ft^2

Fire Detection and Suppression Features

This area is provided with automatic smoke detection and a manual fire hose station. Additional fire extinguishers and manual fire alarm pull station are available in the truck bay. Primary fire suppression is provided from automatic preaction sprinkler system. Secondary suppression is provided from manual fire hose and portable fire extinguishers.

Smoke Control Features

The truck bay/storage vault areas have a significant internal volume sufficient to dilute the smoke released for any potential fire. In a fire event, the truck bay/storage area ventilation system is interlocked with the smoke detection system in the building, which will shutdown the exhaust fan when smoke is detected. This will prevent any smoke release from the building. The same exhaust fan may be used to remove any smoke from the building when it is determined that there is no radioactive contamination.

Fire Protection Adequacy Evaluation

The fire area boundaries are constructed with concrete walls providing a minimum of a 3-hour fire rating. The combustible loading is transient and the potential for a fire is considered relatively small since the elements of fire (combustible material and ignition source) are not present at the same time. The storage vaults are normally closed. An automatic preaction sprinkler system, manual hose station, and an automatic smoke detection system are provided in this fire area.

Significant fire protection for the IRSF is provided by the general arrangement of the combustible material which provides separation between the different zones. The general lack of sufficient combustible material continuity allows any fire that may occur to be confined to its

immediate general zone of influence and confined within the fire zone of occurrence.

Fire Protection System Integrity

The fire protection capability for this area is provided from automatic smoke detection, automatic suppression and manual hose streams. The fire boundaries are of substantial construction and provide protection of at least 3 hours of an ASTM E-119 (Reference 11AA-201) exposure. The plant fire brigade will respond to the fire alarm.

Safe Shutdown Evaluation

A fire in this area has no potential to damage the ability of safe shutdown function, as the IRSF does not impact any components required for safe shutdown of the plant. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe shutdown.

Radioactive Release to Environment Evaluation

The radiation monitors and smoke detectors are interlocked with the building exhaust fan that is mounted on the ceiling, and as smoke is detected, the alarm will notify the operator in the crane operating room and in the MCR. The plant fire brigade is continuously available in case of an emergency, and will muster when the alarm sounds. The brigade will ensure the fire has been extinguished, and manually turn off the suppression system. Any leakage from a HIC (or water used to put out a fire in the vaults) will be retained in the vault. A manual valve on the drain line from each vault is kept closed and is only opened when the water is to be moved into the transfer pit. From the transfer pit, the water is sampled and pumped to a transfer truck and sent for treatment. No fire will spread to adjacent vaults since the reinforced concrete walls have a minimum fire rating of at least 3 hours.

The availability of the automatic smoke detection system, the automatic fire suppression system and the wet nature of the stored resin, preclude resin burning and any resultant radioactivity release.

11AA.4.3.2.2 **FA7-302 IRSF Crane Operating Room and Mechanical Equipment Room**

The crane operating room and mechanical equipment room are adjacent to the storage vaults. An external entrance is provided to operators minimizing their exposure to any possible dose during low-level radioactive waste handling processes.

The individual fire zones of the crane operating room and mechanical equipment room are depicted on Figure 11AA-203. The following listing identifies the fire zone designation and maximum expected fire loading for each fire zone.

Fire Zone No.	Designation	Fire Load (Btu/ft^2)
FA7-303-01	IRSF Crane Operating Room	23,016 Btu/ft^2
FA7-303-02	IRSF Mechanical Equipment Room	30,414 Btu/ft^2

Fire Detection and Suppression Features

This area is provided with an automatic smoke detection system, manual fire extinguishers and a manual fire alarm pull station. Primary fire suppression is provided from manual fire extinguishers. Secondary suppression is provided from the fire hose station in the truck bay and the plant fire brigade.

Smoke Control Features

The crane operating room is unvented. Smoke removal is accomplished by the plant fire brigade using portable fans. The mechanical equipment room is ventilated and the room exhaust fan may be used to remove the smoke.

Fire Protection Adequacy Evaluation

The fire boundaries of the crane operating room and mechanical equipment room provide at least a minimum of a 3-hour fire rating. The crane operating room is not normally staffed. While no automatic fire suppression system is located in this area, the automatic smoke detection system in this area will alarm in the main operator control room in the event of a fire, and the fire will be controlled by the plant fire brigade. The structure reinforcement and integrity ensures limitation on the fire spreading in the adjacent areas of the IRSF building.

Fire Protection System Integrity

The fire protection capability for this area is provided from portable fire extinguishers and the manual hose station applied by the plant fire brigade. The fire boundaries are of substantial construction and provide at least a 3-hour fire rating. The plant fire brigade will respond to the fire alarm.

Safe Shutdown Evaluation

A fire in this area has no potential to damage the ability of safe shutdown function, as the IRSF does not impact any components required for safe shutdown of the plant. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe shutdown.

Radioactive Release to Environment Evaluation

Radiological material is not allowed within the crane operating room and mechanical equipment room by administrative controls. The structural integrity provides sufficient separation from the location where the HICs will be stored. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

NAPS SUP 12.3(2)

11AA.4.4 Radiation Monitoring

The IRSF is equipped with a radiation element on the building ventilation exhaust (RME-121). Building air is drawn to a radiation element contained in the IRSF crane operating room to be monitored for nuclide contamination. The radiation element is inspected and calibrated periodically to ensure operability. The radiation element provides an alarm signal to the MCR if and when a predetermined setpoint is reached. The exhaust monitor has local annunciation consisting of an audible alarm and a warning light at the local readout. The crane operating room building ventilation exhaust monitor is similar to the Plant Vent Extended Gas Monitor RM-RE-080A in DCD Table 11.5-3.

Additionally, there is an area radiation monitor in the truck bay which alarms locally with a warning light at the local readout and also alarms in the MCR if an abnormally high radiation level is detected. The truck bay area radiation monitor (RME-120) is on the south wall and is similar to the Waste Management Monitor RM-RE-008 in DCD Table 2.3-4.

11AA.4.5 Electrical

The IRSF is provided power from the Unit 3 Non-Class 1E 480VAC, 3 Phase, 60Hz distribution system. A 480VAC, 3 Phase, Panelboard is designed to supply power to 480 VAC rated equipment in the IRSF. The radwaste handling crane assembly is powered from a dedicated power circuit from the 480VAC panelboard.

The 480VAC panelboard is designed to provide power to a local 120/208VAC distribution panel through a step down 3 Phase

480-120/208VAC transformer. The 120/208VAC distribution panel is designed to provide power to 120 or 208VAC rated equipment (such as adequate lighting throughout the facility) in the IRSF.

The 480VAC panelboard, transformer and 120/208VAC distribution panel are located in the IRSF crane operating room which has sufficient ventilation to ensure adequate protection against adverse environmental conditions and to minimize vulnerability to physical damage. Adequate electric circuit protection and coordination of protective devices are provided to prevent damage to the equipment, maintain operational continuity, and reduce the safety hazard to the plant personnel.

The 480VAC panelboard, transformer and 120/208VAC distribution panel are designed with adequate capacity and capability to power all electrical loads in the IRSF building. The electrical distribution system is designed to permit periodic in-service testing and inspection of components to assure system integrity and capability to perform its intended function.

11AA.4.6 **IRSF Crane**

The IRSF is designed for remote waste handling operation. The crane control is equipped with indexing for precise waste handling operation with vault identification. A closed-circuit television (CCTV) is provided to monitor all crane operations. The CCTV consists of trolley-mounted downward viewing cameras with pan, tilt, and zoom controls to allow an operator to read container identification markings and see a general view of storage area. Bridge crane mounted cameras, with pan, tilt, and zoom controls are provided for general surveillance of storage area and crane block. The crane is equipped with its own flood lighting for general illumination and for illumination of the HIC and grapple. The intensity of the lighting is matched to that required by the cameras. All crane operations are capable of being performed from the crane operating room.

11AA.4.7 **Instrumentation and Control**

The IRSF is designed not to require continuous operator attention during waste storage. Monitoring of the waste during storage is achieved by

using instrument alarm signals locally and in the MCR. These alarms include:

- Radiation monitoring of potential contamination of building exhaust, and area radiation monitor in the truck bay (as described in Section 11AA.4.4)
- Waste container integrity monitoring by leakage detection of possible vault drains (as described in Section 11AA.4.2)
- Drainage system level detections (as described in Section 11AA.4.2)
- Smoke and fire detection (as described in Section 11AA.4.3)

Any one or combination of these alarms would require operator actions to investigate the extent of the alarming condition, and determine proper corrective actions.

11AA.5 Testing and Inspection Requirements

Testing of equipment prior to IRSF operation is performed to verify the proper operation of the crane and alarms. Acceptance criteria of the IRSF crane are based on the performance of the crane to demonstrate the lifting capability, movement precisions based on the preprogrammed logics, and confirmation of the secure grapple operation.

In addition, alarms described in Section 11AA.4.7 are inspected and calibrated to demonstrate their intended functional performance and accuracies.

Provisions are made for periodic inspection of the following:

- Quarterly inspection on the integrity of the HICs (remotely, using crane cameras)
- Annually inspection of the calibration of the alarm setpoints
- Every five years on the epoxy coatings

11AA.6 Radioactive Effluent Release

11AA.6.1 Radioactive Effluent Monitoring

Because the Class B and C waste is packaged, dewatered, and stabilized in the SWMS in the Auxiliary Building, prior to transfer to the IRSF, the IRSF does not have any liquid processing equipment that would produce radioactive liquid effluent. Standing water in the waste containers is dewatered in the SWMS before the stabilized waste is

moved into the IRSF for interim storage. Any water in the truck bay is contained within the building before being transferred to LWMS for processing, or released to a storm water pond if determined not to be contaminated. Similarly, if any leakage in the IRSF vaults occurs, it is collected in the vaults, and then transferred via the transfer pit to the LWMS for processing.

As discussed in 11AA.3.5, there is no potential for radioactive gaseous effluent from the IRSF. Building exhaust is equipped with airborne radiation monitor, which alarms on high particulate radiation that could result from a breach of container integrity. When the alarm sounds, operator actions are initiated to examine the containers, locate the breached container or area, and take corrective action to decontaminate and repair the breach.

An area radiation monitor is also provided in the truck bay area for personnel protection. On high radiation signal, access will be limited to perform investigation of the extent of conditions.

11AA.6.2 Waste Record Keeping

Waste records (including waste type, contents, radionuclides, and dates of storage and shipments) are maintained for the IRSF for documentation and record keeping, in accordance with NUREG-0800 Section 11.4-A.

11AA.7 Process Control Program

The PCP is addressed in Section 11.4.3.2, including provisions to govern container material selection as HDPE and inspections to ensure container breach does not occur.

11AA.8 References

11AA-201 ASTM E-119, “Standard Test Methods for Fire Tests of Building Construction and Materials,” 2009 Edition.

11AA-202 WSRC-TR-97-00338, “Radiation Studies with Argentine Ion Exchange Material,” C.L. Crawford, Savannah River Site, US DOE, 6/2002.

11AA-203 NUREG-0800, Standard Review Plan (SRP), Section 11.4, Solid Waste Management System, Appendix 11.4-A, Design Guidance for Temporary Storage of Low-Level Radioactive Waste, US NRC, Revision 3, 3/2007.

11AA-204 GL-81-038, “Storage of Low-Level Radioactive Wastes at Power Reactor Sites,” US NRC, 11/10/1981.

11AA-205 SECY-94-198, “Review of Existing Guidance Concerning the Extended Storage of Low-Level Radioactive Waste,” US NRC, 8/1/1994.

NAPS COL 3.2(4)
NAPS COL 3.2(5)
NAPS COL 11.4(1)

Table 11AA-201 Classification of Mechanical and Fluid Systems, Components, and Equipment

System and Components	Equipment Class	Location	Quality Group	10 CFR 50 Appendix B	Codes And Standards	Seismic Category	Note
Interim Radwaste Storage Facility							
IRSF Crane	5	IRSF	D	N/A	5	NS	
IRSF Exhaust Fans	5	IRSF	D	N/A	5	NS	
IRSF Transfer Pump	5	IRSF	D	N/A	5	NS	
IRSF Non-contaminated water pump	5	IRSF	D	N/A	5	NS	
IRSF Area Radiation Monitor (RME-RE-120)	5	IRSF	D	N/A	5	NS	(Non-Class 1E/ Non-harsh environment)
IRSF Exhaust Fan Airborne Radiation Monitor (RME-RE-121)	5	IRSF	D	N/A	5	NS	(Non-Class 1E/ Non-harsh environment)
IRSF Preaction Sprinkler System	7	IRSF	D	N/A	NFPA	NS	
IRSF Standpipe and hose station	7	IRSF	D	N/A	NFPA	NS	
IRSF Fire Detection System	7	IRSF	D	N/A	NFPA	NS	
IRSF Crane Operating Room Heat Pump	5	IRSF	D	N/A	5	NS	

Table headings are as defined in DCD Section 3.2.

NAPS COL 12.2(2)

Table 11AA-202 HIC Shielding Design Basis Specific Activity (for 1 HIC)

Nuclide	Specific Activity (μCi/cm^3)
Co-60	1.54E+02

NAPS COL 12.2(2)

Table 11AA-203 HIC Shielding Design Basis Source Strength (for 1 HIC)

Energy (MeV)	Activity (Photons/sec)
0.6938	3.44E+09
1.1732	2.11E+13
1.3325	2.11E+13
Totals	**4.22E+13**

NAPS COL 12.2(2)

Table 11AA-204 Thicknesses of Concrete Walls that Enclose the Major Components

Elevation	Room Name	North	East	South	West	Floor	Ceiling
Ground	Truck Bay	4'0" (1)	3'-0"	2-0"	4'-0" (1)	Ground	2'-6"
Ground	HIC Storage Vaults (outer perimeter)	4'0" (1)	4'-0"	4'-0"	4'-0" (1)	Ground	2'-0" (2)
Ground	Crane Operating Room and Mechanical Equipment Room	4'0" (1)	2'-0"	2'-0"	2'-0"	Ground	1'-0"

(1) Walls above the crane rail are thinner (2'-0") to support the crane rail
(2) This represents the concrete covers on the storage vaults
(3) The tolerance for all IRSF shielding wall thicknesses is ± 1 inch.

NAPS COL 9.5(2)

Table 11AA-205 List of Fire Areas and Fire Zones

Building	Train	Fire Area	Fire Area Designation	Fire Zone	Fire Zone Designation
IRSF	N	FA7-302	Truck Bay and Storage Vault Area	FA7-302-01	Truck Bay
IRSF	N	FA7-302	Truck Bay and Storage Vault Area	FA7-302-02	Storage Vault Area
IRSF	N	FA7-303	Crane Operating Room and Mechanical Equipment Room	FA7-303-01	Crane Operating Room
IRSF	N	FA7-303	Crane Operating Room and Mechanical Equipment Room	FA7-303-02	Mechanical Equipment Room

NAPS
COL 9.5(2)

Table 11AA-206 Fire Hazard Analysis Summary (Sheet 1 of 4)

Fire Zone	**FA7-302-01**	Figure	**11AA-203**	Section	
Building	**IRSF**	Floors		Floor Area, ft^2	**3905**
Area Designation	**IRSF Truck Bay and Storage Vault Area**			Associated Safety Division(s)	**N**
Zone Designation	**Truck Bay**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Insulation Cable (crane) Fuel Oil Vehicle Tires HIC Class B/C Waste (Resin)	**4.0E+06** **3.0E+07** **1.6E+07** **1.2E+07** **1.2E+08**	**Automatic Smoke Detection System**	**Manual Fire Alarm Pull Station.**	**The Preaction sprinkler system will suppress the fire in this room consistent with GDC-3.**	**There is no safe-shutdown function in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Preaction Sprinkler	**Manual Hose Station at the truck bay. Portable fire extinguishers located as appropriate for hazards and work activities during maintenance.**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**1.0E+03**
Maximum Anticipated Combustible Loading	**4.7E+04**

	Wall	Wall	Floor & Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 11AA-207 for complete listing.)	**FA7-302-02** **FA7-302-01**			**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. All openings and penetrations into the room from the adjacent fire area are rated to provide 3-hour fire resistance.**

NAPS
COL 9.5(2)

Table 11AA-206 Fire Hazard Analysis Summary (Sheet 2 of 4)

Fire Zone	**FA7-302-02**	Figure	**11AA-203**	Section	
Building	**IRSF**	Floors		Floor Area, ft^2	**3905**
Area Designation	**IRSF Truck Bay and Storage Vault Area**			Associated Safety Division(s)	**N**
Zone Designation	**Storage Vault Area**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 13, 14, 30, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
8 HICs Class B/C waste (Resin) Insulation Cable (from crane)	**9.6E+07** **9.7E+08** **4.0E+06**	**Automatic Smoke Detection System**	**Manual Fire Alarm Pull Station.**	**The preaction sprinkler system will suppress the fire in this room consistent with GDC-3.**	**There is no safe-shutdown function in this zone to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Preaction Sprinkler	**There is no access to this area**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**2.7E+05**
Maximum Anticipated Combustible Loading	**2.8E+05**

	Wall	Wall	Floor & Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 11AA-207 for complete listing.)	**FA7-302-01**	**FA7-303-01** **FA7-303-02**		**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. All openings and penetrations from the adjacent fire area are rated to provide 3-hour fire resistance.**

NAPS
COL 9.5(2)

Table 11AA-206 Fire Hazard Analysis Summary (Sheet 3 of 4)

Fire Zone	**FA7-303-01**	Figure	**11AA-203**	Section	
Building	**IRSF**	Floors		Floor Area, ft^2	**487**
Area Designation	**IRSF Crane Operating Room and Mechanical Equipment Room**			Associated Safety Division(s)	**N**
Zone Designation	**Crane Operating Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Equipment **Transients**	**3.2E+06** **8.0E+06**	**Automatic Smoke Detection System**	**Manual Fire Alarm Pull Station.**	**A quickly detected and suppressed fire in this room will minimize fire damage consistent with GDC-3.**	**There is no safe shutdown function in this area to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Portable fire extinguishers	**Manual Hose Station and Site Fire Brigade**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**6.6E+03**
Maximum Anticipated Combustible Loading	**2.3E+04**

	Wall	Wall	Floor & Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 11AA-207 for complete listing.)	**FA7-302-01** **FA7-302-02**	**FA7-303-02**		**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. All openings and penetrations from the adjacent fire area are rated to provide 3-hour fire resistance.**

NAPS
COL 9.5(2)

Table 11AA-206 Fire Hazard Analysis Summary (Sheet 4 of 4)

Fire Zone	**FA7-303-02**	Figure	**11AA-203**	Section	
Building	**IRSF**	Floors		Floor Area, ft^2	**487**
Area Designation	**IRSF Crane Operating Room and Mechanical Equipment Room**			Associated Safety Division(s)	**N**
Zone Designation	**Mechanical Equipment Room**				
Applicable Regulatory and Code Refs	**IBC, RG 1.189; NFPA 10, 14, 72 and 804**				

Potential Combustibles				Fire Impact to Zone	
Item	Heat Release (Btu)	Fire Detection - Primary	Fire Detection - Backup	Suppression System Operates	Suppression System Fails to Operate
Electrical Insulation Other Combustibles Transients	**1.0E+07** **2.4E+06** **2.4E+06**	**Automatic Smoke Detection System**	**Manual Fire Alarm Pull Station.**	**A quickly detected and suppressed fire in this room will minimize fire damage consistent with GDC-3.**	**There is no safe shutdown function in this area to be damaged.**
		Fire Suppression - Primary	Fire Suppression - Backup		
		Portable fire extinguishers	**Manual Hose Station and Site Fire Brigade**		

Fire Zone Combustible Summary	Btu/ft^2
Anticipated Combustible Loading	**2.6E+04**
Maximum Anticipated Combustible Loading	**3.0E+04**

	Wall	Wall	Floor & Ceiling	Fire Barrier Description
Adjacent Fire Zones (Primary interface listed See Table 11AA-207 for complete listing.)	**FA7-302-02**	**FA7-303-01**		**Walls of reinforced concrete or other material providing a minimum 3-hour fire resistance rating form the boundaries of this room. All openings and penetrations from the adjacent fire area are rated to provide 3-hour fire resistance.**

NAPS COL 9.5(2)

Table 11AA-207 Fire Zone/Fire Area Interfaces

Fire Zone	Interface	Adjacent Fire Zones
FA7-302-01	Ceiling	
	Floor	
	Wall	FA7-302-02, FA7-303-01
FA7-302-02	Ceiling	
	Floor	
	Wall	FA7-302-01, FA7-303-01, FA7-303-02
FA7-303-01	Ceiling	
	Floor	
	Wall	FA7-302-01, FA7-302-02, FA7-303-02
FA7-303-02	Ceiling	
	Floor	
	Wall	FA7-302-02, FA7-303-01

NAPS COL 11.4(1)

Figure 11AA-201 IRSF Layout Plan (Sheet 1 of 4)

NAPS COL 11.4(1)

Figure 11AA-201 IRSF Layout Plan (Sheet 2 of 4)

NAPS COL 11.4(1)

Figure 11AA-201 IRSF Layout Plan (Sheet 3 of 4)

NAPS COL 11.4(1)

Figure 11AA-201 IRSF Layout Plan (Sheet 4 of 4)

NAPS COL 12.3(4)

Figure 11AA-202 Radiation Zones for IRSF (Sheet 1 of 3)

NAPS COL 12.3(4) **Figure 11AA-202 Radiation Zones for IRSF (Sheet 2 of 3)**

NAPS COL 12.3(4) **Figure 11AA-202 Radiation Zones for IRSF (Sheet 3 of 3)**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS COL 9.5(2)

Figure 11AA-203 Fire Zones and Fire Areas Zones for IRSF (NAVD88 Elevations)

12 Radiation Protection

12.0 Radiation Protection

12.1 Ensuring That Occupational Radiation Exposures Are As Low As Reasonably Achievable

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.1.1.3.1 Compliance with Regulatory Guide 1.8

NAPS COL 12.1(1) Replace the paragraph in DCD Subsection 12.1.1.3.1 with the following.

The administrative programs and procedures demonstrate compliance with RG 1.8 (except as noted in Table 1.9-202), including the operation policies activities conducted by management personnel who have plant operational responsibility for radiation protection, by utilizing NEI 07-08A, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As is Reasonably Achievable (ALARA)" (Reference 12.1-201). These are addressed in the operational radiation protection program, described in Section 12.5.

12.1.1.3.2 Compliance with Regulatory Guide 8.8

NAPS COL 12.1(1) Replace the second paragraph in DCD Subsection 12.1.1.3.2 with the following.

The administrative programs and procedures demonstrate compliance with RG 8.8, including the operation policies activities conducted by management personnel who have plant operational responsibility for radiation protection, by utilizing NEI 07-08A, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As is Reasonably Achievable (ALARA)" (Reference 12.1-201). These are addressed in the operational radiation protection program, described in Section 12.5.

12.1.1.3.3 Compliance with Regulatory Guide 8.10

NAPS COL 12.1(1) Replace the paragraph in DCD Subsection 12.1.1.3.3 with the following.

The administrative programs and procedures demonstrate compliance with RG 8.10, including the operation policies activities conducted by management personnel who have plant operational responsibility for

radiation protection, by utilizing NEI 07-08A, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As is Reasonably Achievable (ALARA)" (Reference 12.1-201). These are addressed in the operational radiation protection program, described in Section 12.5.

12.1.3 Operational Considerations

STD COL 12.1(3)

Replace the first and second paragraphs in DCD Subsection 12.1.3 with the following.

The operational radiation protection program for ensuring that operational radiation exposures are as low as reasonably achievable (ALARA) is discussed in Section 12.5, by utilizing of NEI 07-03A (Reference 12.1-25). The program follows the guidance of RG 8.2, 8.4, 8.6, 8.7, 8.9, 8.13, 8.15, 8.25, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, and 8.38.

STD COL 12.1(6)
STD COL 12.1(7)
STD COL 12.1(8)

Replace the last sentence of third paragraph in DCD Subsection 12.1.3 with the following.

The licensee performs periodic reviews of operational practices to ensure that operating procedures reflect the installation of new or modified equipment, personnel qualification and training are kept current, and facility personnel are following the operating procedures. In accordance with 10 CFR 50.75(g) and 10 CFR 70.25(g) as applicable, records containing facility design and construction, facility design changes, site conditions before and after construction, onsite waste disposal and contamination, and results of radiological surveys, are used to facilitate decommissioning. The guidance of RG 4.21 (Reference 12.1-27) is followed in developing and implementing operational procedures for SSCs which could be potential sources of contamination, with the objective of limiting leakage and the spread of contamination within the plant. These procedures are subject to the requirements of Subsection 13.5.2.2.

12.1.4 Combined License Information

Replace the content of DCD Subsection 12.1.4 with the following.

NAPS COL 12.1(1)

12.1(1) ***Policy considerations regarding plant operations***

This Combined License (COL) item is addressed in Subsections 12.1.1.3.1, 12.1.1.3.2 and 12.1.1.3.3.

12.1(2) ***Deleted from the DCD.***

STD COL 12.1(3) *12.1(3)* ***Following the guidance regarding radiation protection***

This COL item is addressed in Subsection 12.1.3.

12.1(4) ***Deleted from the DCD.***

NAPS COL 12.1(5) *12.1(5)* ***Radiation protection program***

This COL item is addressed in Section 12.5 and Table 12.5-201.

STD COL 12.1(6) *12.1(6)* ***Periodic review of operational practices***

This COL item is addressed in Sections 12.1.3 and 12.3.1.3.2.

STD COL 12.1(7) *12.1(7)* ***Implementation of requirements for record retention***

This COL item is addressed in Sections 12.1.3 and 12.3.1.3.2.

STD COL 12.1(8) *12.1(8)* ***Develop and implement operational procedures for SSCs which could be potential sources of contamination, with the objective of limiting leakage and the spread of contamination within the plant.***

This COL item is addressed in Sections 12.1.3 and 12.3.1.3.2.

12.1.5 References

Add the following references after the last reference in DCD Subsection 12.1.5:

12.1-201 Nuclear Energy Institute, “Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As is Reasonably Achievable (ALARA),” 07-08A, Revision 0.

12.2 Radiation Sources

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.2.1.1.3 Chemical and Volume Control System

B. CVCS demineralizer

NAPS DEP 9.2(1) Replace the second paragraph with the following.

The degasifier feed demineralizer is a mixed-bed style demineralizer and is provided to remove ionic impurities from the reactor coolant.

C. CVCS filters

NAPS DEP 9.2(1) Replace the second sentence of the second paragraph with the following.

The source strength for the remaining filters corresponds to a dose rate of 100 rem/h at contact.

NAPS DEP 9.2(1) Replace Section E with the following.

E. Degasifier

The degasifier is used to remove the dissolved noble gases (xenon and krypton) and other gases (hydrogen, iodine, oxygen, and nitrogen) from the primary coolant in order to meet the discharge limits for radionuclide concentrations in liquid effluents. Effluent from the holdup tanks is processed by the degasifier feed demineralizer and then sent to the degasifier, where dissolved gasses in the coolant are separated from the liquid phase to the gaseous phase. After degasification, the coolant is sent to the LWMS. The separated gases are sent to the degasifier vent condenser to remove the steam, and then transferred to the GWMS. The source terms for the degasifier and degasifier vent condenser are tabulated in Tables 12.2-201 through 12.2-206.

NAPS DEP 9.2(1) Delete DCD Section F.

NAPS DEP 9.2(1) Delete DCD Table 12.2-51.

NAPS DEP 9.2(1) Delete DCD Tables 12.2-66 through 12.2-69.

NAPS DEP 9.2(1) Delete DCD Table 12.2-77.

12.2.1.1.10 Miscellaneous Sources

NAPS DEP 9.2(1)

Replace the first three paragraphs of DCD Section 12.2.1.1.10 with the following.

The principal source of activity outside the buildings but inside the tank house is the refueling water storage auxiliary tank.

The content of the refueling water storage auxiliary tank is processed by the SFP purification system until the activity in the fluids is sufficiently low to result in dose rates less than 0.25 mrem/h at 2 meters from the surface of the tank.

Radionuclide inventory of the refueling water storage auxiliary tank is presented in DCD Table 12.2-50. There are no other significant amounts of radioactive fluids permanently stored outside the buildings.

NAPS COL 12.2(2)

Replace the second and third sentences of the sixth paragraph in DCD Subsection 12.2.1.1.10 with the following.

The IRSF described in Appendix 11AA will provide storage space for Class B and C low level radioactive waste. Information on the radiation protection aspects of the IRSF is included in Appendix 11AA. The radiation protection program (see Section 12.5) associated with this additional radwaste storage space is in place to ensure compliance with 10 CFR 20, 40 CFR 190 and to be consistent with the recommendations of RG 8.8.

Appendix 11AA contains radiation sources information for the IRSF.

STD COL 12.2(2)

Replace the second sentence of the seventh paragraph in DCD Subsection 12.2.1.1.10 with the following.

There are no additional radwaste facilities for dry active waste.

NAPS COL 12.2(1)

Replace the last paragraph in DCD Subsection 12.2.1.1.10 with the following.

Additionally, the site maintains contained sources of known isotope and activity containing byproduct, source, or special nuclear materials for use as calibration, check, or radiography sources. Example uses for these types of sources include systems security checks; equipment standardization and calibration; process control; gauging and QA testing; teaching; and nuclear reactor operations.

Licensed sources containing byproduct, source, and special nuclear materials that warrant shielding design consideration meet the applicable requirements of 10 CFR 20, 30, 31, 32, 33, 34, 40, 50, and 70. Sources maintained on site are shielded to keep personnel exposure ALARA. Sources brought on-site by contractors for activities such as the servicing or calibration of plant instrumentation or the performance of radiography are maintained and used in accordance with the provisions of the licensed utility group or contractor. If these sources must be maintained on site, designated plant personnel approve the storage location and identify appropriate measures for maintaining security and personnel protection. The licensee maintains procedures to control, limit and monitor cumulative dose for construction workers and security employees such that total exposure for each construction worker and security employee is maintained less than 100 mrem per year in accordance with 10 CFR 20.1301.

Specific details regarding the isotope, quantity, form and use of these sources are maintained onsite following their procurement. The following minimum information is maintained:

- Isotopic concentration
- Location on site
- Source strength, form, and geometry (as applicable)
- Description of the use

Written procedures based upon the Radiation Protection Program govern the procurement, receipt, inventory, labeling, leak testing, surveillance, control, transfer, disposal, storage, issuance, and use of these sources. Additionally, these procedures comply with 10 CFR 19 and 20 to assure that occupational doses associated with the control and use of these materials are maintained ALARA.

12.2.3 Combined License Information

Replace the content of DCD Subsection 12.2.3 with the following.

NAPS COL 12.2(1)

12.2(1) ***Additional sources***

This COL item is addressed in Subsection 12.2.1.1.10.

STD COL 12.2(2)
NAPS COL 12.2(2)

12.2(2) ***Additional storage space and radwaste facilities***

This COL item is addressed in Subsection 12.2.1.1.10 and Section 12.5.

NAPS COL 12.2(3)

12.2(3) ***Radiation Protection Program provisions for limiting the radiation levels of the RWSAT and PMWTs.***

This COL item is addressed in Section 12.5.

NAPS COL 12.2(4)

12.2(4) ***Ensuring the radioactivity concentration in the RWSAT and PMWT remain under the levels described in the DCD.***

This COL item is addressed in Section 12.5.

Table 12.2-1R Radiation Source Parameters (Sheet 3 of 6)

	Assumed Shielding Sources						
	Source Approximate Geometry as Cylinder Volume		Source Characteristics				
Components	Radius (in.)	Length (in.)	Type	Material	Density (lb/ft^3)	Equipment Self-Shielding (in.)	Quantity
Auxiliary Building							
Mix bed demineralizer*	23.7	68.9	Homogeneous	Water	62.4	ignored	2
Cation-bed demineralizer*	15.9	65.6	Homogeneous	Water	62.4	ignored	1
Deborating demineralizer*	23.7	68.9	Homogenous	Water	62.4	ignored	2
Holdup tank Liquid Phase Vapor Phase	147.6	410.0 229.7 180.3	 Homogenous Homogenous	 Water Air	 62.4 7.6E-02	ignored	3
NAPS DEP 9.2(1) ~~B.A. evaporator feed~~ Degasifier feed demineralizer*	23.7	68.9	Homogeneous	Water	62.4	ignored	1
Spent fuel pit demineralizer*	23.7	68.9	Homogeneous	Water	62.4	ignored	2
Steam generator blowdown demineralizer*	44.3	63.4	Homogeneous	Water	62.4	ignored	4
Waste holdup tank	128.0	138.6	Homogeneous	Water	62.4	ignored	4
Waste demineralizer*	23.7	68.9	Homogeneous	Water	62.4	ignored	4
Charcoal bed Charcoal Phase Vapor Phase	23.7	126.0 68.8 57.2	 Homogenous Homogenous	 Charcoal Air	 34.4 7.6E-02	ignored	4
Waste gas surge tank	74.8	167.0	Homogeneous	Air	7.6E-02	1.0	4
Spent resin storage tank	59.1	131.2	Homogeneous	Water	62.4	ignored	2

* Parameters from the US-APWR demineralizers are tabulated in Table 12.2-73.

Table 12.2-1R Radiation Source Parameters (Sheet 3 of 6) *(continued)*

	Components	Assumed Shielding Sources: Source Approximate Geometry as Cylinder Volume: Radius (in.)	Length (in.)	Source Characteristics: Type	Material	Density (lb/ft^3)	Equipment Self-Shielding (in.)	Quantity
NAPS DEP 9.2(1)	~~B.A. evaporator~~ Degasifier Liquid Phase Vapor Phase	~~26.9~~ 27.0	~~188.5~~ 264.0 72.0 102.0	 Homogeneous Homogeneous	 Water Air	 62.4 7.6E-02	ignored	1
NAPS DEP 9.2(1)	~~B.A. evaporator~~ Degasifier vent condenser	5.0	78.1	Homogeneous	Air	7.6E-02	ignored	~~1~~ 2
NAPS DEP 9.2(1)	~~Boric acid tank~~	~~118.1~~	~~361.5~~	~~Homogeneous~~	~~Water~~	~~62.4~~	~~ignored~~	~~2~~

* Parameters from the US-APWR demineralizers are tabulated in Table 12.2-73.

Table 12.2-1R Radiation Source Parameters (Sheet 4 of 6)

	Assumed Shielding Sources						
	Source Approximate Geometry as Cylinder Volume		Source Characteristics				
Components	Radius (in.)	Length (in.)	Type	Material	Density (lb/ft^3)	Equipment Self-Shielding (in.)	Quantity
Plant Yard Area (Outside the Power Block)							
Refueling water storage auxiliary tank	196.9	446.3	Homogeneous	Water	62.4	ignored	1
NAPS DEP 9.2(1) ~~Primary makeup water tank~~	~~183.1~~	~~316.9~~	~~Homogeneous~~	~~Water~~	~~62.4~~	~~ignored~~	~~2~~

Table 12.2-1R Radiation Source Parameters (Sheet 6 of 6)

	Assumed Shielding Sources								
	Source Approximate Geometry as Annular Cylinder Volume			Source Characteristics					
Components	Outer Radius (in.)	Inner Radius (in.)	Height (in.)	Type	Material	Density (lb/ft^3)	Designed Upper limit dose rate (mrem/h)	Equipment Self-Shielding (in.)	Quantity
Auxiliary Building									
Reactor coolant Filter	6.4	5.2	19.7	Homogeneous	Water	62.4	Ignored	500	2
Mixed bed demineralizer inlet filter	6.4	5.2	19.7	Homogeneous	Water	62.4	Ignored	500	3
NAPS DEP 9.2(1) ~~B.A. evaporator feed demineralizer~~ Degasifier feed filter	3.4	2.7	19.7	Homogeneous	Water	62.4	Ignored	100	1
NAPS DEP 9.2(1) ~~Boric acid filter~~	~~6.4~~	~~5.2~~	~~19.7~~	~~Homogeneous~~	~~Water~~	~~62.4~~	~~Ignored~~	~~10~~	~~1~~
Seal water injection filter	1.7	1.6	19.9	Homogeneous	Water	62.4	Ignored	100	2
Waste effluent inlet filter	6.4	5.2	19.7	Homogeneous	Water	62.4	Ignored	100	2
SFP filter	6.4	5.2	19.7	Homogeneous	Water	62.4	Ignored	100	2
SG blowdown demineralizer inlet filter	6.4	5.2	19.7	Homogeneous	Water	62.4	Ignored	10	2

NAPS DEP 9.2(1)

Table 12.2-64R Chemical and Volume Control System Radiation Sources ~~B.A. Evaporator Feed~~ Degasifier Feed Demineralizer Activity (70 ft^3 of Resin)

Nuclide	Activity ($\mu Ci/cm^3$)	Nuclide	Activity ($\mu Ci/cm^3$)
Br-82	1.2E-02	Te-129m	2.0E-01
Br-83	3.0E-03	Te-129	1.5E-04
Br-84	8.5E-05	Te-131m	3.7E-02
Rb-86	2.9E+00	Te-131	2.1E-05
Rb-88	1.1E+00	Te-132	1.1E+00
Rb-89	1.3E-03	Te-133m	2.0E-04
Sr-89	9.3E-02	Te-134	2.1E-04
Sr-90	5.9E-03	I-130	1.5E+00
Sr-91	7.9E-04	I-131	1.3E+01
Sr-92	6.7E-05	I-132	1.3E+00
Y-90	1.3E-01	I-133	2.2E+00
Y-91m	5.3E-04	I-134	3.8E-03
Y-91	1.3E-02	I-135	3.4E-01
Y-92	2.8E-04	Cs-132	5.5E-01
Y-93	1.6E-04	Cs-134	5.0E+02
Zr-95	1.5E-02	Cs-135m	1.4E-03
Nb-95	4.0E-02	Cs-136	6.3E+01
Mo-99	2.5E+00	Cs-137	2.9E+02
Mo-101	1.7E-05	Cs-138	9.1E-02
Tc-99m	3.5E+00	Ba-137m	2.5E+02
Ru-103	1.1E-02	Ba-140	5.2E-02
Ru-106	5.0E-03	La-140	1.0E-01
Ag-110m	4.5E-05	Ce-141	1.2E-02
Te-125m	1.7E-02	Ce-143	8.0E-04
Te-127m	7.5E-02	Ce-144	1.2E-02
		Pr-144	1.7E-02
		Pm-147	1.4E-03

NAPS DEP 9.2(1)

Table 12.2-64R Chemical and Volume Control System Radiation Sources ~~B.A. Evaporator Feed~~ Degasifier Feed Demineralizer Activity (70 ft^3 of Resin) *(continued)*

Nuclide	Activity ($\mu Ci/cm^3$)	Nuclide	Activity ($\mu Ci/cm^3$)
		Eu-154	1.3E-04
		Na-24	4.2E-02
		Cr-51	1.2E-01
		Mn-54	1.2E-01
		Mn-56	1.1E-02
		Fe-55	1.2E-01
		Fe-59	1.6E-02
		Co-58	2.5E-01
		Co-60	4.2E-02
		Zn-65	3.3E-02

NAPS DEP 9.2(1)

Table 12.2-65R Chemical and Volume Control System Radiation Sources ~~B.A. Evaporator Feed~~ Degasifier Feed Demineralizer Source Strength (70 ft^3 of Resin)

Gamma Ray Energy (MeV)	Source Strength ($MeV/cm^3/sec$)
0.015	2.6E+03
0.02	2.7E+02
0.03	3.3E+04
0.04	9.8E+03
0.05	3.0E+02
0.06	1.8E+04
0.08	1.3E+04
0.1	1.1E+03
0.15	6.3E+04
0.2	7.7E+04
0.3	4.3E+05
0.4	1.6E+05
0.5	2.2E+05
0.6	1.9E+07
0.8	1.6E+07
1.0	2.9E+06
1.5	8.9E+05
2.0	2.5E+04
3.0	9.2E+03
4.0	4.3E+01
5.0	3.0E+02

Table 12.2-73R Parameters for the US-APWR demineralizers

	Component	DF	Flow rate	Term of Service	Inlet flow stream activity concentration	Note
		Parameters				
	Mixed bed demineralizer	Kr, Xe=1, Br, I=100, Cs, Rb=2, Others=50	180 gpm	731 days	Table 12.2-13	These values in the left columns are listed in Table 11.1-1
	Cation-bed demineralizer	Kr, Xe=1, Br, I=1, Cs, Rb=10, Others=10	18 gpm	731 days	Table 12.2-74	
	Deborating demineralizer	Anion=100, Cs, Rb=1, Others=1	180 gpm	22 hours	Table 12.2-74	
NAPS DEP 9.2(1)	~~B.A. evaporator feed~~ Degasifier feed demineralizer	Anion=10, Cs, Rb=2, Others=10	30 gpm	780 hours	Table 12.2-75	
	Waste demineralizer (Anion-bed)	I=100, Cs, Rb=1, Others=1	90 gpm	280 hours	Table 12.2-37	
	Waste demineralizer (Cation-bed)	I=1, Cs, Rb=10, Others=10	90 gpm	280 hours	Table 12.2-76	
NAPS DEP 9.2(1)	~~Waste demineralizer (Mixed bed) In case of treating HT system~~	~~Kr, Xe=1, I=5, Cs, Rb=1, Others=10~~	~~30 gpm~~	~~780 hours~~	~~Table 12.2-77~~	~~Parameters used when treating distilled water in the boron recycle system~~
NAPS DEP 9.2(1)	Waste demineralizer (Mixed bed) ~~In case of treating WHT system~~	Kr, Xe=1, I=100, Cs, Rb=2, Others=100	90 gpm	280 hours	Table 12.2-78R	~~Parameters used when treating waste liquid in the waste liquid storage tank~~
	Spent fuel pit demineralizer	Kr, Xe=1, Br, I=100, Cs, Rb=2, Others=100	265 gpm	731 days	Table 12.2-34	
	SG Blowdown demineralizer	Br, I=100, Cs, Rb=100, Others=1000	1.554E+05 lb/hr	731 days	Table 11.1-5	

NAPS DEP 9.2(1)

Table 12.2-75R Inlet Flow Stream Activity of ~~B.A. Evaporator Feed~~ Degasifier feed demineralizer

Nuclide	Activity (μCi/cm³)	Nuclide	Activity (μCi/cm³)
Kr-83m	1.6E-01	Te-129m	1.2E-04
Kr-85m	9.7E-01	Te-129	2.8E-05
Kr-85	9.2E+01	Te-131m	2.8E-04
Kr-87	2.4E-01	Te-131	1.1E-05
Kr-88	1.4E+00	Te-132	3.3E-03
Xe-131m	4.1E+00	Te-133m	4.8E-05
Xe-133m	4.0E+00	Te-134	6.6E-05
Xe-133	3.1E+02	I-130	6.2E-04
Xe-135m	3.3E-01	I-131	1.6E-02
Xe-135	8.4E+00	I-132	2.5E-02
Xe-138	2.6E-02	I-133	2.4E-02
		I-134	9.3E-04
Br-82	7.9E-05	I-135	1.2E-02
Br-83	2.8E-04	Cs-132	4.1E-04
Br-84	3.6E-05	Cs-134	3.8E-01
Rb-86	3.7E-03	Cs-135m	6.4E-04
Rb-88	1.4E+00	Cs-136	9.9E-02
Rb-89	2.0E-03	Cs-137	2.2E-01
Sr-89	4.8E-05	Cs-138	6.9E-02
Sr-90	2.4E-06	Ba-137m	8.1E+00
Sr-91	1.9E-05	Ba-140	4.6E-05
Sr-92	5.6E-06	La-140	3.3E-04
Y-90	4.2E-04	Ce-141	7.1E-06
Y-91m	3.4E-05	Ce-143	5.5E-06
Y-91	6.2E-06	Ce-144	5.3E-06
Y-92	1.4E-05	Pr-144	4.8E-03
Y-93	3.6E-06	Pm-147	6.0E-07
Zr-95	7.3E-06	Eu-154	5.6E-08

NAPS DEP 9.2(1)

Table 12.2-75R Inlet Flow Stream Activity of ~~B.A. Evaporator Feed~~ Degasifier feed demineralizer *(continued)*

Nuclide	Activity (μCi/cm^3)	Nuclide	Activity (μCi/cm^3)
Nb-95	2.0E-05		
Mo-99	8.5E-03	Na-24	6.3E-04
Mo-101	1.6E-05	Cr-51	7.5E-05
Tc-99m	5.7E-02	Mn-54	5.1E-05
Ru-103	6.0E-06	Mn-56	9.8E-04
Ru-106	2.1E-06	Fe-55	4.9E-05
Ag-110m	1.9E-08	Fe-59	8.7E-06
Te-125m	8.6E-06	Co-58	1.2E-04
Te-127m	3.4E-05	Co-60	1.8E-05
		Zn-65	1.4E-05

NAPS DEP 9.2(1)

Table 12.2-78R Inlet Flow Stream Activity of Waste Demineralizer (Mixed bed)*

Nuclide	Activity (μCi/cm^3)	Nuclide	Activity (μCi/cm^3)
Kr-83m	2.8E-02	Te-129m	2.5E-04
Xe-131m	3.1E-03	Te-129	2.0E-04
Xe-133m	1.2E-02	Te-131m	6.3E-04
Xe-133	1.8E-01	Te-131	2.2E-04
Xe-135m	2.5E+00	Te-132	7.0E-03
Xe-135	4.6E-01	Te-133m	4.3E-04
		Te-134	7.6E-04
Br-82	3.5E-04	I-130	2.7E-04
Br-83	2.4E-03	I-131	6.7E-03
Br-84	1.1E-03	I-132	2.0E+00
Rb-86	1.1E-03	I-133	1.1E-02
Rb-88	1.4E-01	I-134	7.0E-03
Rb-89	2.5E-03	I-135	6.4E-03
Sr-89	8.3E-05	Cs-132	2.2E-04
Sr-90	5.4E-06	Cs-134	2.0E-01
Sr-91	4.7E-05	Cs-135m	2.4E-04
Sr-92	2.2E-05	Cs-136	2.5E-02
Y-90	3.3E-05	Cs-137	1.2E-01
Y-91m	3.1E-04	Cs-138	2.6E-02
Y-91	1.3E-05	Ba-137m	4.6E+02
Y-92	3.7E-05	Ba-140	9.8E-05
Y-93	9.0E-06	La-140	3.6E-04
Zr-95	1.6E-05	Ce-141	1.5E-05
Nb-95	2.1E-05	Ce-143	1.2E-05
Mo-99	1.8E-02	Ce-144	1.2E-05
Mo-101	5.0E-04	Pr-144	7.3E-03
Tc-99m	1.6E-01	Pm-147	1.3E-06
Ru-103	I.3E-05	Eu-154	1.2E-07

NAPS DEP 9.2(1)

Table 12.2-78R Inlet Flow Stream Activity of Waste Demineralizer (Mixed bed)* *(continued)*

Nuclide	Activity (μCi/cm^3)	Nuclide	Activity (μCi/cm^3)
Ru-106	4.7E-06		
Aq-110m	4.3E-08	Na-24	1.5E-03
Te-125m	1.9E-05	Cr-51	1.6E-04
Te-127m	7.5E-05	Mn-54	1.1E-04
		Mn-56	4.0E-03
		Fe-55	1.1E-04
		Fe-59	1.9E-05
		Co-58	2.6E-04
		Co-60	3.9E-05
		Zn-65	3.2E-05

NAPS DEP 9.2(1)

~~* These activities are used when this demineralizer processes the liquid effluent from the waste holdup tank.~~

NAPS DEP 9.2(1)

Table 12.2-201 Chemical and Volume Control System Radiation Sources Degasifier Activity (Liquid Phase)

Nuclide	Activity (μCi/cm^3)	Nuclide	Activity (μCi/cm^3)
Kr-83m	3.3E-06	Te-129m	1.2E-05
Kr-85m	0.0E+00	Te-129	2.4E-06
Kr-85	0.0E+00	Te-131m	2.8E-05
Kr-87	0.0E+00	Te-131	6.9E-07
Kr-88	0.0E+00	Te-132	3.2E-04
Xe-131m	1.7E-08	Te-133m	3.7E-06
Xe-133m	3.5E-07	Te-134	4.7E-06.
Xe-133	5.1E-06	I-130	6.2E-05
Xe-135m	9.0E-05	I-131	1.6E-03
Xe-135	3.3E-05	I-132	1.1E-02
Xe-138	0.0E+00	I-133	2.3E-03
		I-134	7.6E-05
Br-82	7.8E-06	I-135	1.1E-03
Br-83	2.5E-05	Cs-132	2.1E-04
Br-84	2.4E-06.	Cs-134	1.9E-01
Rb-86	1.9E-03	Cs-135m	2.4E-04
Rb-88	3.8E-01	Cs-136	5.0E-02
Rb-89	4.8E-04	Cs-137	1.1E-01
Sr-89	4.9E-06	Cs-138	2.3E-02
Sr-90	2.4E-07	Ba-137m	2.0E-01
Sr-91	1.8E-06	Ba-140	4.6E-06
Sr-92	5.1E-07·	La-140	5.9E-05
Y-90	4.4E-05	Ce-141	7.1E-07
Y-91m	1.1E-05	Ce-143	5.4E-07
Y-91	6.3E-07	Ce-144	5.3E-07
Y-92	1.7E-06	Pr-144	6.9E-04
Y-93	3.5E-07	Pm-147	6.0E-08
Zr-95	7.3E-07	Eu-154	5.6E-09

NAPS DEP 9.2(1)

Table 12.2-201 Chemical and Volume Control System Radiation Sources Degasifier Activity (Liquid Phase)

Nuclide	Activity (μCi/cm^3)	Nuclide	Activity (μCi/cm^3)
Nb-95	2.4E-06		
Mo-99.	8.4E-04	Na-24	6.2E-05
Mo-101	7.3E-07	Cr-51	7.5E-06
Tc-99m	1.3E-02	Mn-54	5.1E-06
Ru-103	6.0E-07	Mn-56	8.9E-05
Ru-106	2.1E-07	Fe-55	4.9E-06
Ag-110m	1.9E-09	Fe-59	8.7E-07
Te-125m	8.6E-07	Co-58	1.2E-05
Te-127m	3.4E-06	Co-60	1.8E-06
		Zn-65	1.4E-06

NAPS DEP 9.2(1)

Table 12.2-202 Chemical and Volume Control System Radiation Sources Degasifier Source Strength (Liquid Phase)

Gamma Ray Energy (MeV)	Source Strength (MeV/cm^3/sec)
0.015	1.9E+00
0.02	7.1 E-01
0.03	2.4E+01
0.04	7.3E+00
0.05	8.6E-02
0.06	1.4E+01
0.08	9.4E+00
0.1	9.2E-01
0.15	9.9E+01
0.2	6.0E+01
0.3	3.4E+02
0.4	4.4E+01
0.5	3.3E+02
0.6	9.4E+03
0.8	8.7E+03
1.0	2.5E+03
1.5	1.7E+03
2.0	6.4E+03
3.0	1.4E+03
4.0	1.3E+01
5.0	1.1E+02

NAPS DEP 9.2(1)

Table 12.2-203 Chemical and Volume Control System Radiation Sources Degasifier Activity (Vapor Phase)

Nuclide	Activity (μCi/cm^3)
Kr-83m	2.6E-01
Kr-85m	2.6E+00
Kr-85	4.3E+02
Kr-87	3.0E-01
Kr-88	2.9E+00
Xe-131m	1.9E+01
Xe-133m	1.7E+01
Xe-133	1.4E+03
Xe-135m	1.2E-01
Xe-135	2.8E+01
Xe-138	7.8E-03

NAPS DEP 9.2(1)

Table 12.2-204 Chemical and Volume Control System Radiation Sources Degasifier Source Strength (Vapor Phase)

Gamma Ray Energy (MeV)	Source Strength ($MeV/cm^3/sec$)
0.015	4.24E+4
0.03	7.4E+05
0.04	3.6E+04
0.06	8.1E-03
0.08	1.5E+06
0.1	2.1E+01
0.15	1.8E+04
0.2	2.1E+05
0.3	4.9E+03
0.4	6.6E+03
0.5	3.6E+04
0.6	1.9E+04
0.8	1.5E+04
1.0	6.8E+03
1.5	2.9E+04
2.0	1.3E+05
3.0	7.3E+03

NAPS DEP 9.2(1)

Table 12.2-205 Chemical and Volume Control System Radiation Sources Degasifier Vent Condenser Activity

Nuclide	Activity ($\mu Ci/cm^3$)
Kr-83m	2.6E-01
Kr-85m	2.6E+00
Kr-85	4.3E+02
Kr-87	3.0E-01
Kr-88	2.9E+00
Xe-131m	1.9E+01
Xe-133m	1.7E+01
Xe-133	1.4E+03
Xe-135m	1.2E-01
Xe-135	2.8E+01
Xe-138	7.8E-03

NAPS DEP 9.2(1)

Table 12.2-206 Chemical and Volume Control System Radiation Sources Degasifier Vent Condenser Source Strength

Gamma Ray Energy (MeV)	Source Strength (MeV/cm^3/sec)
0.015	4.24E+4
0.03	7.4E+05
0.04	3.6E+04
0.06	8.1E-03
0.08	1.5E+06
0.1	2.1E+01
0.15	1.8E+04
0.2	2.1E+05
0.3	4.9E+03
0.4	6.6E+03
0.5	3.6E+04
0.6	1.9E+04
0.8	1.5E+04
1.0	6.8E+03
1.5	2.9E+04
2.0	1.3E+05
3.0	7.3E+03

12.3 Radiation Protection Design Features

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.3.1.1.1.2 Balance of Plant Equipment

NAPS DEP 9.2(1)

Delete the content of item C.

Replace the title of item C. with "deleted."

STD COL 12.3(6)
STD COL 12.3(7)
STD COL 12.3(8)

Add the following information at the end of DCD Subsection 12.3.1.1.1.2.

N. Mobile Liquid Waste Processing System

The mobile liquid waste processing system is located in the Auxiliary Building, and treats the effluent prior to discharging it to the waste monitor tank. This system is designed to comply with SRP Section 12.3-12.4, RG 1.206 and RG 1.69. As described in Subsection 11.2.1.6, provisions are included to mitigate contamination, and the system complies with 10 CFR 20.1406. The mobile liquid waste processing system is located in a radiation zone III area. Shield walls are provided for the system in order to allow the surrounding area to maintain a radiation zone III designation.

12.3.1.1.2 Common Facility and Layout Designs for As Low As Reasonably Achievable

NAPS DEP 9.2(1)

Replace the first sentence in the last paragraph in item B with the following.

Piping that carries resin slurries is run vertically as much as possible.

NAPS DEP 9.2(1)

Replace the first sentence of the first paragraph in item E. with the following.

In those systems where process equipment is a major radiation source (such as fuel pit cleanup, coolant, chemical waste, and miscellaneous waste), pumps, valves, and instruments are separated from the process component.

12.3.1.2.1.1 Radiation Zoning

STD COL 12.3(4)

Replace the fourth sentence of the fourth paragraph in DCD Subsection 12.3.1.2.1.1 with the following.

Site radiation zones for plant arrangement plan under normal operation/shutdown conditions are shown in Figure 12.3-1R (COL information provided on Sheet 1 of 34).

NAPS SUP 12.3(1)

Add the following after the last Sentence in the fourth paragraph in DCD subsection 12.2.1.2.1.1.

Radiation zoning maps for the IRSF are shown in Appendix 11AA.

NAPS COL 12.3(10)

12.3.1.3.1.1 Design Considerations for Site Specific Design

This section identifies the site-specific design features of systems that address RG 4.21. These systems include the Startup Steam Generator Blowdown System discharge line and the treated radioactive effluent discharge line from the LWMS. A detailed discussion of these features is provided for the Startup Steam Generator Blowdown System in Subsection 10.4.8.2.1 and for the LWMS in Subsection 11.2.2. A detailed discussion of how these design features meet the design objectives of RG 4.21 is presented in Table 12.3-201. The design features for the LWMS effluent discharge pathway should be reviewed in conjunction with DCD Table 12.3-8. Any site-specific departures regarding DCD Table 12.3-8 are provided in Table 12.3-8R.

STD COL 12.3(10)

The Ultimate Heat Sink (UHS) has an interface with essential service water system (ESWS). As discussed in DCD Table 12.3-8, the ESWS is in compliance with RG 4.21 (Reference 12.3-30), and does not normally contain any radioactivity. Therefore, the UHS has no direct interface with any radioactive system and does not require compliance with RG 4.21.

12.3.1.3.2 Operational/Programmatic Considerations

STD COL 12.1(6)
STD COL 12.1(7)
STD COL 12.1(8)
STD COL 12.3(10)

Replace the last paragraph in DCD Subsection 12.3.1.3.2 with the following.

Programs and procedures are implemented consistent with NEI 08-08A, "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination," to meet the site-specific, operational and

post-construction objectives of RG 4.21 (Reference 12.3-30) and the requirements of 10 CFR 20.1406 (Reference 12.3-29). These objectives include:

- Periodically reviewing operational practices to ensure operating procedures reflect the installation of new or modified equipment, personnel qualification and training are kept current, and facility personnel are following the operating procedures;
- Facilitating decommissioning by maintaining records relating to facility design and construction, facility design changes, site conditions before and after construction, contamination events, and results of radiological surveys;
- Development of a conceptual site model (based on site characterization and facility design and construction) that aids in the understanding of the interface with environmental systems and the features that control the movement of contamination in the environment;
- Evaluating the final site configuration after construction to assist in preventing the migration of radionuclides offsite via unmonitored pathways; and
- Establishing and performing an onsite contamination monitoring program along the potential pathways from the release sources to the receptor points.

12.3.2.2.5 Auxiliary Building Shielding Design

NAPS DEP 9.2(1)

Replace the first sentence of the first paragraph with the following.

During normal operations, the major components in the A/B with potentially high radioactivity are those in the CVCS, SGBDS, GWMS, LWMS, and SWMS.

12.3.2.2.8 Spent Fuel Transfer Canal and Tube Shielding Design

STD COL 12.3(5)

Replace the last paragraph in DCD Subsection 12.3.2.2.8 with the following.

Administrative control of the fuel transfer tube inspection and the access control of the area near the seismic gap below the fuel transfer tube will be addressed in a radiation protection program, described in Section 12.5.

12.3.2.3 Shielding Calculation Methods

NAPS DEP 9.2(1) Replace the first sentence of the third paragraph with the following.

The geometric model assumed for shielding evaluation of tanks, heat exchangers, demineralizers, and the containment is a finite cylindrical volume with maximum source volume capacity.

12.3.4 Area Radiation and Airborne Radioactivity Monitoring Instrumentation

NAPS SUP 12.3(2) Add the following after the second paragraph.

Description, discussion, and locations of the area radiation and airborne radioactivity monitors for the IRSF are in Appendix 11AA.

STD COL 12.3(1) Replace the last paragraph in DCD Subsection 12.3.4 with the following.

Portable instruments to be used in the event of an accident are placed so as to be readily available to personnel responding to an emergency.

The use of portable instruments and the associated training and procedures to accurately determine the airborne iodine concentration in areas within the facility where plant personnel may be present during an accident, in accordance with the requirements of 10 CFR 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737 will be addressed in radiation protection program, described in Section 12.5.

Procedures for locating suspected high-activity areas are part of the radiation protection program that is described in Section 12.5.

12.3.6 Combined License Information

Replace the content of DCD Subsection 12.3.6 with the following.

STD COL 12.3(1) *12.3(1)* ***Portable instruments***

This COL item is addressed in Subsection 12.3.4 and Section 12.5.

12.3(2) ***Deleted from the DCD.***

12.3(3) ***Deleted from the DCD.***

STD COL 12.3(4)
NAPS COL 12.3(4)

12.3(4) ***Site radiation zones***

This COL item is addressed in Subsection 12.3.1.2.1.1 and Figure 12.3-1R (sheet 1 of 34).

STD COL 12.3(5)
NAPS COL 12.3(5)

12.3(5) ***Administrative control of the fuel transfer tube inspection***

This COL item is addressed in Subsection 12.3.2.2.8 and Section 12.5.

STD COL 12.3(6)

12.3(6) ***The radiation protection aspects of the Mobile Liquid Waste Processing System***

This COL item is addressed in Subsection 12.3.1.1.1.2.

STD COL 12.3(7)

12.3(7) ***How the system meets the requirements of 10 CFR 20.1406 and RG 4.21***

This COL item is addressed in Subsections 11.2.1.6 and 12.3.1.1.1.2.

STD COL 12.3(8)

12.3(8) ***Radiation Zones for Mobile Liquid Waste Processing System area***

This COL item is addressed in Subsection 12.3.1.1.1.2.

NAPS COL 12.3(9)
NAPS DEP 9.2(1)

12.3(9) ***Radiation Protection Program contains provisions to ensure the Degasifier Feed Filter and Demineralizer rooms do not become a VHRA.***

This COL item is addressed in Section 12.5.

STD COL 12.3(10)
NAPS COL 12.3(10)

12.3(10) ***The COL Applicant will address the site-specific design features, operational and post-construction objectives of Regulatory Guide 4.21.***

This COL item is addressed in Subsections 12.3.1.3.1.1, 12.3.1.3.2, Tables 12.3-8R and 12.3-201.

Table 12.3-1R Thicknesses of Concrete walls that enclose the major components (Sheet 3 of 4)

	Elevation	Room Name	North	East	South	West	Floor	Ceiling
	Auxiliary Building							
	-26'-4"	A-Holdup tank Room	2'-0"	4'-0"	4'-2"	3'-4"	Ground	4'-2"
	-26'-4"	B-Holdup tank Room	2'-0"	4'-0"	2'-0"	3'-4"	Ground	4'-2"
	-26'-4"	C-Holdup tank Room	4'-0" 1)	4'-0"	2'-0"	3'-4"	Ground	4'-2"
	-26'-4"	A-Waste holdup tank Room	2'-0"	3'-4"	2'-6"	2'-0"	Ground	2'-8"
	-26'-4"	B-Waste holdup tank Room	2'-0"	3'-4"	2'-0"	2'-0"	Ground	2'-8"
	-26'-4"	C-Waste holdup tank Room	2'-0"	2'-6" 1)	2'-6"	3'-4"	Ground	2'-10"
	-26'-4"	D-Waste holdup tank Room	3'-4"	2'-0"	2'-0"	3'-4"	Ground	2'-10"
	-26'-4"	Charcoal bed Room (A)	2'-6"	2'-6"	4'-4" 1)	2'-6"	Ground	4'-1 2)
	-26'-4"	Charcoal bed Room (B)	2'-6"	2'-6"	4'-4" 1)	2'-6"	Ground	4'-1 2)
NAPS DEP 9.2(1)	-26'-4"	Waste gas surge tank Room (A)	3'-4"	~~3'-4"~~ 4'-4"	3'-11 1)	2'-8"	Ground	2'-8"
	-26'-4"	Waste gas surge tank Room (B)	3'-4"	2'-8"	3'-11 1)	3'-4"	Ground	2'-8"
	-26'-4"	A-Spent resin storage tank Room	3'-2"	3'-2"	3'-4"	4'-6"	Ground	3'-2"
	-26'-4"	B-Spent resin storage tank Room	4'-6"	3'-2"	3'-2"	4'-6"	Ground	3'-2"
	-26'-4"	Valve Area 3)	2'-2"	2'-2"	2'-6"	2'-6"	Ground	2'-11" 1)
	-26'-4"	Valve Area 4)	2'-7"	3'-4"	2'-8"	3'-4"	Ground	2'-8"
	-26'-4"	Valve Area 5)	3'-6"	3'-6"	3'-4"	3'-2"	Ground	3'-2"
	-8'-7"	Piping Area 5)	3'-6"	3'-6"	4'-6" 6)	3'-4"	3'-6"	3'-6"
	-8'-7"	Piping Area 7)	3'-4"	3'-4"	3'-4"	4'-0"	2'-8"	2'-8"

Table 12.3-1R Thicknesses of Concrete walls that enclose the major components (Sheet 3 of 4)

Elevation	Room Name	North	East	South	West	Floor	Ceiling

1) Face to area of Zone III
2) Face to Waste Mobile System Room
3) Adjacent to Charcoal bed Room (A)
4) Adjacent to Waste gas surge tank Room
5) Adjacent to Spent resin storage tank Room
6) Face to Spent resin storage tank room
7) Adjacent to Holdup tank Room

Table 12.3-1R Thicknesses of Concrete walls that enclose the major components (Sheet 4 of 4)

Elevation	Room Name	North	East	South	West	Floor	Ceiling
Auxiliary Building							
3'-7"	Mixed bed demineralizer Room	3'-4"	3'-4"	3'-4"	4'-8"	3'-2" 1)	4'-8"
3'-7"	Cation-bed demineralizer Room	3'-4"	2'-10"	2'-10"	4'-0"	2’-10”	4'-8"
3'-7"	Spent fuel pit demineralizer Room	2'-10"	2'-0"	2'-0"	3'-4"	3'-2"	3'-4"
3'-7"	Valve Area 2)	2'-10"	4'-2"	4'-2" 3)	3'-4" 4)	3'-2" 5)	4'-8"
3'-7"	A-Reactor coolant filter Room	2'-0"	2'-8"	2'-0"	2'-0"	2'-8"	2'-2"
3'-7"	B-Reactor coolant filter Room	2'-0"	2'-8"	2'-0"	2'-0"	2'-8"	2'-2"
3'-7"	A-Spent fuel pit filter Room	1'-6"	2'-2"	2'-0"	2'-0"	2'-8"	2'-2"
3'-7"	B-Spent fuel pit filter Room	1'-6"	2'-2"	1’-6”	2'-0"	2'-8"	2'-2"
3'-7"	A, B-Waste demineralizer Room	2’-6”	2'-5"	2'-5"	3'-9"	3'-3"	3'-9"
3'-7"	C, D-Waste demineralizer Room	3'-4"	3'-9" 3)	2'-6"	3'-9"	2'-10"	3’-9”
3'-7"	Valve Area 6)	2'-10"	2'-8"	3'-4"	2'-5" 7)	2'-8" 3)	3'-4"
3'-7"	Waste Mobile Systems	2'-8"	— 8)	2'-8"	3'-4"	4'-1"	4'-0"
3'-7"	~~B.A. evaporator feed~~ Degasifier feed demineralizer Room	2'-0"	2'-0"	3'-4"	3'-4"	3'-2"	3'-4"
15'-9"	Piping Area 9)	2'-6"	3'-4"	2'-1"	3'-4" 3)	2'-8"	3'-4"
15'-9"	Hold up Tank Valve Area	3'-4"	2'-8" 3)	3'-4"	4'-0”	2'-8"	3'-4"
25'-3"	Steam generator blowdown demineralizer Room	3'-4"	2'-8"	2’-6”	2'-3" 3)	3'-4"	2'-3"

NAPS DEP 9.2(1)

Table 12.3-1R Thicknesses of Concrete walls that enclose the major components (Sheet 4 of 4)

Elevation	Room Name	North	East	South	West	Floor	Ceiling
25'-3"	Valve Area [10)]	3'-4"	1'-6"	1'-11"	2'-4"	3'-4"	1'-10"

1) Face to Spent resin storage tank Room
2) Adjacent to Mix bed demineralizer Room
3) Face to area of Zone III
4) Face to A, B-Mix bed demineralizer Room
5) Face to Valve Area
6) Adjacent to Waste demineralizer Room
7) Face to A, B-Waste demineralizer Room
8) Removable Shield is to be used, if necessary
9) East side of demineralizer Rooms
10) Adjacent to Steam generator blowdown demineralizer Room

Table 12.3-8R Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 24 of 61)

	Objective		System Features	DCD Reference
	2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	- The drainage system is equipped with a liquid detection instrument which can provide early warning for leakage and/or overflow condition to initiate operator actions. - The floors of these cubicles containing radioactive fluid are sloped to facilitate faster drainage and to minimize liquid accumulation, and provided with coating with non-porous material to prevent cross contamination. - On the shell side of heat exchangers, the return header has a radiation monitor to isolate the cooling water system, in the event leakage is detected.	12.3.1.1.1.2.E
NAPS COL 12.3(10) **NAPS DEP 9.2(1)**	3	Use leak detection methods (e.g., instrumentation, automated samplers) capable of early detection of leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded, or subterranean piping) to avoid release of contamination of the environment.	The leak detection system is incorporated in all cubicles in which the tanks contain radioactive fluid (refer to system features for objective #2 above). The tanks include: - Holdup Tanks - Volume Control Tank - ~~Boric Acid Tanks~~	—

Table 12.3-8R Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 60 of 61)

Auxiliary Steam Supply System **(Note: The "System Features" column consists of excerpts/summary from the DCD)**

	Objective		System Features	DCD Reference
	1	Minimize leaks and spills and provide containment in areas where such events may occur.	The condensate piping from the ASSS drain tank is a single-walled carbon steel pipe run above ground in pipe chases from the A/B to the T/B, and is then connected to double-walled welded carbon steel piping through the T/B wall penetration to the auxiliary boiler. Since this is not a high traffic area, this segment of pipe is run above ground and is slightly sloped so that any leakage is collected in the outer pipe and drained to the auxiliary boiler building. At the auxiliary boiler building end, a leak detection instrument is provided to monitor leak. A drain pipe is provided to direct any drains to the building sump. The steam piping is jacketed with insulation and heat protection. This design is supplemented by operational programs which includes periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity.	10.4.11.2.1
NAPS COL 12.3(10) **NAPS DEP 9.2(1)**	2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	The auxiliary steam drain monitors the leakage of the radioactive materials from the ~~boric acid evaporator~~ degasifier to the condensed water of the ASSS.	10.4.11.1.2
			Monitoring the leakage from the primary side of the ~~evaporator~~ degasifier, the radiation monitor is attached to the downstream of the auxiliary steam drain pump. The high alarm of the monitor isolates the pump discharge line and steam supply line from main steam and trips the pump.	10.4.11.2.1
			Leakage of radioactive materials from primary side in the ~~B/A evaporator~~ degasifier.	10.4.11.2.3

Table 12.3-8R Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 61 of 61)

NAPS COL 12.3(10)
NAPS DEP 9.2(1)

Objective	System Features	DCD Reference
	If there is leakage of radioactive materials from the primary side in the ~~B/A evaporator~~ degasifier, the auxiliary steam drain tank pump discharge isolation valve is closed and the auxiliary steam drain pumps are tripped by the auxiliary steam drain monitor high alarm. The high signal is alarmed to the main control room.	

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste

Startup Steam Generator Blowdown System

(Note: This table addresses the site-specific components and must be reviewed in parallel with DCD Table 12.3-8 for standard components and Table 12.3-8R for departure components. The "System Features" column consists of excerpts from the FSAR.)

Objective		System Features	FSAR Reference
1	Minimize leaks and spills and provide containment in areas where such events may occur.	The Startup Steam Generator Blowdown System includes a stainless steel flash tank and a heat exchanger (stainless steel on tube side) which have a welded design to minimize leakage. The components are housed in a facility in which the concrete foundation is epoxy-coated and sloped toward a sump to facilitate the collection of leakage. The piping after the heat exchanger is constructed of stainless steel up to and including the connector after the isolation valve. The discharge piping that continues the discharge line from the connector is a double-walled HDPE pipe. Within the double-walled pipe, the blowdown water flows through the inner pipe while the outer pipe serves as containment in the event of leakage. Once the pipe exits the facility, the HDPE pipe is buried and routed underground to the blowdown sump. The buried piping is equipped with manholes, also constructed of HDPE, located at specified piping lengths to facilitate the containment of leakage by means of a collection basin. From the blowdown sump, the blowdown water, mixed with the liquid waste effluent and the flows from the CWS and UHS cooling towers, is routed through additional piping leading to the discharge canal.	10.4.8
2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	The Startup Steam Generator Blowdown Facility has an epoxy-coated concrete floor which is sloped to facilitate drainage to a sump for leakage collection. The sump is equipped with level detection instrumentation which alarms to the MCR for operator action. Outside of the facility, the buried piping segments are sloped toward the next downstream manhole. The manholes are watertight to prevent the intrusion of precipitation or groundwater. Each manhole contains a collection basin so that any leakage in the outer pipe is collected from a given segment of piping. The manhole collection basin is equipped with level detection instrumentation. This design approach, which utilizes manholes along the buried pathway, provides early leak detection capability and provides accessibility to facilitate periodic testing and inspection to maintain pipe integrity.	10.4.8

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

Objective		System Features	FSAR Reference
3	Use leak detection methods (e.g., instrumentation, automated samplers) capable of early detection of leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded or subterranean piping) to avoid release of contamination of the environment.	The equipment and associated piping located within the Startup Steam Generator Blowdown Facility are accessible for inspection and maintenance. The sump provided to collect leakage within the facility is equipped with level detection instrumentation to provide early leak detection. When liquid accumulates in the sump to a predetermined setpoint, the instrument sends a signal to the MCR to alarm for operator action. Once the piping is outside the facility, the double-walled piping is buried to the blowdown sump. The manholes located along this buried pathway are each equipped with a collection basin and level detection instrumentation. When liquid accumulates in the basin to a predetermined setpoint, the instrument sends a signal to the MCR to alarm for operator action. Analysis of samples of the liquid collected in the manholes can also differentiate whether the liquid is rainwater, groundwater or leakage from the discharge piping; these results will dictate the need for treatment prior to discharge of the collected liquid. The manholes also allow for increased accessibility to the buried piping segments in order to conduct periodic testing and inspection. The double-walled piping, manhole stations, and level detection instrumentation serve to provide early leak detection and avoidance of unintended release of contamination to the environment.	10.4.8

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

Objective		System Features	FSAR Reference
4	Reduce the need to decontaminate equipment and structures by decreasing the probability of any release, reducing any amounts released, and decreasing the spread of contaminant from the source.	The Startup Steam Generator Blowdown equipment is welded in order to avoid crud traps and have smooth and polished surfaces to further minimize the trapping of solids. The Startup Steam Generator Blowdown Facility floor is epoxy-coated in order to provide a smooth surface for draining and cleaning. This design reduces the need for decontamination of equipment and minimizes the spread of contamination from the source. The use of double-walled piping to transport the system discharge reduces the probability of contaminated releases by providing a secondary boundary to the environment. Leakage from the inner pipe carrying the contaminated liquid is contained within the outer pipe which is detected quickly using the leak detection methods described for Objectives 2 and 3. The double-walled HDPE piping is fuse-welded in order to minimize crud traps. The discharge piping is also sloped towards the nearest downstream manhole en route to the blowdown sump in order to minimize liquid retention inside the pipe in the case of leakage. The manholes each contain a collection basin to hold any leakage that is transferred downstream through the sloped piping segments. This design helps to decrease the spread of contaminated liquid from the point of leakage as the piping segment between manholes can be quickly identified for replacement and the leakage is collected before it reaches downstream piping segments.	10.4.8

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

Objective		System Features	FSAR Reference
5	Facilitate decommissioning by (1) minimizing embedded and buried piping, and (2) designing the facility to facilitate the removal of any equipment and/or components that may require removal and/or replacement during facility operation or decommissioning.	The overall plant layout dictates the need for buried piping from the Startup Steam Generator Blowdown Facility to the blowdown sump. In all instances in which the buried piping must be routed beneath a roadway, support structures are built in order to preserve the integrity of the pipe and prevent damage which may lead to unintended releases. The blowdown sump is designed to mix the CWS and UHS cooling water blowdown flows, startup steam generator blowdown discharge, and treated liquid effluent. From the blowdown sump, there is a single flowpath routed to the discharge canal which minimizes the total length of buried piping for replacement during facility operation and for removal during decommissioning. This piping is routed to a concrete tunnel and then from the tunnel to the discharge canal. The current design combines the normal SGBDS (for normal power operation) alternate discharge line and the Startup Steam Generator Blowdown System discharge line at the Startup Steam Generator Blowdown Facility. This design approach avoids the routing of two separate buried pipes to the blowdown sump. The use of manholes between pipe segments also facilitates the identification of the leakage sources by having a collection basin and leak detection instrumentation in each manhole. This design enables the replacement of the segment of leaking piping, instead of necessitating the replacement of the entire pipeline from the facility to the blowdown sump.	10.4.8
6	Minimize the generation and volume of radioactive waste both during operation and during decommissioning (by minimizing the volume of components and structures that become contaminated during plant operation).	As described in Objective 5, the current design approach combines the normal SGBDS alternate discharge piping and the Startup Steam Generator Blowdown System discharge piping into a single pipe for transfer to the blowdown sump. This design approach minimizes the overall length of piping material needed, and thus reduces the amount of contaminated material for normal operation and decommissioning. Also described for Objective 5, the placement of manholes at specified distances along the buried piping reduces the generation and volume of radioactive waste by allowing for the replacement of a piping segment identified as the source of leakage instead of requiring the replacement of the entire pipeline.	10.4.8

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

LWMS

(Note: This table addresses the site-specific components and must be reviewed in parallel with DCD Table 12.3-8 for standard components and Table 12.3-8R for departure components. The "System Features" column consists of excerpts from the FSAR.)

Objective		System Features	FSAR Reference
1	Minimize leaks and spills and provide containment in areas where such events may occur.	The LWMS effluent release piping for transporting radioactive effluent from the discharge valve inside the A/B to the blowdown sump is constructed from double-walled HDPE piping. The liquid effluent flow is contained in the inner pipe, and the outer pipe serves as containment in the event of leakage from the inner pipe. In the blowdown sump, the liquid effluent mixes with flows from the CWS and UHS cooling towers and then flows through additional piping to the discharge canal. The buried HDPE piping is run from the A/B to the blowdown sump entirely outside of the plant buildings with manholes constructed at specified piping lengths to allow for the detection of leakage along the buried pathway.	11.2.2
2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	The buried LWMS effluent release piping has manholes provided at specified distances along the buried pathway for monitoring leakage. The manholes, which are also constructed from HDPE, are each equipped with a collection basin and level detection instrumentation. The manholes are watertight to prevent the intrusion of precipitation or groundwater. This design approach provides early leak detection and provides accessibility to facilitate periodic testing (hydrostatic or pressure) or visual inspection to maintain pipe integrity.	11.2.2

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

Objective		System Features	FSAR Reference
3	Use leak detection methods (e.g., instrumentation, automated samplers) capable of early detection of leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded or subterranean piping) to avoid release of contamination of the environment.	The manholes provided along the buried LWMS effluent release piping have level detection instrumentation within each collection basin in order to provide early leak detection. When liquid in the manhole collection basin reaches a predetermined setpoint, the leak detection instrumentation sends a signal to the MCR to alarm for operator action. Analysis of samples of the liquid collected in the manholes can also differentiate whether the liquid is rainwater, groundwater or leakage from the effluent release piping; these results will dictate the need for treatment prior to discharge of the collected liquid. The manholes also allow for increased accessibility to the buried piping segments in order to conduct inspections and periodic testing. The double-walled piping, manhole stations, and level detection instrumentation serve to provide early leak detection and the avoidance of unintended release of contamination to the environment.	11.2.2
4	Reduce the need to decontaminate equipment and structures by decreasing the probability of any release, reducing any amounts released, and decreasing the spread of contaminant from the source.	The double-walled piping used to transport the liquid effluent reduces the probability of contaminated releases by providing a secondary boundary to the environment. Leakage from the inner pipe carrying the contaminated liquid is contained within the outer pipe which is detected quickly using the leak detection methods described for Objectives 2 and 3. The double-walled HDPE piping is fuse-welded in order to minimize crud traps. The liquid effluent piping is also sloped towards the nearest downstream manhole in order to minimize liquid retention inside the pipe in the case of leakage. The manholes each contain a collection basin to hold any leakage that is transferred downstream through the sloped piping segments. This design helps to decrease the spread of contaminated liquid from the point of leakage as the piping segment between manholes can be quickly identified for replacement and the leakage is collected before it reaches downstream piping segments. In addition, the liquid effluent is discharged from the LWMS through a batch operation process such that contaminated liquid is flowing through the buried piping for a few hours on the basis of approximately one batch per week.	11.2.2

NAPS COL 12.3(10)

Table 12.3-201 Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste *(continued)*

Objective		System Features	FSAR Reference
5	Facilitate decommissioning by (1) minimizing embedded and buried piping, and (2) designing the facility to facilitate the removal of any equipment and/or components that may require removal and/or replacement during facility operation or decommissioning.	The overall plant layout dictates the need for buried piping from the LWMS discharge valve to the blowdown sump. In all instances in which the buried piping must be routed beneath a roadway, support structures are built in order to preserve the integrity of the pipe and prevent damage which may lead to unintended releases. The blowdown sump is designed to mix the CWS and UHS cooling water blowdown flows, startup steam generator blowdown discharge, and treated liquid effluent. From the blowdown sump, the mixed liquid discharge is routed through additional piping to a concrete tunnel which houses the piping to direct the mixed liquid discharge to the discharge canal. This piping contains the mixed contents of the blowdown sump which includes the CWS and UHS cooling tower blowdown flows as well as the treated liquid effluent. Thus, this design minimizes the number and the lengths of buried piping for replacement during facility operation and decommissioning. The placement of manholes between buried pipe segments also facilitates the identification of the locations of leakage sources by having a collection basin with leak detection instrumentation in each manhole. The manholes further facilitate the replacement of damaged or leaking piping segments instead of requiring the replacement of the entire length of effluent release piping.	11.2.2
6	Minimize the generation and volume of radioactive waste both during operation and during decommissioning (by minimizing the volume of components and structures that become contaminated during plant operation).	As described in Objective 5 above, the manholes installed at intervals along the buried piping allow for the identification of the piping segment where the leakage source is located. This allows for the replacement of a segment of buried piping instead of having to replace the entire length of piping from the A/B to the blowdown sump. This approach reduces the generation of radioactive waste by reducing the amount of contaminated piping that is removed from the system.	11.2.2

NAPS COL 12.3(4)
NAPS CDI

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Site (Sheet 1 of 34)

NAPS DEP 9.2(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Auxiliary Building at Elevation 261'-1" NAVD88 (Sheet 15 of 34)

NAPS DEP 9.2(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Auxiliary Building at Elevation 278'-10" NAVD88 (Sheet 16 of 34)

NAPS DEP 9.2(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Auxiliary Building at Elevation 291'-0" NAVD88 (Sheet 17 of 34)**

NAPS DEP 9.2(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Auxiliary Building at Elevation 303'-2" NAVD88 (Sheet 18 of 34)**

NAPS DEP 9.2(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Auxiliary Building at Elevation 312'-8" NAVD88 (Sheet 19 of 34)**

NAPS DEP 10.4(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building Sectional View A-A (NAVD88 Elevations) (Sheet 24 of 34)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 262'-5" NAVD88 (Sheet 25 of 34)**

NAPS DEP 10.4(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 291'-0" NAVD88 (Sheet 26 of 34)

NAPS DEP 10.4(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 326'-5" NAVD88 (Sheet 27 of 34)

NAPS DEP 10.4(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 353'-5" NAVD88 (Sheet 28 of 34)**

NAPS DEP 10.4(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 381'-3" NAVD88 (Sheet 29 of 34)

NAPS DEP 10.4(1)

Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Elevation 400'-11" NAVD88 (Sheet 30 of 34)

NAPS DEP 10.4(1) **Figure 12.3-1R Radiation Zones for Normal Operation/Shutdown: Turbine Building at Roof Elevation (NAVD88) (Sheet 31 of 34)**

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

NAPS DEP 9.2(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 291'-0" NAVD88 (Sheet 3 of 10)

NAPS DEP 9.2(1) **Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)**

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)

NAPS DEP 10.4(1) **Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)**

NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-2R General Plant Arrangement with Post Accident Vital Areas: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

NAPS DEP 9.2(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 291'-0" NAVD88 (Sheet 3 of 10)

NAPS DEP 9.2(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)

NAPS DEP 10.4(1) **Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

NAPS DEP 10.4(1)

Figure 12.3-3R Post Accident Radiation Zone MAP:1 hour After Accident: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

NAPS DEP 9.2(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 291'-0" NAVD88 (Sheet 3 of 10)

NAPS DEP 9.2(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)

NAPS DEP 10.4(1) **Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)**

NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-4R Post Accident Radiation Zone MAP:1 day After Accident: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

NAPS DEP 9.2(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 291'-0" NAVD88 (Sheet 3 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 9.2(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

NAPS DEP 10.4(1) **Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)

NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

NAPS DEP 10.4(1)

Figure 12.3-5R Post Accident Radiation Zone MAP:1 week After Accident: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

NAPS DEP 9.2(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 291'-0" NAVD88 (Sheet 3 of 10)

NAPS DEP 9.2(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)

NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

NAPS DEP 10.4(1)

Figure 12.3-6R Post Accident Radiation Zone MAP:1 month After Accident: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 261'-1" NAVD88 (Sheet 1 of 10)

STD CDI

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 9.2(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 278'-10" NAVD88 (Sheet 2 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 291'-7" NAVD88 (Sheet 3 of 10)

NAPS DEP 9.2(1) **Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 300'-11" NAVD88 (Sheet 4 of 10)**

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 312'-8" NAVD88 (Sheet 5 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 337'-7" NAVD88 (Sheet 7 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 363'-10" NAVD88 (Sheet 8 of 10)

NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 388'-5" NAVD88 (Sheet 9 of 10)

NAPS DEP 10.4(1)

Figure 12.3-11R Post Accident Radiation Zone MAP:1 Week After Accident: Power Block at Elevation 402'-11" NAVD88 (Sheet 10 of 10)

12.4 Dose Assessment

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.4.1.9 Dose to Construction Workers

NAPS COL 12.4(1) Replace the paragraph in DCD Subsection 12.4.1.9 with the following.

Doses to construction workers were addressed in ESP-ER Section 4.5 and associated impacts were resolved as SMALL in FEIS Section 4.9. The ESP-ER analysis has been reviewed to evaluate the following more recent information:

- The locations and readings for TLDs located closest to the Unit 3 site.
- Effluent release data for Units 1 and 2 as reported in the 2006 Annual Radioactive Effluent Release Report (Reference 12.4-201).
- Spent fuel cask types planned for the onsite ISFSI have changed.
- The estimated peak number of construction workers is now 2500-3500 (versus 5000 in the ESP-ER).

Based on the results of this review, it is concluded that the 120 person-rem calculated in the ESP-ER remains a conservative estimate.

12.4.3 Combined License Information

Replace the content of DCD Subsection 12.4.3 with the following.

NAPS COL 12.4(1) *12.4(1)* ***Estimated annual doses to construction workers***

This COL item is addressed in Subsection 12.4.1.9.

12.4.4 References

Add the following references after the last reference in DCD Subsection 12.4.4.

12.4-201 Annual Radioactive Effluent Release Report, January 1, 2006 – December 31, 2006, Dominion Virginia Power.

12.5 Operational Radiation Protection Program

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 12.1(5)
NAPS COL 12.3(1)

Replace the content of DCD Section 12.5 with the following.

NEI 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description," (Reference 12.1-25), is incorporated by reference with the following changes.

Delete the third paragraph of Section 12.5.2.4.

Delete the first two paragraphs of Section 12.5.3.1.

Add the following after the first paragraph in Section 12.5.3.2.

The selection and calibration of this instrumentation and equipment is based on relevant industry standards such as ANSI N42.17A-1989, as it relates to the accuracy and overall performance of portable survey instrumentation, and ANSI N323A-1997, as it relates to the calibration and maintenance of portable radiation survey instruments.

Delete the third paragraph of Section 12.5.3.2.

Replace the second paragraph of Section 12.5.3.3 with the following.

If the NIOSH/Mine Safety and Health Administration certified equipment is not used, the equipment used complies with 10 CFR 20.1703(b) and 20.1705.

NAPS COL 12.2(3)
NAPS COL 12.2(4)
NAPS COL 12.3(9)

Modify the third paragraph of Section 12.5.4.1.

The frequency and extent of the surveys will depend upon several factors, such as location, actual or potential radiation levels, plant operational status and work in progress, and accessibility/occupancy. The frequency of surveys may be weekly, monthly, quarterly, semiannually, annually, or as directed by the Radiation Protection Manager. Surveys are performed more frequently in accessible areas subject to changes in radiological conditions. For example, periodic routine surveillance activities are required to ensure that the dose rate at 2 meters from the surface of the RWSAT remains below 0.25 mrem/h. Site specific procedures define the survey frequencies and extent.

Add the following information prior to the last paragraph in Section 12.5.4.1.

Calibration of portable and non-portable radiation protection equipment is normally performed onsite by station personnel, although, calibration by a qualified vendor is allowed. Calibration is performed using written procedures and radioactive sources traceable to the National Institute of Standards and Technology (NIST) or using transfer instruments, such as electrometers, which have been calibrated using NIST traceable sources.

Delete the second paragraph of 12.5.4.2.

NAPS COL 12.2(2)

In Section 12.5.4.2, add the following information after the first paragraph of the Radwaste Handling section.

The licensee plans to temporarily store radioactive wastes/materials in an IRSF (Appendix 11AA). Entry into the radiologically controlled areas of this facility is allowed only through the issuance of a Radiation Work Permit. Non-radiologically controlled areas allow for general access.

NAPS COL 12.2(3)
NAPS COL 12.2(4)
NAPS COL 12.3(9)

Add the following information after the last paragraph in the discussion on Normal Operation in Section 12.5.4.2.

If the activity concentration in the RWSAT becomes higher than the levels described in DCD Table 12.2-50, the dose rate at 2 meters from the surface of the tank will exceed 0.25 mrem/h. Therefore, a method of ensuring that the radioactivity concentration in the RWSAT remains under the specified concentration level described in the DCD is to be implemented. Additionally, the radiological surveillance procedures provide for periodic routine surveillances to verify that the dose rate at 2 meters from the surface of the RWSAT remains below 0.25 mrem/h.

Add the following information after the last paragraph in the discussion on Calibration in Section 12.5.4.2.

Source Term Reduction Strategy

The plant source term is described by the level of radiation, or radioactive material, given off or contained in plant systems, structures, or components that results in occupational radiation exposure from routine operation of the plant, including AOOs. The source term includes, but is not limited to, activated components in the primary coolant, corrosion and wear products activated in the reactor and distributed in plant systems, or

sealed sources maintained to support plant operations. The reduction and control of the plant radiation source term is an essential element of meeting the requirements of 10 CFR 20.1101(b). FSAR Subsection 12.1.1.3.2 commits the administrative programs and procedures to comply with RG 8.8, which provides several strategies for reducing personnel exposure, including some options that would limit the overall source term, such as crud control and equipment isolation and decontamination.

Additionally, the following DCD Subsections, which describe design considerations for the reduction of the overall source term, are already incorporated into the FSAR by reference:

- Subsection 12.1.2.1
- Subsection 12.1.2.2.3
- Subsection 12.3.1.1.1.1 Item (E)
- Table 12.3-7

Dominion will identify cobalt and other activated material sources during the detailed design phase of the project. During plant operation, Dominion will utilize industry practice guidance similar to EPRI report TR-103296 to ensure that procurement of components or piping, conducting maintenance, or modifications considers the identified sources of cobalt and other activated materials.

Replace the third paragraph in Section 12.5.4.4 with the following information.

The locations and radiological controls of the radiation zones on plant layout drawings are located in DCD Subsection 12.3.1.2. Administrative controls for restricting access to Very High Radiation Areas are incorporated into plant procedures which require approval by the Plant Manager (or designee) for each entry. Entry will be controlled through the Radiation Work Permit (RWP) process. Physical access controls for Very High Radiation Areas are provided by physical barriers such as lockable gates or doors which prevent unauthorized access. It’s not necessary to enter these areas periodically. DCD Subsection 12.3.1.2 includes detailed drawings of the very high radiation areas and indicates the physical access controls. Table 12.5-201 summarizes the plant areas with the potential to become very high radiation areas. Radiation monitor locations for each area are indicated in DCD Subsection 12.3.4.

Add the following information after the sixth paragraph in Section 12.5.4.4.

NAPS COL 12.3(5)

The gates provide access control of the fuel transfer tube inspection (Very High Radiation Area) and the area near the seismic gap below the transfer tube. Access control for these areas is controlled by the gates and entry to these areas is allowed only by the issuance of a Radiation Work Permit.

Add the following information at the end of Section 12.5.4.8.

In addition, NEI Template 08-08A, "Generic FSAR Template Guidance for Life-Cycle Minimization of Contamination" (Reference 12.5-201), is fully adopted. Also, the guidance provided in NEI 08-08A will be used at North Anna Unit 3 to minimize contamination during construction, operation and decommissioning. This will include the use of photographs and video records during construction to facilitate updating the conceptual site model for groundwater movement and aid in revising the groundwater monitoring plan post-construction. Final layout drawings, photographs, global positioning survey information and video records will be used in assessing the proper location for groundwater monitoring wells, foundations, pipes, conduits and other below grade structures.

Replace the first paragraph of Section 12.5.4.9 with the following.

Respiratory protection procedures assure compliance with 10 CFR 20, Subpart H, and are consistent with the guidance in RG 8.15 to assure protection against radiological hazards and the relevant portions of 29 CFR 1910.134 to assure protection against nonradiological hazards, such as fumes, dust, smoke, or oxygen deficiency.

Replace the first and second paragraph in Section 12.5.4.12 with the following.

The radiation protection program and procedures are established, implemented, maintained and reviewed consistent with the 10 CFR 20.1101 and the QAP referenced in Chapter 17.

Site specific information in the radiation protection program will be implemented in accordance with the milestones listed in Table 13.4-201 by utilizing NEI 07-03A and NEI 07-08A, "Generic FSAR Template

Guidance for Ensuring that Occupational Radiation Exposures are as Low as is Reasonably Achievable (ALARA)" (Reference 12.1-201).

12.5.5 References

12.5-201 NEI Technical Report 08-08A, "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination," Revision 0, October 2009.

NAPS COL 12.1(5)

Table 12.5-201 Summary of North Anna Unit 3 Very High Radiation Areas (VHRAs) (Sheet 1 of 2)

Plant Area	Description of Area and Methods Employed to Ensure Personnel Safety
Refueling Canal Refueling Cavity (including Core Internals Laydown Area) Cask Pit Fuel Inspection Pit Spent Fuel Pit	These areas have the potential to become VHRAs during underwater spent fuel transfer and inspection operations. These areas are submerged during this period and become inaccessible for personnel. Per DCD Subsection 12.3.2.2.4, all spent fuel removal, transfer, and inspection operations are performed under borated water to provide radiation protection and to maintain sub-criticality conditions. Administrative and access controls, such as temporary fences or ropes, are in place to assure that personnel doses are maintained ALARA during fuel handling and inspection operations. With the exception of the spent fuel pit, the dose rates in these areas of the plant are significantly less under all other operating conditions.
Fuel Transfer Tube	The surrounding areas only have the potential to reach Zone X radiation conditions while there is spent fuel passing through the tube. As indicated in Section 12.5, locked gates provide positive access control of the fuel transfer tube. Entry to these areas is allowed only through the issuance of a specific Radiation Work Permit. However, the issuance of a specific Radiation Work Permit for access to these areas is not regularly permitted while spent fuel is passing through the tube.
Reactor Cavity	This area is designed to contain the molten core from the RV in the event of a severe accident. This area is inaccessible to personnel.
Reactor Vessel	This area is inaccessible to personnel.

NAPS COL 12.1(5)

Table 12.5-201 Summary of North Anna Unit 3 Very High Radiation Areas (VHRAs) (Sheet 2 of 2)

Plant Area	Description of Area and Methods Employed to Ensure Personnel Safety
Waste Gas Surge Tanks Rooms	As indicated in Figure 12.3-1R and DCD Figure 12.3-1, these areas are isolated in individual shielded compartments with elevated access by ladder/stairs or completely enclosed shielded compartments with hatch openings or removable concrete block walls. Locked gates positively control entry into these areas, which is allowed only with the issuance of a Specific Radiation Work Permit. However, there is no projected reason for entry into these areas for equipment maintenance, repair or replacement. The issuance of a Specific Radiation Work Permit for access to these areas is not regularly permitted. However, if entry is required, the applicable ALARA principles, such as remote operations, limiting stay time, using temporary shielding, backwashing filters, draining tanks, etc., will be employed to reduce doses as much as practical.
Spent Resin Storage Tank Rooms	
Spent Resin Storage Tank Valve Area	
Charcoal Beds Rooms (including the passage near the rooms)	
Mixed-Bed Demineralizer Room	
Cation-Bed Demineralizer Room	
Valve Area next to the Mixed-Bed Demineralizer Room, the Cation-Bed Demineralizer Room and the Deborating Demineralizer Room	
A, B-Waste Demineralizer Room	
Volume Control Tank Room	

13 Conduct of Operations

13.0 Conduct of Operations

This section of the referenced DCD is incorporated by reference with no departures or supplements.

13.1 Organizational Structure of Applicant

NAPS COL 13.1(2)

Add the following supplement.

Dominion has over 35 years of experience in the design, construction, and operation of nuclear generating stations. Dominion and its affiliates currently operate seven nuclear units at four sites located in Virginia, Connecticut, and Wisconsin.

Add the following paragraph to DCD Section 13.1.

This section provides a description of the Dominion corporate organization functions and responsibilities, with regard to activities including facility design, design review, design approval, construction management, testing, and operation of North Anna Unit 3. The organizational structure complies with the requirements of 10 CFR 50.54(i) through (m).

13.1.1 Management and Technical Support Organization

NAPS COL 13.1(1)
NAPS COL 13.1(3)

Replace the content of DCD Section 13.1.1 with the following:

Corporate offices provide support for the nuclear stations. Figure 13.1-205 illustrates the relationship of the nuclear organization to other divisions of Dominion. This support includes executive level management to provide strategic and financial support for plant initiatives, coordination of functional efforts division-wide, and functional level management in areas such as security, emergency planning, reactor engineering, and engineering analysis.

NAPS COL 13.1(5)

Figure 13.1-204 provides a high-level illustration of the nuclear organization. More detailed charts and position descriptions, including qualification requirements and staffing numbers for corporate support staff, are maintained in corporate offices.

NAPS COL 13.1(3) Changes to the organization described herein are reviewed under the provisions of 10 CFR 50.54(a) to ensure that any reduction in commitments in the QAPD (as accepted by the NRC) are submitted to, and approved by the NRC, prior to implementation.

13.1.1.1 Design, Construction, and Operating Responsibilities

NAPS COL 13.1(1) Replace DCD Subsection 13.1.1.1 with the following:

The president and chief nuclear officer (CNO) has overall responsibility for functions involving planning, design, construction, and operation of Dominion's nuclear units. Line responsibilities for those functions are passed to the executives in charge of nuclear operations, engineering and technical services, planning, development, and oversight, who maintain direct control of nuclear plant activities.

The first priority and responsibility of each member of the nuclear staff throughout the life of the plant is nuclear safety. Decision making for station activities is performed in a conservative manner with expectations of this core value regularly communicated to appropriate personnel by management interface, training, and station directives.

Lines of authority and communication clearly and unambiguously establish that utility management directs the project.

At key project milestones, including beginning of construction, fuel load, and commercial operation, senior management will determine if there are sufficient numbers of qualified personnel available to move the project forward.

The construction management organization is shown in Figure 13AA-201.

13.1.1.1.1 Design and Construction Responsibilities

This section is included in Appendix 13AA for future designation as historical information.

13.1.1.1.2 Technical Support for Plant Operations

This section describes the functional groups that will be activated before fuel load. The vice president North Anna 3 will establish the organization of managers, functional managers, supervisors, and staff sufficient to

perform required functions for support of safe plant operation. These functions include the following:

- Nuclear, mechanical, structural, electrical, thermal-hydraulic, metallurgical and material, and I&C engineering
- Plant chemistry
- Radiation protection
- Fueling and refueling operations support
- Maintenance support
- Operations support
- QA
- Training
- Safety review
- Fire protection
- Emergency organization
- Outside contractual assistance

In the event that station personnel are not qualified to deal with a specific problem, the services of qualified individuals from other functions within the company or outside consultants are engaged. Figure 13.1-204 illustrates the nuclear operating organization. Table 13.1-201 shows the estimated number of positions required for each function.

13.1.1.1.2.1 **Facility Engineering and Technical Support**

The facility engineering and technical support department consists of system engineering, design engineering and engineering technical support. These groups are responsible for performing the classical design activities as well as providing engineering expertise for programs such as fire protection, ISI, IST, snubbers, and maintenance rule. The corporate engineering organization provides support for engineering projects, safety and engineering analysis, and nuclear fuels engineering. They are responsible for probabilistic safety assessment and other safety issues, plant system reliability analysis, performance and technical support, core management, reactor engineering, and periodic reactor testing.

Each of the site engineering groups has a functional manager who reports to the senior manager facility engineering and technical support.

The facility engineering and technical support department is responsible for:

- Support of plant operations in the engineering areas of mechanical, structural, electrical, thermal-hydraulic, metallurgy and materials, electronic, instrument and control, and fire protection. Priorities for support activities are established based on input from the senior manager operations and maintenance with emphasis on issues affecting safe operation of the plant.
- Support of procurement, chemical and environmental analysis, and maintenance activities in the plant as requested by the senior manager operations and maintenance
- Performance of design engineering of plant modifications
- Maintaining the design basis by updating the record copy of design documents as necessary to reflect the actual as-built configuration of the plant
- Human Factors Engineering (HFE) design process

Reactor engineering, led by the functional manager reactor engineering, provides technical assistance in the areas of core operations, core thermal limits, and core thermal hydraulics. The functional manager reactor engineering reports to the manager nuclear fuel analysis and design.

Design work may be contracted to and performed by outside companies in accordance with Appendix 17AA, Sections 2 and 2.2.

13.1.1.1.2.2 **Plant Chemistry**

A chemistry program is established to monitor and control the chemistry of various plant systems such that corrosion of components and piping is minimized and radiation from corrosion by-products is kept to levels that allow operations and maintenance with radiation doses as low as is reasonably achievable.

The functional manager radiation protection and chemistry is responsible for maintaining chemistry programs and for monitoring and maintaining the water chemistry of plant systems. The staff of the radiation protection and chemistry department consists of laboratory technicians, support personnel, and supervisors who report to the functional manager radiation protection and chemistry.

13.1.1.1.2.3 **Radiation Protection**

A radiation protection (RP) program is established to protect the health and welfare of the surrounding public and personnel working at the plant. The RP program is described in Chapter 12.

The RP department is staffed by radiation protection technicians, support personnel, and supervisors who report to the functional manager radiation protection and chemistry. To provide sufficient organizational freedom from operating pressures, the functional manager radiation protection and chemistry reports directly to the senior manager safety and licensing.

13.1.1.1.2.4 **Fueling and Refueling Operations Support**

The function of fueling and refueling is performed by a combination of personnel from various departments including operations, maintenance, radiation protection, engineering, and reactor technology vendor or other contractor staff. Initial fueling is a function of the startup management organization discussed in Appendix 13AA. Refueling operations are a function of the operations organization.

13.1.1.1.2.5 **Maintenance Support**

The maintenance department includes mechanical maintenance, electrical maintenance, and I&C groups. Each group includes supervisors, foremen, and technicians in sufficient numbers to provide for the safe and efficient operation of the plant during all phases of plant life.

In support of maintenance activities, planners, schedulers, and parts specialists prepare work packages, acquire proper parts, and develop procedures that provide for the successful completion of maintenance tasks. Maintenance tasks are integrated into the station schedule for evaluation of operating or safe shutdown risk elements and to provide for efficient and safe performance. Functional managers in charge of planning and scheduling report to the manager outage and planning.

13.1.1.1.2.6 **Operations Support**

The operations support function is provided under the direction of the operations manager, and includes the following programs:

- Operations procedures
- Operations surveillances
- Equipment tagging preparation

- Fuel handling

13.1.1.1.2.7 **Quality Assurance**

Safety-related activities associated with the operation of the plant are governed by the QAP established in Section 17.5. QA includes:

- Maintenance of the QAPD
- Coordinating the development of audit schedules
- Audit, surveillance, and evaluation of Nuclear Division suppliers
- QC inspection/testing activities

QA management is independent of the station management line organization. The manager nuclear oversight reports to the corporate-stationed senior manager nuclear oversight.

13.1.1.1.2.8 **Training**

The training department is responsible for providing training programs that are established, maintained, and implemented in accordance with applicable plant administrative directives, regulatory requirements, and company operating policies so that station personnel can meet the performance requirements of their jobs in operations, maintenance, technical support, emergency response, and other areas. The training department's responsibilities encompass operator initial license training, requalification training, and plant staff training as well as the plant access training (general employee training) course and radiation worker training. To maintain independence from operating pressures, the functional manager training reports to the senior manager safety and licensing. Nuclear plant training programs are described in Section 13.2.

13.1.1.1.2.9 **Safety Review**

Review and audit activities are addressed in Chapter 17.

Oversight of station programs, procedures, and activities is performed by the Facility Safety Review Committee (FSRC), a corporate independent review committee (IRC), and an organizational effectiveness department, which is responsible for corrective actions and assessments. The functional manager organizational effectiveness reports to the senior manager safety and licensing who reports to the vice president North Anna 3.

In the event of an unplanned reactor trip or significant power reduction, the FSRC is responsible for determining the circumstances, analyzing

the cause, and determining that operations can proceed safely before the reactor is returned to power.

13.1.1.1.2.10 **Fire Protection**

The station is committed to maintaining a FPP as described in DCD Section 9.5. The vice president North Anna 3 has overall responsibility for the FPP. Assigning the responsibility at that level provides the authority to obtain the resources and assistance necessary to meet FPP objectives, resolve conflicts, and delegate appropriate responsibility to fire protection staff. Fire protection for the facility is organized and administered by fire protection engineer. The fire protection engineer is responsible for development and implementation of the FPP, including development of fire protection procedures, and inspections of FPSs and functions. The fire protection engineer reports to the functional manager design engineering. Functional descriptions for all responsible positions are included in appropriate procedures. Station personnel are responsible for adhering to the fire protection/prevention requirements detailed in Section 9.5.1. The fire brigade is described in Section 13.1.2.1.5.

During construction:

- The vice president North Anna 3 is ultimately responsible for fire protection on Unit 3.
- Construction workers will receive fire protection training as part of their indoctrination to the site.
- Periodic fire drills will be conducted on Unit 3.

13.1.1.1.2.11 **Emergency Organization**

The emergency response organization (ERO) is a matrixed organization composed of personnel who have the experience, training, knowledge, and ability necessary to implement actions to protect the public in the case of emergencies. Managers and station personnel assigned to positions in the ERO are responsible for supporting the emergency preparedness organization and the emergency plan as required. The staff members of the emergency planning organization administer and orchestrate drills and training to maintain qualification of station staff members, and develop procedures to guide and direct the ERO during an emergency. The manager emergency preparedness reports to the vice

president support services via the senior manager protection services. The site ERO is described in the Emergency Plan.

13.1.1.1.2.12 **Outside Contractual Assistance**

Contract assistance with vendors and outside suppliers is provided by the supply chain organization. The functional manager procurement control reports to the senior manager supply chain management.

Resources and management of the supply chain organization are shared between units.

13.1.1.2 Organizational Arrangement

NAPS COL 13.1(1)
NAPS COL 13.1(3)
NAPS COL 13.1(4)

Replace Section 13.1.1.2 with the following:

Organizational arrangement for corporate offices and site organizations reporting directly to corporate offices is presented below.

13.1.1.2.1 **Executive/Management Organization**

Executive management is ultimately responsible for execution of activities and functions for Unit 3. Executive management establishes expectations such that a high level of quality, safety, and efficiency is achieved in aspects of plant operations and support activities through an effective management control system and an organization selected and trained to meet the above expectations. The executives with direct line of authority for activities associated with the design, construction, and operation of the plant are shown in Figure 13.1-204. Responsibilities of those executives are discussed below.

13.1.1.2.1.1 **President and Chief Nuclear Officer**

The CNO has the ultimate responsibility for the safe and reliable operation of each nuclear station owned and/or operated by the utility. It is the responsibility of the CNO to provide guidance and direction such that safety-related activities under his/her direction including engineering, construction, operations, operations support, maintenance, and planning are performed following the guidelines of the QAP. During the operational phase, the CNO is responsible for appointing an IRC chair and assuring the IRC functions as described in the QAPD.

The CNO delegates authority and responsibility for operation and support of the site through the vice president North Anna 3, vice president nuclear engineering, vice president support services, and senior

manager nuclear oversight. The CNO has no ancillary responsibilities that might detract attention from nuclear safety matters.

13.1.1.2.1.2 [Deleted]

13.1.1.2.1.3 Vice President Nuclear Engineering

The vice president nuclear engineering is responsible to provide support for Unit 3. These support functions include but are not limited to transient and accident analyses and reactor engineering. The vice president nuclear engineering reports to the CNO.

13.1.1.2.1.4 Vice President Support Services

The vice president support services is responsible for ensuring that nuclear regulatory requirements for operating plants are implemented, and for maintaining lines of communication with the nuclear regulatory authority. The vice president support services is also responsible for the operating plant support functions of emergency planning, training and development, and security. The direct reports of the vice president support services include managers responsible for security, emergency preparedness, and supply chain services for Unit 3. The vice president support services reports to the CNO.

13.1.1.2.1.5 [Deleted]

13.1.1.2.1.6 Senior Manager Nuclear Oversight

The senior manager nuclear oversight is responsible for the verification of effective company and supplier QA program development, documentation, and implementation. This position is independent of cost and scheduling concerns associated with construction, operations, maintenance, modification, and decommissioning activities for performing QAP verification. Where implementation of any or all of these functions is delegated to suppliers, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, the senior manager nuclear oversight retains responsibility for the scope and effective implementation of the QAP for those functions.

The senior manager nuclear oversight has the necessary authority and responsibility for verifying quality achievement; identifying quality problems, recommending solutions and verifying implementation of the solutions, and escalating quality problems to higher management levels. The senior manager nuclear oversight has the authority to suspend

unsatisfactory work and control further processing or installation of non-conforming materials. The authority to stop work delegated to nuclear oversight personnel is delineated in procedures. The senior manager nuclear oversight reports to the CNO.

13.1.1.2.1.7 Senior Manager Nuclear Analysis and Fuel

The senior manager nuclear analysis and fuel is responsible for providing nuclear fuel and related business and technical support consistent with the operational needs of the plant. The senior manager nuclear analysis and fuel is assisted by functional managers of fuel procurement, safety analysis, core design, PRA, spent fuel storage and handling, fuel performance, accident and transient analysis, and reactor engineering. The senior manager nuclear analysis and fuel reports to the vice president of nuclear engineering.

13.1.1.2.1.8 [Deleted]

13.1.1.2.1.9 [Deleted]

13.1.1.2.2 Site Organization (Operating)

13.1.1.2.2.1 Vice President North Anna 3

The vice president North Anna 3 reports to the CNO. The vice president North Anna 3 is directly responsible for management and direction of activities associated with the efficient, safe, and reliable operation of the nuclear station, except for those functions delegated to the vice president nuclear engineering, the vice president support services, and the senior manager nuclear oversight. The vice president North Anna 3 is assisted in management and technical support activities by the senior manager operations and maintenance, the senior manager facility engineering and technical support, and the senior manager safety and licensing. The vice president North Anna 3 is responsible for the site FPP through the fire protection engineer.

13.1.1.2.2.2 Senior Manager Facility Engineering and Technical Support

The senior manager facility engineering and technical support is the on-site lead position for engineering and reports to the vice president North Anna 3. The senior manager facility engineering and technical support is responsible for engineering activities related to design engineering, system engineering, project engineering, program engineering, and component engineering. The senior manager facility

engineering and technical support directs functional managers responsible for each of these engineering areas.

13.1.1.2.2.2.1 **Functional Managers System Engineering**

The functional manager system engineering supervises a technical staff of engineers and other engineering specialists and coordinate their work with that of other groups. The functional manager system engineering reports to the senior manager facility engineering and technical support and is responsible for providing direction and guidance to system engineers as follows:

- Monitoring the efficiency and proper operation of balance of plant (BOP) and reactor systems.
- Planning programs for improving equipment performance, reliability, or work practices.
- Conducting operational tests and analyzing the results.
- Identification of plant spare parts for systems within his/her cognizance.

The functional manager of system engineering is supported by a staff of experts in specialized areas including pumps, AOVs, MOVs, and safety and relief valves. The staff provides support to the maintenance department and to other engineering groups.

13.1.1.2.2.2.2 **Functional Manager Design Engineering**

The functional manager design engineering reports to the senior manager facility engineering and technical support and is responsible for:

- Resolution of design issues.
- On-site development of design related change packages and plant modifications.
- Management of contractors who may perform modification or construction activities.
- Maintaining configuration control program.
- Fire protection

The functional manager design engineering is also responsible for:

- Development and maintenance programs and specifications of selected plant equipment.

- Planned upgrades to equipment such as turbine rotors and major component replacement.
- Implementation of effective project management of contractors.
- Implementation of effective project management methods and procedures, including cost controls, for implementation of modifications and construction activities.

13.1.1.2.2.2.3 **Functional Manager Engineering Technical Support**

The functional manager engineering technical support reports to the senior manager facility engineering and technical support.

The functional manager of engineering technical support is responsible for programs such as:

- Materials engineering
- Performance/ISI engineering
- Valve engineering
- Maintenance rule tracking and trending
- Piping erosion corrosion
- In-service testing
- Predictive Analysis
- NDE

13.1.1.2.2.2.4 **Fire Protection Engineer**

The fire protection engineer is responsible for:

- Fire Protection Program requirements, including consideration of potential hazards associated with postulated fires, knowledge of building layout, and system design.
- Post-fire shutdown capability
- Design, maintenance, surveillance, and QA of fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment.
- Fire prevention activities (administrative controls).
- Pre-fire planning, including review and updating of pre-fire plans at least every two years.

The fire protection engineer reports to the vice president North Anna 3 through the senior manager facility engineering and technical support and functional manager design engineering.

Additionally, the fire protection engineer works with the operations department to coordinate activities and program requirements.

In accordance with RG 1.189, the fire protection engineer is an individual who has been delegated authority commensurate with the responsibilities of the position, and who has available staff personnel knowledgeable in fire protection and nuclear safety.

13.1.1.2.2.2.5 [Deleted]

13.1.1.2.2.3 Functional Manager Organizational Effectiveness

The responsibilities of the functional manager organizational effectiveness include establishing processes and procedures to facilitate identification and correction of conditions adverse to quality and implementing corrective actions. The functional manager organizational effectiveness reports to the senior manager safety and licensing.

13.1.1.2.2.4 Functional Manager Licensing

The functional manager licensing is responsible for providing a coordinated focus for interface with the NRC, and for technical direction and administrative guidance to the licensing staff for the following activities:

- Developing licensee event reports (LERs) and responding to notices of violations.
- Preparing/submitting license amendments and updating the FSAR.
- Tracking commitments and answering generic letters.
- Analyzing operating experience data and monitoring industry issues.
- Preparing the station for special NRC inspections, interfacing with NRC inspectors, and interpreting NRC regulations.
- Maintaining the license basis.

The functional manager licensing reports to the senior manager safety and licensing.

13.1.1.2.2.5 **Manager Emergency Preparedness**

The manager emergency preparedness is responsible for:

- Coordinating and implementing the plant emergency response plan with state and local emergency plans.
- Developing, planning, and executing emergency drills and exercises.
- Emergency action level development.
- NRC reporting associated with 10 CFR 50.54(q).

The manager emergency preparedness reports to the vice president support services through the senior manager protection services.

13.1.1.2.2.6 **Functional Manager Training**

The functional manager training is responsible for training programs at the site required for the safe and proper operation and maintenance of the plant as described in Section 13.1.1.1.2.8. The functional manager training supervises a staff of training supervisors who coordinate the development, preparation, and presentation of training programs for nuclear plant personnel and reports to the vice president North Anna 3 through the senior manager safety and licensing.

13.1.1.2.2.7 **Functional Manager Procurement Control**

The functional manager procurement control is responsible for providing sufficient and proper materials to support the material needs of the plant and performing related activities including:

- Procedure development
- Materials storage
- Supply system database maintenance
- Meeting QA and internal audit requirements

The functional manager of procurement control is also responsible for site purchasing. The functional manager procurement control reports to the vice president support services through the senior manager supply chain management.

13.1.1.2.2.8 **Manager Nuclear Security**

The manager nuclear security is responsible for:

- Implementation and enforcement of security directives, procedures, and instructions received from appropriate authorities.

- Day-to-day supervision of the security force.
- Administration of the security program.
- Training the security force.
- Implementing the fitness-for-duty program.

The manager nuclear security reports to the vice president of support services via protection services management.

13.1.1.2.2.9 Manager Nuclear Oversight

The manager nuclear oversight is responsible for those functions listed in Section 13.1.1.1.2.7. The manager of nuclear oversight reports to the senior manager nuclear oversight.

13.1.1.3 Qualifications of Technical Support Personnel

NAPS COL 13.1(5)

Replace DCD Section 13.1.1.3 with the following:

Personnel of the technical support organization meet or exceed the applicable minimum qualifications of ANSI/ANS-3.1-1993 (Reference 13.1-201), as endorsed by RG 1.8. Exceptions are specified in the Quality Assurance Program Description (QAPD). Cold license operator candidates meet the equivalent requirements in NEI-06-13A, "Template for an Industry Training Program Description" (Table 1.6-201). Each member of the unit staff shall meet or exceed the minimum qualifications of RG 1.8. Exceptions to RG 1.8 are specified in the QAPD. Qualifications for physical security and cyber security personnel are addressed in the respective plans.

13.1.2 Operating Organization

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Replace DCD Section 13.1.2 with the following:

13.1.2.1 Plant Organization

The plant management, technical support, and plant operating organizations are shown in Figure 13.1-204. The operating organization is described in Sections 13.1.1.2 and 13.1.2. The on-shift organization is shown in Figure 13.1-203. Additional personnel are required to augment normal staff during outages.

Nuclear plant employees are responsible for reporting problems with plant equipment and facilities. They are required to identify and document equipment problems in accordance with the QA program. QA

program requirements as they apply to the operating organization are described in Section 17.5.

Rules of practice are met through administrative controls as described in Section 17.5. These controls include:

- Establishment of a QAP for the operational phase
- Preparation of procedures necessary to carry out an effective QAP
- A program for review and audit of activities affecting plant safety
- Programs and procedures for rules of practice

Managers and supervisors within the plant operating organization are responsible for establishing goals and expectations for their organization and to reinforce behaviors that promote radiation protection. Specifically, managers and supervisors are responsible for the following, as applicable to their position within the plant organization:

- Interfacing directly with radiation protection staff to integrate radiation protection measures into plant procedures and designing documents into the planning, scheduling, conduct, and assessment of operations and work.
- Notifying radiation protection personnel promptly when radiation protection problems occur or are identified, taking corrective actions, and resolve deficiencies associated with operations, procedures, systems, equipment, and work practices.
- Training site personnel on radiation protection and providing periodic retraining in accordance with 10 CFR 19 so that personnel are properly instructed and briefed for entry into restricted areas.
- Periodically observing and correcting, as necessary, radiation worker practices.
- Supporting radiation protection management in implementing the radiation protection program.
- Maintaining exposures to site personnel ALARA.

13.1.2.1.1 **Vice President North Anna 3**

The vice president North Anna 3 reports to the CNO. The vice president North Anna 3 is directly responsible for management and direction of activities associated with the efficient, safe, and reliable operation of the nuclear station, except for those functions delegated to the vice president nuclear engineering, the vice president support services, and the senior

manager nuclear oversight. The vice president North Anna 3 is assisted in management and technical support activities by the senior manager operations and maintenance, the senior manager facility engineering and technical support, and the senior manager safety and licensing. Executive management establishes expectations such that a high level of quality, safety, and efficiency is achieved in aspects of plant operations and support activities through an effective management control system and an organization selected and trained to meet the above objectives.

Additionally, the vice president North Anna 3 has overall responsibility for occupational and public radiation safety. Radiation protection responsibilities of the vice president North Anna 3 are consistent with the guidance in RG 8.8 and RG 8.10, including the following:

- Providing management radiation protection policy throughout the plant organization
- Providing an overall commitment to radiation protection by the plant organization
- Interacting with and supporting the functional manager radiation protection and chemistry on implementation of the radiation protection program
- Supporting identification and implementation of cost-effective modifications to plant equipment, facilities, procedures and processes to improve radiation protection controls and reduce exposures
- Establishing plant goals and objectives for radiation protection
- Maintaining exposures to site personnel ALARA
- Supporting timely identification, analysis, and resolution of radiation protection problems (e.g., through the plant corrective action program)
- Providing training to site personnel on radiation protection in accordance with 10 CFR 19
- Establishing an ALARA Committee with delegated authority from the site that includes the operations manager, maintenance manager, senior manager facility engineering and technical support, and functional manager radiation protection and chemistry to help provide for effective implementation of line organization responsibilities for maintaining worker doses ALARA

The site vice president is responsible for the site fire protection program through the fire protection engineer.

The succession of responsibility for overall plant instructions or special orders in the event of absences, incapacitation of personnel, or other emergencies is as follows, unless otherwise designated in writing:

1. The vice president North Anna 3
2. The senior manager operations and maintenance
3. The operations manager

The succession of authority includes the authority to issue standing or special orders as required.

13.1.2.1.1.1 **Senior Manager Operations and Maintenance**

The senior manager operations and support reports to the vice president North Anna 3, is responsible for safe operation of the plant, and has control over onsite activities necessary for safe operation and maintenance of the plant including the following:

- Operations
- Maintenance
- Outage and planning
- Site services

13.1.2.1.1.2 **Senior Manager Safety & Licensing**

The senior manager safety and licensing reports to the vice president North Anna 3, is responsible for safe operation of the plant, and has control over onsite activities necessary for safe operation and maintenance of the plant including the following:

- Procedures and records
- Licensing
- Radiation protection
- Chemistry and radiochemistry
- Organizational effectiveness
- Training

13.1.2.1.1.3 **Maintenance Manager**

Maintenance of the plant is performed by the maintenance department mechanical, electrical, and I&C disciplines. The functions of this department are to perform preventive and corrective maintenance, equipment testing, and to implement modifications as necessary.

The maintenance manager is responsible for the performance of preventive and corrective maintenance and modification activities required to support operations, including compliance with applicable standards, codes, specifications, and procedures. The maintenance manager is responsible for the development of maintenance programs. The maintenance manager reports to the senior manager operations and maintenance and provides direction and guidance to the maintenance discipline functional managers and maintenance support staff.

13.1.2.1.1.4 Maintenance Discipline Functional Managers

The functional managers of each maintenance discipline (mechanical, electrical, and I&C) are responsible for maintenance activities within their discipline including plant modifications. They provide guidance in maintenance planning and craft supervision. They establish the necessary manpower levels and equipment requirements to perform both routine and emergency type maintenance activities, seeking the services of others in performing work beyond the capabilities of the plant maintenance department group. Each discipline functional manager is responsible for liaison with other plant staff organizations to facilitate safe operation of the station. These functional managers report to the maintenance manager.

13.1.2.1.1.5 Maintenance Discipline Supervisors

The maintenance discipline supervisors and assistant supervisors (mechanical, electrical, and I&C) supervise maintenance activities, assist in the planning of future maintenance efforts, and guide the efforts of the craft within their discipline. The maintenance discipline supervisors report to the appropriate maintenance discipline functional managers.

13.1.2.1.1.6 Maintenance Mechanics, Electricians, and Instrumentation and Control Technicians

The discipline craft perform electrical and mechanical maintenance and I&C tasks as assigned by the discipline supervisors. They troubleshoot, inspect, repair, maintain, and modify plant equipment and perform Technical Specification surveillances on equipment for which they have cognizance. They perform these tasks in accordance with approved procedures and work packages.

13.1.2.1.1.7 Manager Outage and Planning

The manager outage and planning is responsible for the support functions described in Section 13.1.1.1.2.5. This manager safely fulfills the responsibilities of planning and scheduling all plant work through a staff which includes a functional manager in each area of planning, scheduling, and outages. The manager outage and planning reports to the senior manager operations and maintenance.

13.1.2.1.1.8 Functional Manager Radiation Protection and Chemistry

The functional manager radiation protection and chemistry has the direct responsibility for providing adequate protection of the health and safety of personnel working at the plant and members of the public during activities covered within the scope and extent of the license. This manager's radiation protection responsibilities are consistent with the guidance in RG 8.8 and RG 8.10. They include:

- Managing the radiation protection organization
- Establishing, implementing, and enforcing the radiation protection program
- Providing radiation protection input to facility design and work planning
- Tracking and analyzing trends in radiation work performance and taking necessary actions to correct adverse trends
- Supporting the plant emergency preparedness program and assigning emergency duties and responsibilities within the radiation protection organization
- Delegating authority to appropriate radiation protection staff to stop work or order an area evacuated (in accordance with approved procedures) when, in his or her judgment, the radiation conditions warrant such an action and such actions are consistent with plant safety
- Managing the radioactive waste programs
- Managing programs that address radioactive liquid and gaseous effluent releases and associated offsite doses

The functional manager radiation protection and chemistry is responsible for development, implementation, and direction and coordination of the chemistry, radiochemistry, and non-radiological environmental monitoring

programs. This area includes overall operation of the hot lab, cold lab, emergency offsite facility lab, and non-radiological environmental monitoring. The functional manager radiation protection and chemistry is responsible for the development, administration, and implementation of procedures and programs which provide for effective compliance with environmental regulations. The functional manager radiation protection and chemistry is responsible for assuring that a chemistry technician is on site whenever the unit is in modes other than cold shutdown or refueling.

The functional manager radiation protection and chemistry reports to the senior manager safety and licensing and is assisted by the supervisor radiation protection and the supervisors chemistry.

13.1.2.1.1.9 **Supervisors Radiation Protection**

The supervisors radiation protection are responsible for carrying out the day-to-day operations and programs of the radiation protection department as listed in Section 13.1.1.1.2.3, to promote safe and efficient plant operation.

Supervisors radiation protection report to the functional manager radiation protection and chemistry.

13.1.2.1.1.10 **Radiation Protection Technicians**

Radiation protection technicians (RPTs) directly carry out responsibilities defined in the radiation protection program and procedures. In accordance with Technical Specifications, an RPT is on site whenever there is fuel in the vessel.

The following are some of the duties and responsibilities of the RPTs:

- In accordance with authority delegated by the functional manager radiation protection and chemistry, stop work or order an area evacuated (in accordance with approved procedures) when, in his or her judgment, the radiation conditions warrant such an action and such actions are consistent with plant safety
- Provide coverage and monitor radiation conditions for jobs potentially involving significant radiation exposure
- Conduct surveys, assess radiation conditions, and establish radiation protection requirements for access to and work within restricted, radiation, high radiation, very high radiation, airborne radioactivity areas, and areas containing radioactive materials

- Provide control over the receipt, storage, movement, use, and shipment of licensed radioactive materials, including radioactive wastes destined for offsite processing, storage, and disposal
- Review work packages, proposed design modifications, and operations and maintenance procedures to facilitate integration of adequate radiation protection controls and dose-reduction measures
- Review and oversee implementation of plans for the use of process or other engineering controls to limit the concentrations of radioactive materials in the air
- Provide personnel monitoring and bioassay services
- Maintain, prescribe, and oversee the use of respiratory protection equipment
- Perform assigned emergency response duties
- Manage radioactive liquid and gaseous effluent releases and conduct radiological environmental monitoring in assessing offsite doses to members of the public

13.1.2.1.1.11 **[Deleted]**

13.1.2.1.1.12 **[Deleted]**

13.1.2.1.2 **Operations Department**

All operations activities are conducted with safety of personnel, the public, and equipment as the overriding priority. Management personnel of the operations department are responsible for:

- Operation of station equipment
- Monitoring and surveillance of safety- and non-safety-related equipment
- Fuel loading
- Providing the nucleus of emergency and fire-fighting teams

The operations department maintains sufficient licensed and senior licensed operators to staff the MCR continuously using a crew rotation system. The operations department is under the authority of the operations manager who, through the functional manager shift operations, directs the day-to-day operation of the plant.

Specific duties, functions, and responsibilities of key shift members are discussed in Section 13.1.2.1.2.5 through Section 13.1.2.1.2.9 and in

plant administrative procedures and the Technical Specifications. The minimum shift manning requirements are shown in Table 13.1-202. Expected staffing levels are provided in Table 13.1-201.

For activities that do not require an operator's license, resources of the operations organization may be shared between units. These activities may include administrative functions and tagging. To operate or supervise the operation of more than one unit, an operator (SRO or RO) must hold an appropriate, current license for each unit.

The operations support group is staffed with sufficient personnel to provide support activities for the operating shifts and overall operations department. The following is an overview of the operations organization.

13.1.2.1.2.1 **Operations Manager**

The operations manager has overall responsibility for the day-to-day operation of the plant. The operations manager reports to the senior manager operations and maintenance and is assisted by the functional managers shift operations, operations support, and operations maintenance support. Either the manager operations or the functional manager shift operations is SRO licensed.

13.1.2.1.2.2 **Functional Manager Shift Operations**

The functional manager shift operations, under the direction of the operations manager, is responsible for:

- Shift plant operations in accordance with the operating license, Technical Specifications, and written procedures
- Providing supervision of operating shift personnel for operational shift activities including those of emergency and firefighting teams
- Coordinating with the functional manager operations support and other plant staff sections
- Verifying that nuclear plant operating records and logs are properly prepared, reviewed, evaluated and turned over to the functional manager of operations support

The functional manager shift operations is assisted in these areas by the operations shift manager who directs the operating shift personnel. The functional manager shift operations may assume the duties of the operations manager in the event of an absence.

13.1.2.1.2.3 **Functional Manager Operations Support**

The functional manager operations support, under the direction of the operations manager is responsible for:

- Directing and guiding plant operations support activities in accordance with the operating license, Technical Specifications, and written procedures
- Providing supervision of operating support personnel and operations support activities, and coordination of support activities
- Providing for nuclear plant operating records and logs to be turned over to the nuclear records group for maintenance as quality records
- Supervising operating procedure maintenance

The functional manager operations support is assisted by specialists in the areas of work management, radwaste operations, operations procedures, and other support personnel. In the absence of the operations manager, the functional manager operations support may assume the duties and responsibilities of the operations manager.

13.1.2.1.2.4 **Functional Manager Operations Maintenance Support**

The functional manager operations maintenance support is a licensed SRO reporting directly to the operations manager. Responsibilities of this position include:

- Valve lineups for maintenance and testing activities.
- Equipment tagging
- Review and authorization of maintenance, surveillance, or other work or testing.
- Keeping the operations shift manager and other operations personnel informed of activities for which they need to be cognizant.
- Verifying that work and testing is safe and appropriate for the existing conditions of the plant.
- Tracking the work and testing to provide assurance that any LCOs or other requirements will not be exceeded.

13.1.2.1.2.5 **Operations Shift Manager**

The operations shift manager is a licensed senior reactor operator (SRO) responsible for the control room command function, and is the direct management representative of the vice president North Anna 3 for the

conduct of operations. The operations shift manager has the responsibility and authority to direct the activities and personnel onsite as required to:

- Protect the health and safety of the public, the environment, and personnel on the plant site
- Prevent damage to site equipment and structures
- Comply with the operating license

The operations shift manager retains this responsibility and authority until formally relieved of operating responsibilities by a licensed SRO. Additional responsibilities of the operations shift manager include:

- Directing nuclear plant employees to report to the plant for response to potential and real emergencies
- Seeking the advice and guidance of the shift technical advisor and others in executing his duties whenever in doubt as to the proper course of action
- Promptly informing responsible supervisors of significant actions affecting their responsibilities
- Participating in operator training, retraining, and requalification activities from the standpoint of providing guidance, direction, and instruction to shift personnel

The operations shift manager is assisted in carrying out the above duties by the on-shift senior operator and the operating shift personnel. As shown on Figure 13.1-203, the operations shift manager reports to the functional manager shift operations.

13.1.2.1.2.6 **On-Shift Senior Operator**

The on-shift senior operator is a licensed SRO. The main functions of the on-shift senior operator are to administratively support the operations shift manager such that the “command function” is not overburdened with administrative duties and to supervise the licensed and non-licensed operators in carrying out the activities directed by the operations shift manager. Other duties and responsibilities include:

- Being aware of maintenance and testing performed during the shift
- Directing reactor shutdown if conditions warrant this action

- Informing the operations shift manager and other station management in a timely manner of conditions which may affect public safety, plant personnel safety, plant capacity or reliability, or cause a hazard to equipment
- Initiating immediate corrective action as directed by the operations shift manager in any upset situation until assistance, if required, arrives
- Participating in operator training, retraining, and requalification activities from the standpoint of providing guidance, direction, and instruction to shift personnel
- Responding conservatively to instrument indications unless they are proved to be incorrect
- Adhering to the plant's technical specifications
- Reviewing routine operating data to assure safe operation

As shown on Figure 13.1-203, the on-shift senior operator reports directly to the operations shift manager.

13.1.2.1.2.7 **Reactor Operator**

Reactor operators (RO) are licensed personnel and normally report to the on-shift senior operator. They are responsible for routine plant operations and performance of major evolutions at the direction of the on-shift senior operator. The RO duties and responsibilities include:

- Monitoring control room instrumentation
- Responding to plant or equipment abnormalities in accordance with approved plant procedures
- Directing the activities of non-licensed operators
- Documenting operational activities, plant events, and plant data in shift logs
- Responding conservatively to instrument indications unless they are proved to be incorrect
- Adhering to the plant's technical specifications
- Reviewing routine operating data to assure safe operation

- Initiating plant shutdowns or scrams or other compensatory actions when:
  - Observation of plant conditions indicates a nuclear safety hazard exists
  - Approved procedures so direct
  - The RO determines that the safety of the reactor is in jeopardy
  - Operating parameters exceed any of the reactor protection system setpoints and automatic shutdown does not occur

Whenever there is fuel in the RV, at least one RO is in the control room monitoring the status of the unit at the main control panel. The RO assigned to the main control panel is designated the Operator-At-The Controls (OATC) and conducts monitoring and operating activities in accordance with the guidance set forth in RG 1.114, which is further described in Section 13.1.2.1.3.

13.1.2.1.2.8 **Non-Licensed Operator**

The non-licensed operators perform routine duties outside the control room as necessary for continuous, safe plant operation including:

- Assisting in plant startup, shutdown, surveillance, and emergency response by manually or remotely changing equipment operating conditions, placing equipment in service, or securing equipment from service at the direction of the RO
- Performing assigned tasks in procedures and checklists such as valve manipulations for plant startup or data sheets on routine equipment checks, and making accurate entries according to the applicable procedure, data sheet, or checklist
- Assisting in training of new employees and improving and upgrading their own performance by participating in the applicable sections of the training program

13.1.2.1.2.9 **Shift Technical Advisor**

The station is committed to meeting NUREG-0737 TMI Action Plan item I.A.1.1 for shift technical advisors (STAs). The STA reports directly to the operations shift manager and provides advanced technical assistance to the operating shift complement during normal and abnormal operating conditions. The STA's responsibilities are detailed in

plant administrative procedures as required by TMI Action Plan I.A.1.1 and NUREG-0737, Appendix C. These responsibilities include:

- Monitoring core power distribution and critical parameters
- Assisting the operating shift with technical expertise during normal and emergency conditions
- Evaluating technical specifications, special reports, and procedural issues

The STA contributes to operations safety by independently observing plant status and advising shift supervision of conditions that could compromise plant safety. During transients or accident situations, the STA independently assesses plant conditions and provides technical assistance and advice to mitigate the incident and minimize the effect on personnel, the environment, and plant equipment.

An SRO on shift who meets the qualifications for the combined SRO/STA position specified for Option 1 of Generic Letter 86-04may also serve as the STA. If this option is used for a shift, the separate STA position may be eliminated for that shift.

13.1.2.1.3 **Conduct of Operations**

Station operations are controlled and coordinated through the control room. Maintenance activities, surveillances, and removal from/return to service of SSCs affecting the operation of the plant may not commence without the authority of the operations shift manager or designee. The rules of practice for control room activities, as described by administrative procedures, which are based on RG 1.114, address the following:

- Position/placement of the workstation for the operator at the controls and the expected area of the control room where the on-shift senior operator or operations shift manager should spend the majority of on-shift time
- Definition and outline of “surveillance area” and requirement for continuous surveillance by the operator at the controls
- Relief requirements for operator at the controls and the on-shift senior operator or operations shift manager

In accordance with 10 CFR 50.54 (i), (j), (k), (l), and (m):

- Reactivity controls may be manipulated only by ROs and senior operators except as allowed for training under 10 CFR 55

- Apparatus and mechanisms other than controls which may affect reactivity or power level of the reactor shall be operated only with the consent of the operator at the controls or the on-shift senior operator or operations shift manager
- An RO or SRO shall be present at the controls at all times during the operation of the facility
- For each shift, the operations shift manager designates one or more SROs to be responsible for directing the licensed activities of licensed operators
- An SRO shall be present at the facility or readily available on call at all times during its operation, and shall be present at the facility during initial start-up and approach to power, recovery from an unplanned or unscheduled shut-down or significant reduction in power, and refueling, or as otherwise prescribed in the facility license
- Minimum shift staffing for operations personnel is shown in Table 13.1-202
- With the unit in modes other than cold shutdown or refueling, there shall be one SRO in the control room at all times. In addition, there shall be one RO or one SRO at the controls whenever there is fuel in the RV

13.1.2.1.4 **Operating Shift Crews**

Plant administrative procedures implement the required shift staffing. These provisions establish crews with sufficient qualified plant personnel to staff the operational shifts and be readily available in the event of an abnormal or emergency situation. The objective is to operate the plant with the required staff and to develop work schedules that minimize overtime for plant staff members who perform safety-related functions. Work hour limitations and shift manning requirements defined by TMI Action Plan I.A.1.3 are addressed in station procedures. Shift crew staffing plans may be modified during refueling outages to accommodate safe and efficient completion of outage work in accordance with work hour limitations established in administrative procedures.

The minimum composition of an operating shift crew depends on the operational mode, as shown in Table 13.1-202. Reporting relationships for these positions are shown in Figure 13.1-203.

13.1.2.1.5 Fire Brigade

The plant is designed, and the fire brigade organized, to be self-sufficient with respect to fire fighting activities. The fire brigade is organized to deal with fires and related emergencies that could occur. It consists of a fire brigade leader and a sufficient number of team members to be consistent with the equipment that must be put in service during a fire emergency. The fire brigade leader has ready access to keys to any locked doors. A sufficient number of trained and physically qualified fire brigade members are available on site during each shift. The fire brigade consists of at least five members on each shift. Members of the fire brigade are knowledgeable of building layout and system design. The assigned fire brigade members for any shift do not include the operations shift manager nor any other members of the minimum shift operating crew necessary for safe shutdown of the unit, nor do they include any other personnel required for other essential functions during a fire emergency. Fire brigade members for a shift are designated in accordance with established procedures at the beginning of the shift. The fire brigade for Unit 3 does not include personnel assigned to Units 1 and 2.

The brigade leader and at least two brigade members have sufficient training in, or knowledge of, plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader has training or experience necessary to assess the potential safety consequences of a fire and advise control room personnel, as evidenced by possession of an operator’s license or equivalent knowledge of plant systems. The qualification of fire brigade members includes an annual physical examination to determine their ability to perform strenuous firefighting activities.

13.1.3 Qualification of Nuclear Plant Personnel

NAPS COL 13.1(5)
NAPS COL 13.1(7)

Replace DCD section 13.1.3 with the following:

13.1.3.1 Minimum Qualification Requirements

Personnel of the technical support organization meet or exceed the applicable minimum qualifications of ANSI/ANS-3.1-1993 (Reference 13.1-201), as endorsed by RG 1.8. Exceptions are specified in the QAPD. Cold license operator candidates meet the equivalent requirements in NEI-06-13A, “Template for an Industry Training Program Description” (Table 1.6-201). Each member of the unit staff shall meet or

exceed the minimum qualifications of RG 1.8. Exceptions to RG 1.8 are specified in the QAPD. Qualifications for physical security and cyber security personnel are addressed in the respective plans.

13.1.3.2 Qualification Documentation

Resumes and other documentation of qualification and experience of initial appointees to appropriate management and supervisory positions are available for review by regulators upon request after position vacancies are filled.

13.1.4 Combined License Information

Replace the content DCD Section 13.1.4 with the following:

NAPS COL 13.1(1)

13.1(1) ***The COL Applicant is to provide a description of the corporate or home office organization, its functions and responsibilities, and the number and qualifications of personnel. The COL Applicant directs attention to activities that include facility design, design review, design approval, construction management, testing, and operation of the plant.***

This COL item is addressed in Sections 13.1.1 and 13.1.2

NAPS COL 13.1(2)

13.1(2) ***The COL Applicant is to develop a description of past experience in the design, construction, and operation of nuclear power plants and past experience in activities of similar scope and complexity.***

This COL item is addressed in Section 13.1.1

NAPS COL 13.1(3)

13.1(3) ***The COL Applicant is to describe its management, engineering, and technical support organizations. The description includes organizational charts for the current headquarters and engineering structure and any planned modifications and additions to those organizations that reflect the added functional responsibilities with the nuclear power plant.***

This COL item is addressed in Sections 13.1.1 and 13.1.1.1

NAPS COL 13.1(4)

13.1(4) ***The COL Applicant is to develop a description of the organizational arrangement. This description shows how the added functional responsibilities associated with the addition of the nuclear power plant to the Applicant's power generation capacity are delegated and assigned (or expected to be assigned) to each of the working or performance-level organizational units to implement these responsibilities. The description includes organizational charts reflecting the current corporate structure and the specific working- or performance-level organizational units that provide technical support for the operation.***

This Combined License (COL) item is addressed in Sections 13.1.1 and 13.1.2.

NAPS COL 13.1(5)

13.1(5) ***The COL Applicant is to develop the description of the general qualification requirements in terms of educational background and experience for positions or classes of positions depicted in the organizational arrangement.***

This COL item is addressed in Section 13.1.1, 13.1.1.3.and 13.1.3

NAPS COL 13.1(6)

13.1(6) ***The COL Applicant is to develop the organizational structure for the plant organization, its personnel responsibilities and authorities, and operating shift crews.***

This COL item is addressed in Section 13.1.2

NAPS COL 13.1(7)

13.1(7) ***The COL Applicant is to develop the description of education, training, and experience requirements established for management, operating, technical, and maintenance positions for the operating organization.***

This COL item is addressed in Section 13.1.3.

13.1.5 References

Add the following reference after the last reference in DCD Subsection 13.1.5:

13.1-201 ANSI/ANS-3.1-1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," 1993.

13.1-202 American Society of Mechanical Engineers, Quality Assurance Requirements for Nuclear Facility Applications, NQA-1-1994.

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Opera-tional Phase
Executive management	president and chief nuclear officer	n/a	President & CNO Dominion Nuclear	1**
	vice president North Anna 3	4.2.1	Site Vice President North Anna 3	1
Nuclear support	vice president support services	n/a	Vice President Nuclear Support Services	1**
	vice president nuclear engineering	n/a	Vice President Nuclear Engineering	1**
Plant management	senior manager operations and maintenance	4.2.1	Plant Manager (Nuclear)	1
	senior manager safety and licensing	4.2.4	Director Nuclear Station Safety & Licensing	1
Operations	operations manager	4.2.2	Manager Nuclear Operations	1
Operations, plant	functional manager shift operations	4.3.8	Supervisor Nuclear Shift Operations	1
Operations, admin	functional manager operations support	4.3.8	Supervisor Nuclear Operations Support	1
	functional manager operations maintenance support	4.3.8	Nuclear Operations Maintenance Advisor	1
	senior operator	4.4.2	Unit Supervisor	1
on shift operations	operations shift manager	4.4.1	Shift Manager	6
	senior operator	4.4.2	Unit Supervisor	8
	shift technical advisor	4.6.2	STA****	5
	reactor operator	4.5.1	Control Room Operator (Licensed)	10
	Non-licensed operator	4.5.2	Control Room Operator (Nuclear)	30
	rad waste operator	4.5.2	Control Room Operator (Nuclear)	2

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Opera-tional Phase
Engineering	senior manager facility engineering and technical support	4.2.4	Director Nuclear Engineering	1
technical support	functional manager engineering technical support	4.3.9	Manager Nuclear Engineering	1
	programs engineer	4.6.1	Nuclear Engineer	12
system engineering	functional manager system engineering	4.3.9	Manager Nuclear Site Engineering	4
	system engineer	4.6.1	Nuclear Engineer	16
design engineering	functional manager design engineering	4.3.9	Manager Nuclear Design Engineering	1
	projects engineer	4.6.1	Nuclear Engineer	3
	design engineer	4.6.1	Nuclear Engineer	10
safety and engineering analysis	functional manager nuclear fuel analysis and design	4.3.9	Manager Nuclear Engineering	1**
	analysis engineer	4.6.1	Nuclear Engineer	3
reactor engineering	functional manager reactor engineering	4.3.9	Supervisor Nuclear Engineering	1
	reactor engineer	4.6.1	Nuclear Engineer	3
Chemistry	functional manager chemistry	4.3.2	Manager Radiation Protection & Chemistry	1
	supervisor chemistry	4.4.5	Supervisor, Nuclear Chemistry	2
	chemistry technician	4.5.3.1	Nuclear Chemistry Technician	10

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Operational Phase
Radiation Protection	functional manager radiation protection	4.3.3	Manager Radiation Protection & Chemistry	1
	supervisor radiation protection	4.4.6	Health Physics Supervisor	8
	radiation protection technician	4.5.3.2	Health Physics Technician	18
	ALARA specialist	n/a	Health Physicist	3
	decon technician	n/a	Radiation Decontamination Technician	6
Maintenance	maintenance manager	4.2.3	Manager Nuclear Maintenance	1
Instrumentation and control	functional manager I&C	4.3.4	Supervisor I&C	1
	supervisor I&C	4.4.7	Assistant Supervisor I&C	2
	I&C technician	4.5.3.3	Nuclear Instrument Technician	30
mechanical	functional manager mechanical maintenance	4.3.6	Supervisor Nuclear Maintenance	1
	supervisor mechanical	4.4.9	Nuclear Maintenance Supervisor	2
	mechanical technician	4.5.7.2	Mechanic	30
electrical	functional manager electrical	4.3.5	Supervisor Nuclear Maintenance	1
	supervisor electrical	4.4.8	Nuclear Maintenance Supervisor	2
	electrical technician	4.5.7.1	Electrician	30
Planning and scheduling and outage	manager outage and planning	4.2.4	Manager Nuclear Outage & Planning	1
	functional manager outage	4.3.9	Supervisor Nuclear Planning	1
	functional manager scheduling	4.3.9	Supervisor Nuclear Scheduling	1
	functional manager planning	4.3.9	Supervisor Nuclear Planning	1

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Operational Phase
Purchasing and contracts	functional manager procurement control	4.3.9	Manager Supply Chain Services	1
	procurement engineer	4.6.1	Procurement Engineer	2
QA	senior manager nuclear oversight	QAPD, Part II, Section 2.6	Director Nuclear Oversight	1**
	manager nuclear oversight	QAPD, Part II, Section 2.6	Manager Nuclear Oversight	1
	QA internal auditor	QAPD, Part II, Section 2.7	Nuclear Quality Specialist	7
	QC inspector	QAPD, Part II, Section 2.7	Nuclear Quality Specialist	6
	supplier auditor	QAPD, Part II, Section 2.7	Nuclear Quality Specialist	7**
	vendor surveillance QC inspector	QAPD, Part II, Section 2.7	Vendor Quality Specialist	4**
	nuclear fuel inspector	QAPD, Part II, Section 2.7	Nuclear Technical Specialist	3**

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Opera-tional Phase
Training	functional manager training	4.3.1	Manager Nuclear Training	1
	supervisor operations training	4.4.4	Supervisor Nuclear Training	1
	supervisor simulator	4.4.4	Supervisor Nuclear Training	1
	operations training instructor	4.5.4	Instructor	10
	supervisor technical staff training	4.4.4	Supervisor Nuclear Training	1
	supervisor maintenance training	4.4.4	Supervisor Nuclear Training	1
	technical staff/maintenance instructors	4.5.4	Instructor	7
Nuclear safety assurance	functional manager licensing	4.3.9	Supervisor Nuclear Engineering	1
	licensing engineer	n/a	Nuclear Engineer	2
	functional manager organizational effectiveness	4.3.9	Supervisor Station Nuclear Safety	1
	corrective action engineer	n/a	Nuclear Engineer	1
emergency preparedness	manager emergency preparedness	4.3.9	Manager Nuclear Emergency Planning	1
	EP planner	n/a	Emergency Preparedness Specialist	2
security	manager nuclear security	4.3.9	Manager Nuclear Protection Services	1***
	supervisor security	n/a	Supervisor Nuclear Security	10***
	security officer	n/a	Nuclear Security Officer	100***

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Generic Position	ANS 3.1-1993 section	Nuclear Plant Position (Site-Specific)	Opera-tional Phase
Startup Testing	supervisor startup testing	4.4.12	Startup Test Manager	
	supervisor startup testing	4.4.12	Startup Test Director	1
	startup test engineer	n/a*****	Startup Test Engineer	4
	supervisor preoperational testing	4.4.11	Preoperational Test Manager	
	supervisor preoperational testing	4.4.11	Preoperational Test Director	-
	preoperational test engineer	n/a*****	Preoperational Test Engineer	-

** The number in this block indicates total positions in the nuclear organization.

*** Shared position with other North Anna units.

**** An SRO on shift who meets the qualifications for the combined SRO/STA position specified for Option 1 of Generic Letter 86-04, may also serve as the STA. If this option is used for a shift the separate STA position may be eliminated for that shift.

***** Level II inspection and test personnel, as defined in ASME NQA-1 (Reference 13.1-202), Part 1, Basic Requirement 2 and Supplement 2S-1; and Part III, Subpart 3.1, Appendix 2A-1.

NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Table 13.1-202 Minimum Shift Staffing for Unit 3

Unit Shutdown	1 SM (SRO) 1 RO 1 NLO
Unit Operating*	1 SM (SRO) 1 SRO 2 RO 2 NLO
SM – shift manager SRO – Licensed Senior Reactor Operator	RO – Licensed Reactor Operator NLO – non-licensed operator

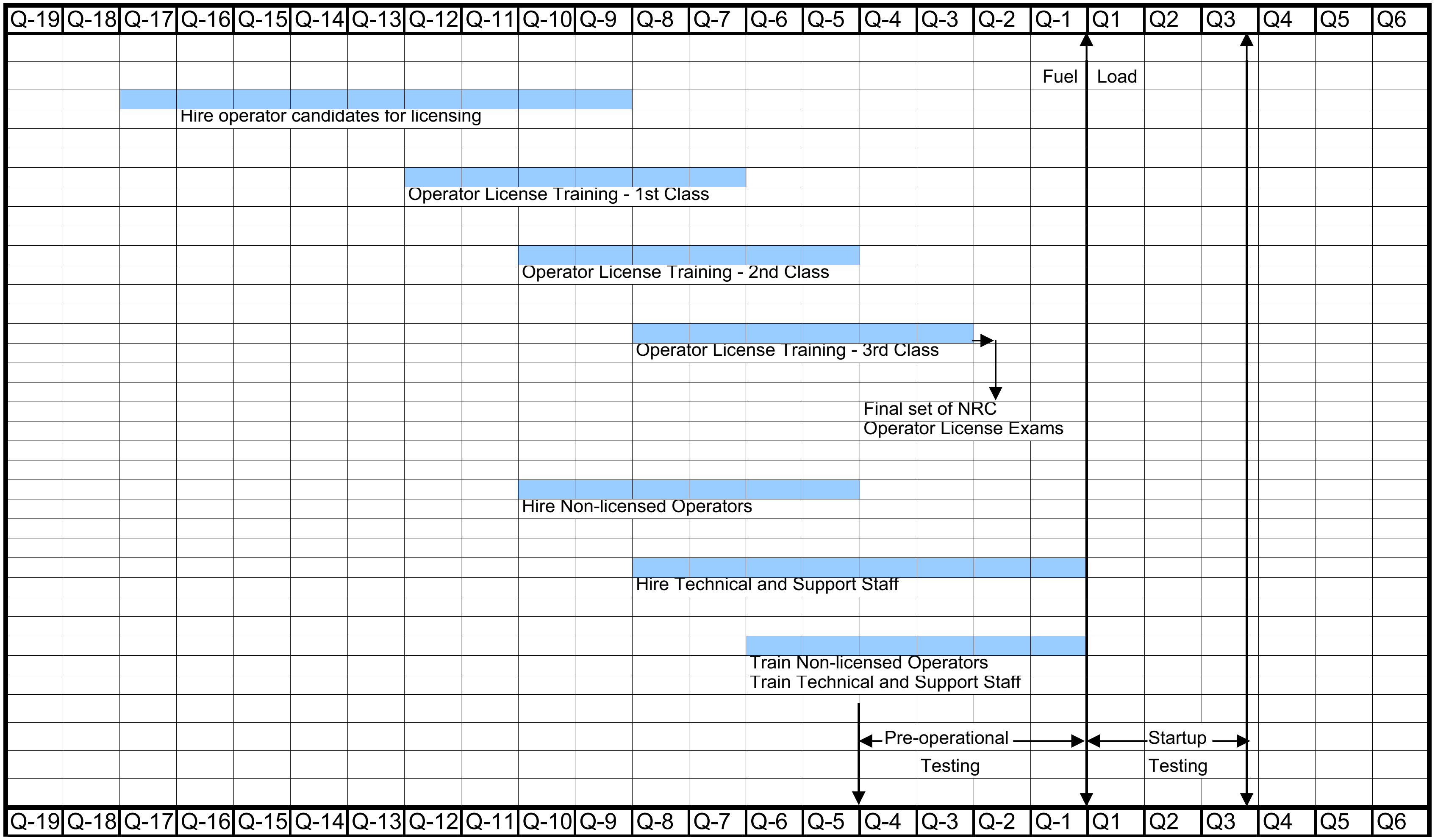
Notes:
1) In addition, one Shift Technical Advisor (STA) is assigned during plant operation in modes other than cold shutdown or refueling. A shift manager or another SRO on shift, who meets the qualifications for the combined Senior Reactor Operator/Shift Technical Advisor (SRO/STA) position, as specified for option 1 of Generic Letter 86-04, the commission's policy statement on engineering expertise on shift, may also serve as the STA. If this option is used for a shift, then the separate STA position may be eliminated for that shift.
2) In addition to the minimum shift organization above, during refueling a licensed SRO or SRO limited (fuel handling only) is required to directly supervise any core alteration activity.
3) A shift manager/supervisor (licensed SRO), is on site at all times when fuel is in the reactor.
4) A health physics technician is on site at all times where there is fuel in the reactor.
5) A chemistry technician is on site during plant operation in modes other than cold shutdown or refueling.
6) Procedures contain guidance for shift staffing that meet the requirements of this table, the Technical Specifications, the Emergency Plan and Fire Brigade staffing.

* Operating modes other than cold shutdown or refueling.

Figure 13.1-201 [Deleted]

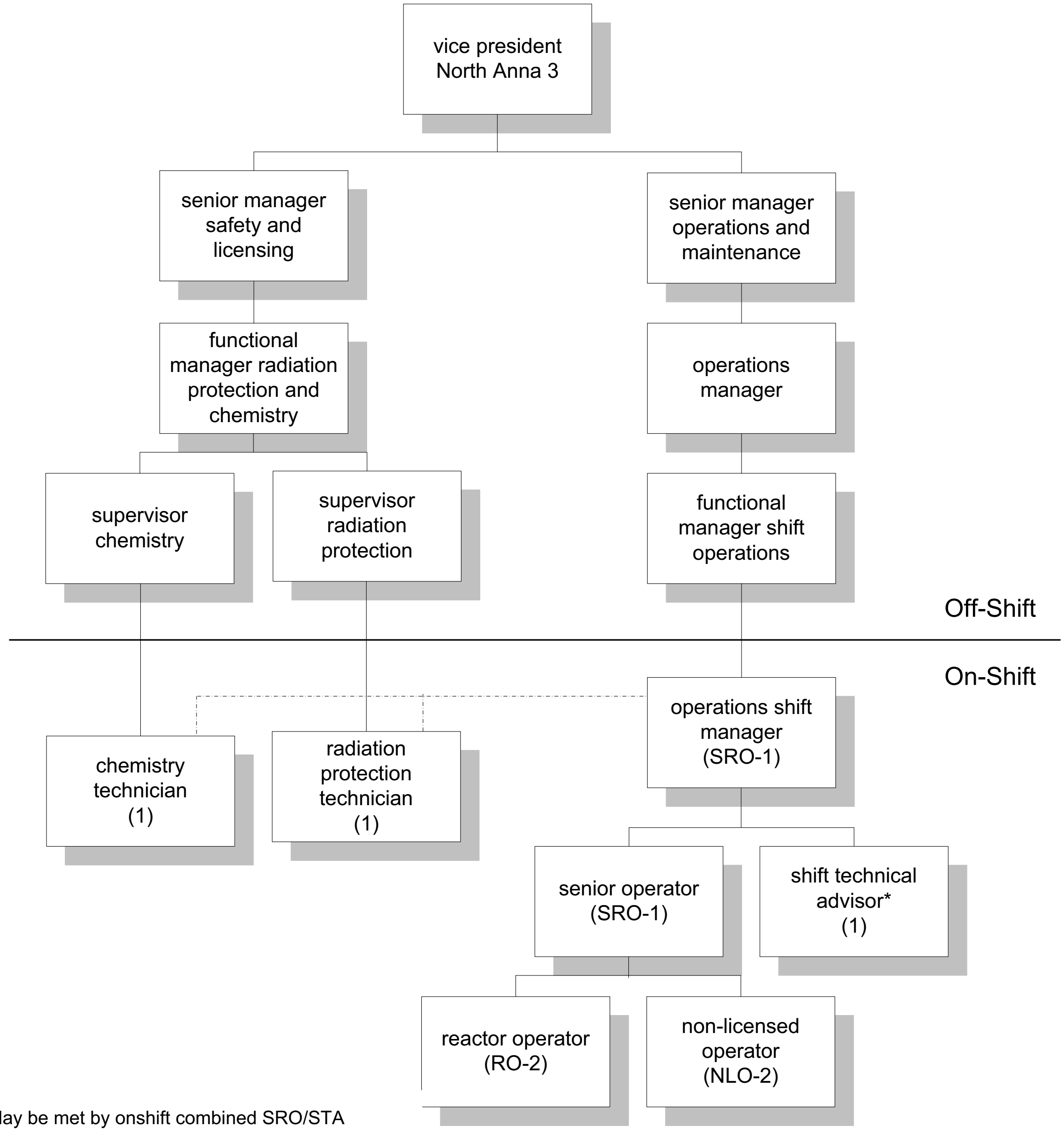
NAPS COL 13.1(7)

Figure 13.1-202 Nominal Plant Staff Hiring and Training Schedule



NAPS COL 13.1(4)
NAPS COL 13.1(6)

Figure 13.1-203 Shift Operation



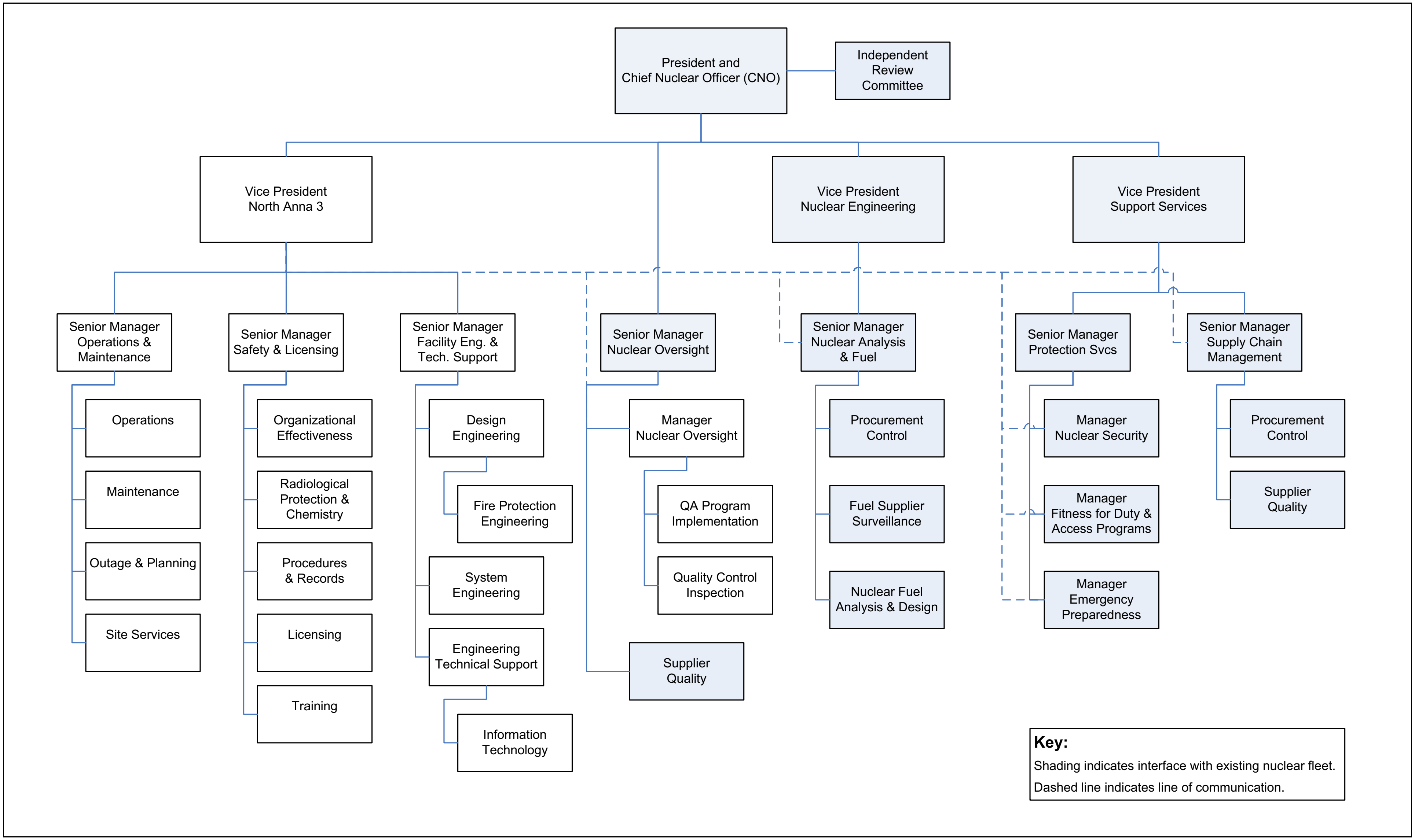
* May be met by onshift combined SRO/STA
SRO - licensed senior reactor operator
RO - licensed reactor operator
NLO - non-licensed operator

Shift Manning - 5 shifts (minimum)
(No.) - Indicates number of positions per shift.

Procedures contain guidance for shift staffing that meets the requirements of this figure, the Technical Specifications, the Emergency Plan, and Fire Brigade staffing.

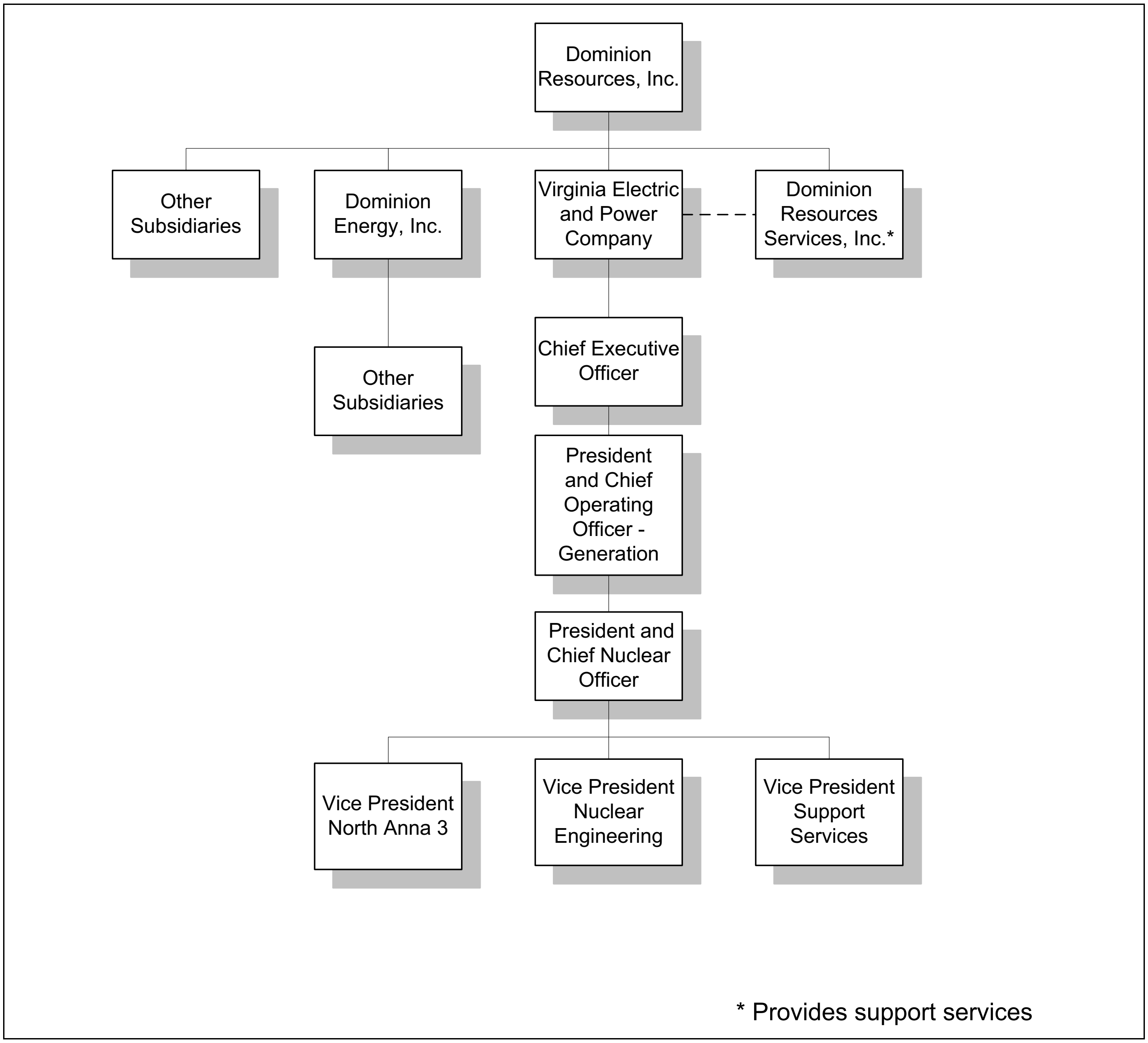
NAPS COL 13.1(1)
NAPS COL 13.1(4)
NAPS COL 13.1(6)

Figure 13.1-204 Operating Organization



NAPS COL 13.1(1)
NAPS COL 13.1(4)

Figure 13.1-205 Corporate Structure



13.2 Training

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 13.2(1)
STD COL 13.2(2)
STD COL 13.2(3)
STD COL 13.2(5)

Add the following text to the end of DCD Section 13.2.

NEI 06-13A, "Template for an Industry Training Program Description" which includes Appendix A – Cold License Training Plan (Table 1.6-201), including all subsections, is incorporated by reference. NEI 06-13A provides a complete generic program description for use with COL applications. The document reflects guidance provided by the NRC and by Industry-NRC discussions on training-related issues. A main objective of this program is to assist in expediting NRC review and issuance of the combined license. Chapter 1 of NEI 06-13A states "The results of reviews of operating experience are incorporated into training and retraining programs in accordance with the provisions of TMI Action Item I.C.5, Appendix 1A."

NAPS COL 13.2(4)

A schedule showing approximate timing of initial licensed operator training relative to fuel loading is included as Figure 13.1-202. Requalification training is implemented in accordance with Section 13.4. A schedule showing approximate timing of initial training for non-licensed plant staff relative to fuel load is included as Figure 13.1-202.

13.2.1.1 Program Description

NAPS COL 13.2(1)
NAPS COL 13.2(2)
NAPS COL 13.2(3)
NAPS COL 13.2(5)

Replace the content of DCD Subsection 13.2.1.1 with the following.

The content of this subsection is discussed above.

13.2.1.1.1 Licensed Plant Staff Training Program

Replace the content of DCD Subsection 13.2.1.1.1 with the following.

The content of this subsection is discussed above.

13.2.1.1.2 Non-Licensed Plant Staff Training Program (to be verified during construction)

Replace the content of DCD Subsection 13.2.1.1.2 with the following.

The content of this subsection is discussed above.

Add the following Subsection after DCD Subsection 13.2.1.1.2.

13.2.1.1.3 Hazards Awareness Training

Workers and operators will receive initial and annual refresher training for protection from chemical hazards and confined space entry in accordance with 29 CFR 1910.

13.2.1.2 Coordination with Preoperational Tests and Fuel Loading

Replace the content of DCD Subsection 13.2.1.2 with the following.

The content of this subsection is discussed above.

13.2.2 Applicable Nuclear Regulatory Commission Documents

Replace the content of DCD Subsection 13.2.2 with the following.

The content of this subsection is discussed above.

13.2.3 Combined License Information

Replace the content of DCD Subsection 13.2.3 with the following.

STD COL 13.2(1)
NAPS COL 13.2(1)

13.2(1) ***Training program***

This COL item is addressed in Section 13.2.

STD COL 13.2(2)
NAPS COL 13.2(2)

13.2(2) ***Training programs for reactor operators.***

This COL item is addressed in Section 13.2.

STD COL 13.2(3)
NAPS COL 13.2(3)

13.2(3) ***Training programs for non-licensed plant staff***

This COL item is addressed in Section 13.2.

NAPS COL 13.2(4)

13.2(4) ***Training programs, including the schedule of each part of the training program for each functional group of employees in the organization***

This COL item is addressed in Section 13.2.

STD COL 13.2(5)
NAPS COL 13.2(5)

13.2(5) ***Extent to which portions of applicable NRC guidance is used in the facility training program or the justification of exceptions***

This COL item is addressed in Section 13.2.

13.3 Emergency Planning

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 13.3(1)

Replace the fourth sentence of the first paragraph in the DCD Subsection 13.3 with the following.

Interfaces of design features with site specific designs and site parameters are addressed in Combined License Application Part 5 "Emergency Plan".

STD COL 13.3(7)

Add the following paragraph to the end of DCD Section 13.3.

The description of the operation support center is provided in Combined License Application Part 5 "Emergency Plan".

13.3.1 Combined License Application and Emergency Plan Content

NAPS COL 13.3(2)

Replace the first and second sentence of the first paragraph in the DCD Subsection 13.3.1 with the following.

The Emergency Plan is provided in Combined License Application Part 5 "Emergency Plan."

STD COL 13.3(3)
STD COL 13.3(4)

Replace the second paragraph in the DCD Subsection 13.3.1 with the following.

Emergency classifications and action levels, and the security-related aspects of emergency planning are addressed in Combined License Application Part 5 "Emergency Plan".

13.3.2 Emergency Plan Considerations for Multi-Unit Site

NAPS COL 13.3(5)

Replace the sentence in the DCD Subsection 13.3.2 with the following.

The interface between the Emergency Plan for Units 1 and 2 and the Emergency Plan for Unit 3 is addressed in Combined License Application Part 5 "Emergency Plan."

13.3.3 Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria

NAPS COL 13.3(6) Replace the sentence in the DCD Subsection 13.3.3 with the following.

Emergency planning ITAAC are provided in COLA Part 10, "Tier 1/ITAAC."

13.3.4 Combined License Information

Replace the content of DCD Subsection 13.3.4 with the following.

STD COL 13.3(1) *13.3(1)* ***Interfaces of design features with site specific designs and site parameters***

This COL item is addressed in Section 13.3.

NAPS COL 13.3(2) *13.3(2)* ***Comprehensive emergency plan***

This COL item is addressed in Subsection 13.3.1.

STD COL 13.3(3) *13.3(3)* ***Emergency classification and action level scheme***

This COL item is addressed in Subsection 13.3.1.

STD COL 13.3(4) *13.3(4)* ***Security-related aspects of emergency planning***

This COL item is addressed in Subsection 13.3.1.

NAPS COL 13.3(5) *13.3(5)* ***Multi-unit site interface plan depending on the location of the new reactor on, or near, an operating reactor site with an existing emergency plan***

This COL item is addressed in Subsection 13.3.2.

NAPS COL 13.3(6) *13.3(6)* ***Emergency planning inspections, tests, analyses, and acceptance criteria***

This COL item is addressed in Subsection 13.3.3.

STD COL 13.3(7) *13.3(7)* ***Operation support center***

This COL item is addressed in Section 13.3.

NAPS SUP 13.3(1)

13.3.5 ESP Information

SSAR Section 13.3 is incorporated by reference for historical purposes.

13.4 Operational Program Implementation

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 13.4(1)

Replace the sentence in the DCD Section 13.4 with the following.

Table 13.4-201 identifies the required Operational Programs including the associated FSAR Sections and committed Milestones for implementation. Each operational program is "fully described" in the associated FSAR Sections.

NAPS COL 13.4(2)

A leakage monitoring and prevention program, as described in Technical Specification Section 5.5.2, and which includes appropriate methods and acceptance criteria defined in NUREG-0734 Item III.D.1.1, will be developed prior to initial fuel load.

13.4.1 Combined License Information

Replace the content of DCD Subsection 13.4.1 with the following.

STD COL 13.4(1)
NAPS COL 13.4(1)

13.4(1) ***Operational Programs as defined in SECY-05-0197 (Ref. 13.4-1)***

This COL item is addressed in Section 13.4, including Table 13.4-201.

NAPS COL 13.4(2)

13.4(2) ***Leakage monitoring and prevention program as defined in NUREG-0737 Item III.D.1.1.***

This COL item is addressed in Section 13.4.

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation Milestone	Implementation Requirement
1.	Inservice Inspection Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.8.1.7 DCD 3.9.3.4.2 5.2.4 6.1 6.6	Prior to Commercial service	10 CFR 50.55a(g) ASME Code Section XI IWA-2430(b)
	• Steam Generator Program	10 CFR 50.55a(g)	5.4.2.2	Prior to Commercial service	10 CFR 50.55a(g) ASME Code Section XI IWA-2430(b) Technical Specification 5.5.9
2.	Inservice Testing Program	10 CFR 50.55a(f) 10 CFR 50, Appendix A	DCD 3.9.3.4.2 3.9.6 5.2.4	After generator on-line on nuclear heat	10 CFR 50.55a(f) ASME OM Code
3.	EQ Program	10 CFR 50.49(a)	3.10 3.11	Prior to initial fuel load	License Condition
4.	PSI Program	10 CFR 50.55a(g)	3.8.1.7 5.2.4 6.6	Completion prior to initial plant startup	10 CFR 50.55a(g) ASME Code Section XI IWB/IWC/IWD/IWE/IWF-2200(a) IWL-2210
	• Steam Generator Tube PSI	10 CFR 50.55a(g)	5.4.2.2	Prior to entry into Mode 4, Hot Shutdown	10 CFR 50.55a(g) ASME Code Section XI IWB-2200(c)
5.	Reactor Vessel Material Surveillance Program	10 CFR 50.60 10 CFR 50, Appendix H	5.3.1	Prior to initial criticality	License Condition
6.	PST Program	10 CFR 50.55a(f)	DCD 3.9.3.4.2 3.9.6	Prior to initial fuel load	License Condition

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation: Milestone	Implementation: Requirement
7.	Containment Leakage Rate Testing Program	10 CFR 50.54(o) 10 CFR 50, Appendix J	6.2.6	Prior to initial fuel load	10 CFR 50, Appendix J Option B
8.	Fire Protection Program	10 CFR 50.48	9.5.1	Prior to fuel receipt for elements of the Fire Protection Program necessary to support receipt and storage of fuel on-site. Prior to initial fuel load for elements of the Fire Protection Program necessary to support fuel load and plant operation.	License Condition
9.	Process and Effluent Monitoring and Sampling Program				
	Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls	10 CFR 20.1301 and 20.1302 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, Appendix I, II and IV	11.5	Prior to fuel load	License Condition
	Offsite Dose Calculation manual	Same as above	11.5	Prior to fuel load	License Condition
	Radiological Environmental Monitoring Program	Same as above	11.5	Prior to fuel load	License Condition
	Process Control Program	Same as above	11.4	Prior to fuel load	License Condition

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation Milestone	Implementation Requirement
10.	Radiation Protection Program	10 CFR 20.110110 CFR 20.1406	12.5	Prior to initial receipt of by-product, source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) for those elements of the Radiation Protection (RP) Program necessary to support such receipt Prior to fuel receipt for those elements of the RP Program necessary to support receipt and storage of fuel onsite Prior to fuel load for those elements of the RP Program necessary to support fuel load and plant operation Prior to first shipment of radioactive waste for those elements of the RP Program necessary to support shipment of radioactive waste	License Condition

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation	
				Milestone	Requirement
11.	Non licensed Plant Staff Training Program	10 CFR 50.120	13.2	18 months prior to scheduled fuel load	10 CFR 50.120(b)
12.	Reactor Operator Training Program	10 CFR 55.13 10 CFR 55.31 10 CFR 55.41 10 CFR 55.43 10 CFR 55.45	13.2	18 months prior to scheduled fuel load	License Condition
13.	Reactor Operator Requalification Program	10 CFR 50.34(b) 10 CFR 50.54(i) 10 CFR 55.59	13.2	Within 3 months after issuance of an operating license or the date the Commission makes the finding under 10 CFR 52.103(g)	10 CFR 50.54(i-1)
14.	Emergency Planning	10 CFR 50.47 10 CFR 50, Appendix E	13.3	Full participation exercise conducted within 2 years prior to scheduled date for initial loading of fuel	10 CFR 50, Appendix E.IV.F.2.a(ii)
				Onsite exercise conducted within 1 year prior to the schedule date for initial loading of fuel	10 CFR 50, Appendix E.IV.F.2.a(ii)
				Detailed implementing procedures for emergency planning submitted no less than 180 days prior to scheduled date for initial loading of fuel	10 CFR 50, Appendix E.V.

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation	
				Milestone	Requirement
15.	Security Program:	10 CFR 52.79(a)(35) 10 CFR 52.79(a)(36)			
	Cyber Security Program	10 CFR 73.54 10 CFR 73.55 10 CFR 52.79(a)(36)	13.6	Prior to receipt of fuel on-site	10 CFR 73.55(a)(4)
	Physical Security Program	10 CFR 73.55 10 CFR 73.56 10 CFR 73.57 10 CFR 26	13.6	Prior to receipt of fuel on-site	10 CFR 73.55(a)(4)
	Safeguards Contingency Program	10 CFR 52.79(a)(36) 10 CFR 73.55	13.6	Prior to receipt of fuel on-site	10 CFR 73.55(a)(4)
	Training and Qualification Program	10 CFR 73, Appendix B	13.6	Prior to receipt of fuel on-site	10 CFR 73.55(a)(4)
16.	Quality Assurance Program Operation	10 CFR 50.54(a) 10 CFR 50, Appendix A (GDC 1) 10 CFR 50, Appendix B	17.5	30 days prior to scheduled date for initial loading of fuel	10 CFR 50.54(a)(1)
17.	Maintenance Rule	10 CFR 50.65	17.6	Prior to fuel load authorization per 10 CFR 52.103(g)	10 CFR 50.65(a)(1)
18.	MOV Testing	10 CFR 50.55a(b)(3)(ii)	3.9.6	Prior to initial fuel load	Licence Condition

NAPS COL 5.2(4)
NAPS COL 5.2(5)
NAPS COL 13.4(1)
NAPS COL 13.6(1)

Table 13.4-201 Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required by)	FSAR (SRP) Section	Implementation: Milestone	Implementation: Requirement
19.	ITP	10 CFR 50.34 10 CFR 52.79(a)(28)	14.2	Prior to the first preoperational test for the Preoperational Test Program Prior to Initial fuel loading for the Startup Test Program	License Condition
20.	FFD Program for Construction:		13.7	Prior to initiating 10 CFR Part 26 construction activities	10 CFR Part 26
	- management and oversight personnel	10 CFR 26.4(e)			Subparts A–H, N and O
	- workers and first-line supervisors	10 CFR 26.4(f)			Subpart K
	- FFD Program personnel	10 CFR 26.4(g)			Subparts A–H, N and O
	- Security personnel	10 CFR 26.4(e)(1)			Subparts A–H, N and O
	FFD Program for Operation	10 CFR 26.4(a) and (b)	13.7	Prior to the earliest of: A. Licensee's receipt of fuel assemblies onsite; B. Establishment of a protected area; or C. The 10 CFR 52.103(g) finding	10 CFR 26.3 10 CFR Part 26, Subparts A–I, N and O, except individuals in Section 26.4(b) who are not subject to Subsections 26.205–209.
	FFD Program for persons required to physically report to the TSC or EOF	10 CFR 26.4(c)	13.7	Prior to the conduct of the first full-participation emergency preparedness exercise under 10 CFR 50, App. E, Section F.2.a	10 CFR Part 26, except Subpart K and Subsections 26.205–209.

13.5 Plant Procedures

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 13.5(1)

Replace the first paragraph of DCD Section 13.5 with the following.

This section describes the administrative and operating procedures that the operating organization (plant staff) uses to conduct routine operating, abnormal, and emergency activities in a safe manner.

NAPS SUP 13.5(1)

The QAPD describes procedural document control, record retention, adherence, assignment of responsibilities, and changes.

NAPS SUP 13.5(2)

Procedures are identified in this section by topic, type, or classification in lieu of the specific title, and represent general areas of procedural coverage.

Procedures are developed prior to fuel load to allow sufficient time for plant staff familiarization and to allow NRC staff adequate time to review the procedures and to develop operator licensing examinations.

NAPS SUP 13.5(3)

Industry guidance for the appropriate format, content, and typical activities delineated in written procedures is implemented, as appropriate. Guidance is based on ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications" (Reference 13.5-202).

NAPS COL 13.5(4)

The format and content of procedures are controlled by administrative procedure(s). Procedures are organized to include the following components, as necessary:

- Title Page
- Table of Contents
- Scope and Applicability
- Responsibilities
- Prerequisites
- Precautions and Limitations
- Main Body
- Acceptance Criteria
- Check-off Lists

- References
- Attachments and Data Sheets

NAPS SUP 13.5(4)

Each procedure is sufficiently detailed for an individual to perform the required function without direct supervision, but does not provide a complete description of the system or plant process. The level of detail contained in the procedure is commensurate with the qualifications of the individual normally performing the function.

NAPS COL 13.5(3)

Procedures are developed consistent with guidance described in DCD Section 18.8, Procedure Development, and with input from the HFE process and evaluations.

The bases for procedure development include:

- Plant design bases
- System-based technical requirements and specifications
- Task analyses results
- Risk-important human actions identified in the human reliability analysis/PRA
- Initiating events considered in the Emergency Operating Procedures (EOPs), including those events in the design bases
- Generic Technical Guidelines (GTGs) for EOPs

Procedure verification and validation includes the following activities, as appropriate:

- A review to verify they are correct and can be carried out.
- A final validation in a simulation of the integrated system as part of the verification and validation activities as described in DCD Section 18.10, Human Factors Verification and Validation.
- A verification of modified procedures for adequate content, format, and integration. The procedures are assessed through validation if a modification substantially changes personnel tasks that are significant to plant safety. The validation verifies that the procedures correctly reflect the characteristics of the modified plant and can be performed effectively to restore the plant.

NAPS SUP 13.5(5)

Procedures for shutdown management are developed consistent with the guidance described in NUMARC 91-06, “Guidelines for Industry Actions to Assess Shutdown Management,” to reduce the potential for loss of

reactor coolant system (RCS) boundary and inventory during shutdown conditions. (Reference 13.5-203)

13.5.1 Administrative Procedures

NAPS COL 13.5(1)

Replace the content of DCD Section 13.5.1 with the following:

This section describes administrative procedures that provide administrative control over activities that are important to safety for the operation of the facility.

NAPS SUP 13.5(6)

Administrative procedures are developed in accordance with the nominal schedule presented in Table 13.5-202.

NAPS SUP 13.5(7)

Procedures outline the essential elements of the administrative programs and controls as specified in the QAPD described in Section 17.5. These procedures are organized such that the program elements are prescribed in documents normally referred to as administrative procedures.

Administrative procedures contain adequate programmatic controls to provide effective interface between organizational elements. This includes contractor and owner organizations providing support to the station operating organization.

Procedure control is discussed in the QAPD. Type and content of procedures are discussed throughout Section 13.5.

NAPS COL 13.5(3)

A procedure style (writer's) guide promotes the standardization and application of HFE principles to procedures. The writer's guide establishes the process for developing procedures that are complete, accurate, consistent, and easy to understand and follow. The guide provides objective criteria so that procedures are consistent in organization, style, and content. The writer's guide includes criteria for procedure content and format including the writing of action steps and the specification of acceptable acronym lists and acceptable terms to be used.

NAPS SUP 13.5(8)

Procedure maintenance and control of procedure updates are performed in accordance with the QAPD.

NAPS SUP 13.5(9)

The administrative programs and associated procedures developed in the pre-COL phase are described in Table 13.5-201 (for future designation as historical information).

13.5.1.1 Administrative Procedures-General

This section describes those procedures that provide administrative controls with respect to procedures, including those that define and provide controls for operational activities of the plant staff.

Plant administrative procedures provide procedural instructions for the following:

- Procedures review and approval
- Procedure adherence
- Scheduling for surveillance tests and calibration
- Log entries
- Record retention
- Containment access
- Bypass of safety function and jumper control
- Communication systems
- Equipment control procedures - These procedures provide for control of equipment, as necessary, to maintain personnel and reactor safety, and to avoid unauthorized operation of equipment
- Control of maintenance and modifications
- Fire Protection Program procedures
- Crane Operation Procedures - Crane operators who operate cranes over fuel pools are qualified and conduct themselves in accordance with ANSI B30.2 (Chapter 2-3), "Overhead and Gantry Cranes" (Reference 13.5-201).
- Temporary changes to procedures
- Temporary procedure issuance and control
- Special orders of a temporary or self-canceling nature
- Standing orders to shift personnel including the authority and responsibility of the shift manager, SRO in the control room, control room operator, and STA
- Manipulation of controls and assignment of shift personnel to duty stations per the requirements of 10 CFR 50.54 (i), (j), (k), (l), and (m) including delineation of the space designated for the "At the Controls" area of the Control Room
- Shift relief and turnover procedures

- FFD
- Control Room access
- Working hour limitations
- Feedback of design, construction, and applicable important industry and operating experience
- Shift Manager administrative duties
- Verification of correct performance of operational activities
- A vendor interface program that provides vendor information for safety related components is incorporated into plant documentation
- A process for implementing the safety/security interface requirements of 10 CFR 73.58

13.5.2 Operating and Maintenance Procedures

NAPS COL 13.5(5)

Replace the first sentence in DCD Section 13.5.2 with the following.

Operating Procedures are developed in accordance with Section 13.5.2.1 and Maintenance Procedures are developed in accordance with Section 13.5.2.2.6.1. The development of operating procedures is described in DCD Section 18.8.

13.5.2.1 Operating and Emergency Operating Procedures

NAPS COL 13.5(4)
NAPS COL 13.5(5)

Replace the first sentence in DCD Section 13.5.2.1 with the following.

This section describes the operating procedures used by the operating organization (plant staff) to conduct routine operating, abnormal, and emergency activities in a safe manner.

Operating procedures are developed at least six months prior to fuel load to allow sufficient time for plant staff familiarization and to allow NRC staff adequate time to review the procedures and to develop operator licensing examinations.

The Plant Operating Procedures Development Plan establishes:

- A scope that includes those operating procedures defined below, which direct operator actions during normal, abnormal, and emergency operations, and considers plant operations during periods when plant systems/equipment are undergoing test, maintenance, or inspection.

- The methods and criteria for the development, verification and validation, implementation, maintenance, and revision of procedures. The methods and criteria are in accordance with NUREG-0737 TMI Items I.C.1 and I.C.9. (Reference 13.5-204)

The following procedures are included in the scope of the Plant Operating Procedures Development Plan:

- System operating procedures
- General operating procedures
- Abnormal (off-normal) or alarm response procedures
- Procedures for combating emergencies and other significant events
- Procedures for maintenance and modification
- Procedures for radiation monitoring and control
- Fuel handling procedures
- Temporary procedures
- Procedures for handling of heavy loads
- Procedures for calibration, inspection, and testing

Implementation of the Plant Operating Procedures Development Plan establishes:

- Procedures that are consistent with the requirements of 10 CFR 50 and the TMI requirements in NUREG-0737 and Supplement 1 to NUREG-0737 (Reference 13.5-205)
- Requirements that the procedures developed include, as necessary, the elements described in the QAPD
- Bases for specifying plant operating procedures including:
  - Operator actions identified in the vendor's task analysis and PRA efforts in support of the design certification
  - Standardized plant emergency procedure guidelines
  - Consideration of plant-specific equipment selection and site specific elements such as the station water intake structure and the ultimate heat sink
- The definition of the methods through which specific operator skills and training needs, as may be considered necessary for reliable execution of the procedures, are identified and documented

- Procedures for the incorporation of the results of operating experience and the feedback of pertinent information into plant procedures in accordance with the provisions of TMI Item I.C.5 (NUREG-0737)

13.5.2.1.1 Procedure Classification

Replace the content of DCD Section 13.5.2.1.1 with the following.

The classifications of operating procedures are:

- System Operating Procedures
- General Operating Procedures
- Abnormal (Off-Normal) Operating Procedures
- EOPs
- Alarm Response Procedures
- Temporary Procedures
- Fuel Handling Procedures

Responsibilities for maintaining operating procedures is discussed in Section 13.1.2.1.2.3.

13.5.2.1.1.1 System Operating Procedures

Instructions for energizing, filling, venting, draining, starting up, shutting down, changing modes of operation, returning to service following testing or maintenance (if not contained in the applicable procedure), and other instructions appropriate for operation of systems are delineated in system procedures.

System procedures contain check-off lists, where appropriate, which are prepared in sufficient detail to provide an adequate verification of the status of the system.

13.5.2.1.1.2 General Operating Procedures

General operating procedures provide instructions for performing integrated plant operations involving multiple systems such as plant startup and shutdown. These procedures provide a coordinated means of integrating procedures together to change the mode of plant operation or achieve a major plant evolution. Check-off lists are used for the purpose of confirming completion of major steps in proper sequence.

Typical types of general operating procedures are described as follows:

- Startup procedures provide instruction for starting the reactor from cold or hot conditions, establishing power operation, and recovery from reactor trips.
- Shutdown procedures guide operations during and following controlled shutdown or reactor trips, and include instructions for establishing or maintaining hot standby and safe or cold shutdown conditions, as applicable.
- Power operation and load changing procedures provide instruction for steady-state power operation and load changing.

13.5.2.1.1.3 Abnormal (Off-Normal) Operating Procedures

Abnormal operating procedures for correcting abnormal conditions are developed for those events where system complexity might lead to operator uncertainty. Abnormal operating procedures describe actions to be taken during other than routine operations, which if continued, could lead to either material failure, personnel harm, or other unsafe conditions.

Abnormal procedures are written so that a trained operator knows in advance the expected course of events or indications that identify an abnormal situation and the immediate action to be taken.

NAPS COL 13.5(6)

13.5.2.1.1.4 Emergency Operating Procedures

EOPs are procedures that direct actions necessary for the operators to mitigate the consequences of transients and accidents that cause plant parameters to exceed reactor protection system or ESF actuation setpoints.

EOPs include appropriate guidance for the operation of plant post-72-hour equipment, and are developed as appropriate per the guidance of:

- NUREG-0737, “Clarification of TMI Action Plan Requirements,” Items I.C.1 and I.C.9
- The QAPD

The EOP program (e.g., the procedures generation package (PGP)) describes the objectives of the emergency procedure development process, the program for developing EOPs and the required content of the EOPs.

The procedure development program, as described in the PGP for EOPs, is submitted to the NRC at least three months prior to the planned date to begin formal operator training on the EOPs. The PGP includes:

- GTGs, which are guidelines based on analysis of transients and accidents that are specific to the plant design and operating philosophy. The submitted documentation includes: a) a description of the process used to develop plant-specific technical guidelines (P-STGs) from the GTGs, b) identification of significant deviations from the generic guidelines (including identification of additional equipment beyond that identified in the generic guidelines), along with necessary engineering evaluations or analyses to support the adequacy of each deviation, and c) a description of the process used for identifying operator information and control requirements.
- A plant-specific writer's guide (P-SWG) that details the specific methods used in preparing EOPs based on P-STGs. The writer's guide contains objective criteria that require that the emergency procedures developed are consistent in organization, style, content, and usage of terms.
- A description of the program for verification and validation (V&V) of EOPs. The general objectives of the EOP V&V process are to ensure the EOPs:
  - correctly reflect the generic technical guidelines
  - reflect the procedure writer's guide
  - are usable
  - correctly refer to controls, equipment, and indications
  - provide language and level of information consistent with minimum staff qualifications and composition
  - provide a high level of assurance they will effectively guide the operator in mitigating transients and accidents.
- A description of the program for training operators on EOPs.
- The objectives of the emergency procedure development.
- Discussion of any design change recommendations and/or negative implications that the current design may have on safe operation as noted during implementation of the emergency procedures development plan.

13.5.2.1.1.5 **Alarm Response Procedures**

Procedures are provided for annunciators (alarm signals) identifying the proper operator response actions to be taken. Each of these procedures normally contains: a) the meaning of the annunciator or alarm, b) the source of the signal, c) any automatic plant responses, d) any immediate operator action, and e) the long range actions. When corrective actions are very detailed and/or lengthy, the alarm response may refer to another procedure.

13.5.2.1.1.6 **Temporary Procedures**

Temporary procedures are issued during the operational phase only when permanent procedures do not exist for the following activities: to direct operations during testing, refueling, maintenance, and modifications; to provide guidance in unusual situations not within the scope of the normal procedures; and to provide orderly and uniform operations for short periods when the plant, a system, or a component of a system is performing in a manner not covered by existing detailed procedures, or has been modified or extended in such a manner that portions of existing procedures do not apply.

Temporary operating procedures are developed under established administrative guidelines. They include designation of the period of time during which they may be used and adhere to the QAPD and Technical Specifications, as applicable.

13.5.2.1.1.7 **Fuel Handling Procedures**

Fuel handling operations, including fuel receipt, identification, movement, storage, and shipment, are performed in accordance with written procedures. Fuel handling procedures address, for example, the status of plant systems required for refueling; inspection of replacement fuel and control rods; designation of proper tools; proper conditions for spent fuel movement and storage; proper conditions to prevent inadvertent criticality; proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits, and mode switches. These procedures provide instructions for use of refueling equipment, actions for core alterations, monitoring core criticality status, accountability of fuel, and partial or complete refueling operations.

13.5.2.1.2 Operating Procedure Program

Replace the content of DCD Section 13.5.2.1.2 with the following.

The program for developing and implementing operating procedures is described in Section 13.5.2.1.

NAPS COL 13.5(6)

13.5.2.1.3 Emergency Operating Procedure Program

Replace the content of DCD Section 13.5.2.1.3 with the following.

The program for developing and implementing EOPs is described in Section 13.5.2.1.1.4.

NAPS COL 13.5(7)

13.5.2.2 Maintenance and Other Operating Procedures

Replace the content of DCD Section 13.5.2.2 with the following.

The QAPD provides guidance for procedural adherence. Responsibilities for maintaining maintenance and other operating procedures is discussed in Section 13.1.2.1.

13.5.2.2.1 Plant Radiation Protection Procedures

The plant radiation protection program is contained in procedures. Procedures are developed and implemented for such things as: maintaining personnel exposures, plant contamination levels, and plant effluents ALARA; monitoring both external and internal exposures of workers, considering industry-accepted techniques; performing routine radiation surveys; performing environmental monitoring in the vicinity of the plant; monitoring radiation levels during maintenance and special work activities; evaluating radiation protection implications of proposed modifications; management of radioactive wastes for offsite shipment, disposal, and treatment; and maintaining radiation exposure records of workers and others.

13.5.2.2.2 Emergency Preparedness Procedures

A discussion of emergency preparedness procedures can be found in the Emergency Plan. A list of implementing procedures is maintained in the Emergency Plan.

13.5.2.2.3 Instrument Calibration and Test Procedures

The QAPD provides a description of procedural requirements for instrumentation calibration and testing.

13.5.2.2.4 **Chemistry Procedures**

Procedures provided for chemical and radiochemical control activities include the nature and frequency of sampling and analyses; instructions for maintaining fluid quality within prescribed limits; the use of control and diagnostic parameters; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces or become sources of radiation hazards due to activation.

Procedures are also provided for the control, treatment, and management of radioactive wastes and control of radioactive calibration sources.

13.5.2.2.5 **Radioactive Waste Management Procedures**

Procedures for the operation of the radwaste processing systems provide for the control, treatment, and management of on-site radioactive wastes. These procedures are addressed in Section 13.5.2.1.1.1, System Operating Procedures.

13.5.2.2.6 **Maintenance, Inspection, Surveillance, and Modification Procedures**

13.5.2.2.6.1 **Maintenance Procedures**

Maintenance procedures describe maintenance planning and preparation activities. Maintenance procedures are developed considering the potential impact on the safety of the plant, license limits, availability of equipment required to be operable, and possible safety consequences of concurrent or sequential maintenance, testing, or operating activities.

Maintenance procedures contain sufficient detail to permit the maintenance work to be performed correctly and safely. Procedures include provisions for conducting and recording results of required tests and inspections, if not performed and documented under separate test and inspection procedures. References are made to vendor manuals, plant procedures, drawings, and other sources, as applicable.

Instructions are included, or referenced, for returning the equipment to its normal operating status. Testing is commensurate with the maintenance that has been performed. Testing may be included in the maintenance procedure or be covered in a separate procedure.

Where appropriate sections of related documents, such as vendor manuals, equipment operating and maintenance instructions, or

approved drawings with acceptance criteria, provide adequate instructions to provide the required quality of work, the applicable sections of the related documents are referenced in the procedure, or may, in some cases, constitute adequate procedures in themselves. Such documents receive the same level of review and approval as maintenance documents.

The preventive maintenance program, including preventive and predictive procedures, as appropriate, prescribes the frequency and type of maintenance to be performed. An initial program based on service conditions, experience with comparable equipment and vendor recommendations is developed prior to fuel loading. The program is revised and updated as experience is gained with the equipment. To facilitate this, equipment history files are created and maintained. The files are organized to provide complete and easily retrievable equipment history.

13.5.2.2.6.2 **Inspection Procedures**

The QAPD provides a description of procedural requirements for inspections.

13.5.2.2.6.3 **Surveillance Testing Procedures**

The QAPD provides a description of procedural requirements for surveillance testing. Surveillance testing procedures are written in a manner that adequately tests all portions of safety-related logic circuitry as described in Generic Letter 96-01, “Testing of Safety Related Logic Circuits.” (Reference 13.5-206)

13.5.2.2.6.4 **Modification Procedures**

Plant modifications and changes to setpoints are developed in accordance with approved procedures. These procedures control necessary activities associated with the modifications such that they are carried out in a planned, controlled, and orderly manner. For each modification, design documents such as drawings, equipment and material specifications, and appropriate design analyses are developed, or the as-built design documents are utilized. Separate reviews are conducted by individuals knowledgeable in both technical and QA requirements to verify the adequacy of the design effort.

Proposed modifications that involve a license amendment or a change to Technical Specifications are processed as proposed license amendment request.

Plant procedures impacted by modifications are changed to reflect revised plant conditions prior to declaring the system operable and cognizant personnel who are responsible for operating and maintaining the modified equipment are adequately trained.

13.5.2.2.6.5 Heavy Load Handling Procedures

This topic is discussed in DCD Section 9.1.5.

13.5.2.2.7 Material Control Procedures

The QAPD provides a description of procedural requirements for material control.

13.5.2.2.8 Security Procedures

A discussion of security procedures is provided in the Security Plan.

13.5.2.2.9 Refueling and Outage Planning Procedures

Procedures provide guidance for the development of refueling and outage plans, and as a minimum address the following elements:

- An outage philosophy which includes safety as a primary consideration in outage planning and implementation
- Separate organizations responsible for scheduling and overseeing the outage and provisions for an independent safety review team that would be assigned to perform final review and grant approval for outage activities
- Control procedures, which address both the initial outage plan and safety-significant changes to schedule
- Provisions that activities receive adequate resources
- Provisions that defense-in-depth during shutdown and margins are not reduced or provisions that an alternate or backup system must be available if a safety system or a defense-in-depth system is removed from service
- Provisions that personnel involved in outage activities are adequately trained including operator simulator training to the extent practicable, and training of other plant personnel, including temporary personnel, commensurate with the outage tasks they are to perform

- The guidance described in NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," to reduce the potential for loss of RCS boundary and inventory during shutdown conditions (Reference 13.5-203)

13.5.3 Combined License Information

Replace the content of DCD Section 13.5 with the following.

NAPS COL 13.5(1)

13.5(1) ***Administrative procedures***

This COL item is addressed in Subsection 13.5 and 13.5.1.

13.5(2) ***Deleted from the DCD.***

NAPS COL 13.5(3)

13.5(3) ***Procedures performed by licensed operators in the control room***

This COL item is addressed in Subsection 13.5 and 13.5.1.

NAPS COL 13.5(4)

13.5(4) ***Different classifications of procedures***

This COL item is addressed in Subsection 13.5 and 13.5.2.1.

NAPS COL 13.5(5)

13.5(5) ***Program for developing operating procedures***

This COL item is addressed in Subsection 13.5.2 and 13.5.2.1.

NAPS COL 13.5(6)

13.5(6) ***Program for developing and implementing emergency procedures***

This COL item is addressed in Subsection 13.5.2.1.1.4 and 13.5.2.1.3.

NAPS COL 13.5(7)

13.5(7) ***Classifications of maintenance and other operating procedures***

This COL item is addressed in Subsection 13.5.2.2.

13.5.4 References

Delete DCD References 13.5-2 and 13.5-3. Add the following at the end of this section.

13.5-201 American National Standards Institute, Overhead and Gantry Cranes, ANSI B30.2- 2001.

13.5-202 American Society of Mechanical Engineers, Quality Assurance Requirements for Nuclear Facility Applications, NQA-1-1994.

13.5-203 Nuclear Utilities Management and Resources Council, Guidelines for Industry Actions to Assess Shutdown Management, NUMARC 91-06, December 1991.

13.5-204 NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.

13.5-205 NUREG-0737, Supplement 1, "Clarification of TMI Action Plan Requirements," December 1982.

13.5-206 Generic Letter 96-01, "Testing of Safety-Related Logic Circuits," January 1996.

NAPS SUP 13.5(10)

Table 13.5-201 Pre-COL Phase Administrative Programs and Procedures

(This table is included for future designation as historical information.)

Design/Construction Quality Assurance Program
Reporting of Defects and Noncompliance,10 CFR 21 Program
Fitness for Duty During Construction, 10 CFR 26
Design Reliability Assurance Program

NAPS SUP 13.5(11)

Table 13.5-202 Nominal Procedure Development Schedule

(This table is included for future designation as historical information.)

Category A: Controls

Group	Procedure Type	Preparation Milestone
1	Procedures review and approval	6 months before first license class
2	Equipment control procedures	18 months before fuel load
3	Control of maintenance and modifications	18 months before fuel load
4	Fire Protection procedures	1. 6 months before fuel receipt for elements of the program supporting fuel onsite 2. 6 months before fuel load for elements supporting fuel load and plant operation
5	Crane operation procedures	6 months before fuel receipt
6	Temporary changes to procedures	6 months before first license class
7	Temporary procedures	6 months before first license class
8	Special orders of a transient or self-canceling character	6 months before first license class

Category B: Specific Procedures

Group	Procedure Type	Preparation Milestone
1	Standing orders to shift personnel including the authority and responsibility of the shift supervisor, licensed SRO in the control room, control room operator, and shift technical advisor	6 months before first license class
2	Assignment of shift personnel to duty stations and definition of “surveillance area”	6 months before first license class
3	Shift relief and turnover	6 months before fuel load
4	FFD	6 months prior to corresponding milestones in Table 13.4-201
5	Control room access	6 months before fuel load
6	Limitations on work hours	6 months before fuel load
7	Feedback of design, construction, and applicable important industry and operating experience	6 months before fuel load

NAPS SUP 13.5(11)

Table 13.5-202 Nominal Procedure Development Schedule

8	Shift supervisor administrative duties	6 months before fuel load
9	Verification of correct performance of operating activities	6 months before first license class

13.6 Physical Security

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 13.6(1) Replace the first paragraph in DCD Subsection 13.6 with the following:

The Security Plan consists of the physical security plan, training and qualification plan, the safeguards contingency plan. The Security Plan and Cyber Security Plan, provided in COLA Part 8, are submitted to the NRC to fulfill the requirements of 10 CFR 52.79(a)(35) and 10 CFR 52.79(a)(36). The Security Plan and Cyber Security Plan meet the requirements contained in 10 CFR 26 and 10 CFR 73 and will be maintained in accordance with the requirements of 10 CFR 52.98. The Security Plan is categorized as security safeguards Information and is withheld from public disclosure pursuant to 10 CFR 73.21.

NAPS COL 13.6(1) Table 13.4-201 provides milestones for security program implementation.

13.6.1 Physical Security – Combined License

NAPS COL 13.6(2) Replace the content of DCD Subsection 13.6.1 with the following:

As stated above, the Security Plan and the Cyber Security Plan are submitted to the NRC to fulfill the requirements of 10 CFR 52.79(a)(35) and 10 CFR 52.79(a)(36). The site specific physical security features and capabilities that are beyond the scope of the certified standard plant design are described in the physical security plan (PSP) (Reference 13.6-201), the PSPSR (Reference 13.6-205) and in Section 13.6.2 below.

13.6.2 US-APWR Physical Security

NAPS COL 13.6(2)
NAPS COL 13.6(3) Insert the following after the second paragraph in DCD Subsection 13.6.2:

Non-standard plant vital area and vital equipment information is included in the North Anna Power Station Unit 3 Supplement to US-APWR Design Certification Physical Security Element Review (Reference 13.6-204). Non-standard plant design information is included in the North Anna Power Station Unit 3 Supplement to US-APWR High Assurance EvaluationAssessment (Reference 13.6-203). Because these documents

are classified as security safeguards information and withheld from public disclosure pursuant to 10 CFR 73.21, they are submitted to the NRC as separate licensing documents.

13.6.2.1 Barriers, Isolation Zone, and Controlled Access Points

NAPS COL 13.6(2)

Replace the content of DCD Subsection 13.6.2.1 with the following:

The site-specific physical security features and capabilities are addressed in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205).

NAPS ESP COL 13.6-1

The design requirements for the protected area barriers are described in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205). The barriers will be designed and located to support the security response strategy timelines. The specific designs for protected area barriers will be completed as part of detailed plant design before the milestone for PSP implementation (Table 13.4-201).

13.6.2.2 Vital Areas and Vital Equipment

NAPS COL 13.6(3)

Replace the last sentence of the first paragraph in DCD Subsection 13.6.2.2 with the following:

Non-standard plant vital area and vital equipment information is included in the North Anna Power Station Unit 3 Supplement to US-APWR Design Certification Physical Security Element Review (Reference 13.6-204).

NAPS COL 13.6(2)
NAPS COL 13.6(4)

Replace the last paragraph in DCD Subsection 13.6.2.2 with the following:

The alarm stations for Unit 3 are addressed in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205). Because these documents are classified as security safeguards information and withheld from public disclosure pursuant to 10 CFR 73.21, they are submitted to the NRC as separate licensing documents.

13.6.2.3 Alarm Systems and Detection Aids

NAPS COL 13.6(2)

Replace the second paragraph in DCD Subsection 13.6.2.3 with the following:

The design requirements for site-specific detection aids are addressed in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205).

13.6.2.4 Security Lighting

NAPS COL 13.6(2)

Replace the content of DCD Subsection 13.6.2.4 with the following:

The design requirements for security lighting are addressed in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205).

13.6.2.5 Security Communication Systems

NAPS COL 13.6(5)

Replace the last sentence of the first paragraph in DCD Subsection 13.6.2.5 with the following:

Communication system design requirements, including any adaptations, modifications, or equivalent systems, to provide security communications in accordance with the requirements of 10 CFR 73.55(j), are addressed in the PSP (Reference 13.6-201) and the PSPSR (Reference 13.6-205).

Replace the last sentence of the last paragraph in DCD Subsection 13.6.2.5 with the following:

The security communications capability to communicate with the local law enforcement agencies is addressed in the PSP (Reference 13.6-201).

13.6.2.6 Security Power

NAPS COL 13.6(2)

Replace the content of DCD Subsection 13.6.2.6 with the following:

Alternative backup power capability is addressed in the PSPSR (Reference 13.6-205) and the North Anna Power Station Unit 3 Supplement to US-APWR High Assurance Evaluation Assessment (Reference 13.6-203).

13.6.4 Combined License Information

Replace the content of DCD Subsection 13.6.4 with the following.

NAPS COL 13.6(1)

13.6(1) ***The plant overall security plan and implementation schedule***

This COL item is addressed in Section 13.6.

NAPS COL 13.6(2)

13.6(2) ***Site specific security features and capabilities.***

This COL item is addressed in Section 13.6.1, 13.6.2, 13.6.2.1, 13.6.2.2, 13.6.2.3, 13.6.2.4 and 13.6.2.6, the physical security plan and the PSPSR.

NAPS COL 13.6(3)

13.6(3) ***Identification of Vital Equipment by Subsequent COL Applicants.***

To the extent applicable, this COL item is addressed in Section 13.6.2 and 13.6.2.2.

NAPS COL 13.6(4)

13.6(4) ***Provision of the secondary alarm station by single unit sites.***

To the extent applicable, this COL item is addressed in Section 13.6.2.2.

NAPS COL 13.6(5)

13.6(5) ***Communication capability with local law enforcement agencies.***

This COL item is addressed in Section 13.6.2.5, the physical security plan, and the PSPSR.

13.6.5 References

Add the following references after the last reference in DCD Subsection 13.6.5.

13.6-201 North Anna Power Station Units 1 and 2, and Unit 3 Combined Operating License Application (COLA) Security Plan, Training and Qualification Plan, and Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program (COLA PSP), Revision 3.

13.6-202 North Anna Power Station Unit 3 Cyber Security Plan, Revision 2.

13.6-203 North Anna Power Station Unit 3 Supplement to US-APWR High Assurance Evaluation Assessment, Revision 1.

13.6-204 North Anna Power Station Unit 3 Supplement to US-APWR Design Certification Physical Security Element Review, Revision 1.

13.6-205 North Anna Power Station Unit 3 Physical Security Protection Systems Report, Revision 1.

NAPS SUP 13.6(1)

13.6.6 ESP Information

SSAR Section 13.6 is incorporated by reference.

13.7 Fitness For Duty

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 13.7(1)

Replace the contents of DCD Section 13.7 with the following.

The FFD Program is implemented and maintained in two phases: the construction phase program and the operating phase program. The construction and operating phase programs are implemented as identified in Table 13.4-201.

The construction phase program is consistent with NEI 06-06, Revision 5 (Reference 13.7-201), which is currently under review by the NRC. NEI 06-06 applies to persons constructing or directing the construction of safety- and security-related structures, systems, or components performed onsite where the new reactor will be installed and operated. Management and oversight personnel, as further described in NEI 06-06, and security personnel prior to the receipt of special nuclear material in the form of fuel assemblies (with certain exceptions) will be subject to the operations FFD program that meets the requirements of 10 CFR Part 26, Subparts A through H, N, and O. Following the receipt of special nuclear material onsite in the form of fuel assemblies, security personnel as described in 10 CFR 26.4(a)(5) will meet the requirements of the operations FFD program. The construction FFD program for those subject to Subpart K (as described by NEI 06-06 and 10 CFR Part 26) will be revised, as necessary, to conform to the NRC-endorsed version of NEI 06-06, or justified alternative methods of conformance will be provided, as appropriate.

The workforce population subject to random testing during construction is determined on a weekly basis by averaging the total number of active construction badges over each preceding seven-day period. The random

selection from each week's workforce population is identified by a computerized random number generator using the number of active badges as the range of numbers considered in the weekly random testing population.

The operating phase program is consistent with 10 CFR 26.

The following site-specific information is provided:

- Dominion's Engineering, Procurement, and Construction (EPC) contractor personnel and the EPC's subcontractors working in the following areas are covered by a Dominion-approved contractor FFD Program (elements Subparts A-H, N and O):
  - FFD program personnel
  - Security personnel
  - Construction management and oversight personnel
- Dominion's EPC contractor personnel and the EPC's subcontractors working in the following area are covered by a Dominion-approved contractor FFD Program (elements Subpart K):
  - Construction workers and first-line supervisors
- Dominion's employees and Dominion's subcontractors working in the following areas are covered by the Dominion North Anna Units 1 and 2 Operations FFD Program (elements Subparts A-I, N and O):
  - FFD program personnel
  - Security personnel protecting fuel assemblies
  - Personnel required to physically report to the Technical Support Center (TSC) or EOF by Emergency Plans and procedures (except for Subsections 26.205-209 and Subpart K, which do not apply)
- All other Dominion employees and Dominion subcontractors working at the construction site are covered by the Dominion North Anna Units 1 and 2 Operations FFD Program (elements Subparts A-H, N and O).

13.7.1 Combined License Information

Replace the content of DCD Subsection 13.7.1 with the following.

NAPS COL 13.7(1)

13.7(1) ***Operating and construction plant fitness-for-duty programs***

This COL item is addressed in Section 13.7.

13.7.2 References

13.7-201 Nuclear Energy Institute (NEI) "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites," NEI 06-06, Revision 5, August 2009.

NAPS COL 11.4(1)

13.8 Solid Low-Level Radioactive Waste Minimization Program

In the event that an offsite facility is not available to accept Class B and C waste, an operational program to minimize generation of Class B and C waste to the extent practicable will be implemented. This program will consider strategies to reduce generation of Class B and C waste, including reducing the in-service run length of resin beds, as well as resin selection, short-loading, and point of generation segregation techniques.

NAPS COL 13.1(1)

Appendix 13AA Design and Construction Responsibilities

13AA.1 Design and Construction Activities

Dominion has substantial experience in the design, construction, and operation of nuclear power plants and substantial experience in activities of similar scope and complexity. Dominion was responsible for the design and construction activities associated with two existing nuclear power stations in Virginia, Surry and North Anna, both of which Dominion currently operates. Dominion oversaw the activities of Westinghouse Electric Company and Stone & Webster Engineering Corporation in the design and construction of those stations.

In addition, Dominion has been responsible for the design, construction, and operation of several large fossil stations, activities of similar scope and complexity. One example is Chesterfield Power Station in Virginia. Dominion oversaw the activities of Combustion Engineer, General Electric Co. and Stone & Webster in the design and construction of the station. Dominion currently operates Chesterfield Power Station. The station generates over 1700 MWe.

Dominion's management, engineering, and technical support organization for the construction and operation of Unit 3 are described in Chapters 17 and 13.0, respectively. As described in Section 1.4.1, Dominion has selected MNES as its primary contractor.

Other design and construction activities will be contracted to qualified suppliers of such services. Implementation or delegation of design and construction responsibilities is described in the sections below. QA aspects are described in Chapter 17.

13AA.1.1 Principal Site-Related Engineering Work

The principal site engineering activities accomplished towards the construction and operation of the plant are:

Meteorology

Information concerning local (site) meteorological parameters is developed and applied by station and contract personnel to assess the impact of the station on local meteorological conditions. An onsite meteorological measurements program is employed by station personnel to produce data for the purpose of making atmospheric dispersion estimates for postulated accidental and expected routine airborne releases of effluents. A maintenance program is established for

surveillance, calibration, and repair of instruments. More information regarding the study and meteorological program is found in Section 2.3.

Geology

Information relating to site and regional geotechnical conditions is developed and evaluated by utility and contract personnel to determine if geologic conditions could present a challenge to safety of the plant. Items of interest include geologic structure, seismicity, geological history, and ground water conditions. The excavation for safety-related structures will be geologically mapped and photographed by experienced geologists. Unforeseen geologic features that are encountered will be evaluated. Section 2.5 provides details of these investigations.

Seismology

Information relating to seismological conditions is developed and evaluated by utility and contract personnel to determine if the site location and area surrounding the site is appropriate from a safety standpoint for the construction and operation of a nuclear power plant. Information regarding tectonics, seismicity, correlation of seismicity with tectonic structure, characterization of seismic sources, and ground motion are assessed to estimate the potential for strong earthquake ground motions or surface deformation at the site. Section 2.5 provides details of these investigations.

Hydrology

Information relating to hydrological conditions at the plant site and the surrounding area is developed and evaluated by utility and contract personnel. The study includes hydrologic characteristics of streams, lakes, shore regions, the regional and local groundwater environments, and existing or proposed water control structures that could influence flood control and plant safety. Section 2.4 includes more detailed information regarding this subject.

Demography

Information relating to local and surrounding area population distribution is developed and evaluated by utility and contract personnel. The data is used to determine if requirements are met for establishment of exclusion area, low population zone, and population center distance. Section 2.1 includes more detailed information regarding population around the plant site.

Environmental Effects

Monitoring programs are developed to enable the collection of data necessary to determine possible impact on the environment due to construction, startup, and operational activities and to establish a baseline from which to evaluate future environmental monitoring. This program is described in the ESP-ER and in COLA Part 3.

13AA.1.2 Design of Plant and Ancillary Systems

Design and construction of systems outside the power block such as circulating water, service water, switchyard, and secondary FPSs are performed by Dominion or qualified contractors, as assigned.

13AA.1.3 Review and Approval of Plant Design Features

Design engineering review and approval is performed in accordance with Chapter 17. The primary contractor is responsible for design control of the power block. Design work is performed in accordance with the design and construction QA manual including the reviews necessary to verify the adequacy of the design. Verification is performed by competent individuals or groups other than those who performed the original design. Design issues arising during construction are addressed and implemented with notification and communication of changes to the manager design engineering for review. As systems are tested and approved for turnover and operation, control of design is turned over to plant staff. The senior manager facility engineering and technical support, along with functional managers and staff, assumes responsibility for review and approval of modifications, additions, or deletions in plant design features, as well as control of design documentation, in accordance with the Operational QA Program. Design control becomes the responsibility of the senior manager facility engineering and technical support prior to loading fuel. During construction, startup, and operation, changes to human-system interfaces of control room design are approved using a HFE evaluation addressed within DCD Chapter 18. See Figure 13AA-201, Construction Organization and the QAPD (incorporated into Section 17.5) for reporting relationships.

13AA.1.4 Environmental Effects

Impact to the surrounding environment from construction and operating activities is fully addressed in Part 3: Applicants' Environmental Report - Combined License Stage.

13AA.1.5 Security Provisions

The Physical Security Plan is designed with provisions that meet the applicable NRC regulations. See Section 13.6 and the Security Plan, which was submitted under separate transmittal.

13AA.1.6 Development of Safety Analysis Reports

Information regarding the development of the FSAR is found in Chapter 1.0.

13AA.1.7 Review and Approval of Material and Component Specifications

Safety-related material and component specifications of SSCs designed by the reactor vendor are reviewed and approved in accordance with the reactor vendor QAP and Section 17.1. Review and approval of items not designed by the reactor vendor are controlled for review and approval by Section 17.5 and the QAPD.

13AA.1.8 Procurement of Materials and Equipment

Procurement of materials during construction phase is the responsibility of the reactor vendor and constructor. The process is controlled by the construction QA programs of these organizations. Oversight of the inspection and receipt of materials process is the responsibility of the manager in charge of nuclear oversight.

13AA.1.9 Management and Review of Construction Activities

Management and responsibility for construction activities is assigned to the site executive for construction who is accountable to the CNO.

Monitoring and review of construction activities by utility personnel is a continuous process at the plant site. Contractor performance is monitored to provide objective data to utility management in order to identify problems early and develop solutions. Monitoring of construction activities verifies that the contractors are in compliance with contractual obligations for quality, schedule, and cost. To maintain independence from the construction organization, the oversight organization reports directly to the CNO.

Monitoring and review of construction activities is divided functionally across the various disciplines of the utility construction staff, i.e. electrical, mechanical, instrument and control, etc., and tracked by schedule based on system and major plant components/areas.

After each system is turned over to plant staff the construction organization relinquishes responsibility for that system. At that time the construction organization will be responsible for completion of construction activities as directed by plant staff and available to provide support for start-up testing as necessary.

13AA.2 Preoperational Activities

This section describes the activities required to transition the unit from the construction phase to the operational phase. These activities include turnover of systems from construction, preoperational testing, schedule management, test procedure development, fuel load, integrated startup testing, and turnover of systems to plant staff.

13AA.2.1 Development of Human Factors Engineering Design Objectives and Design Phase Review of Proposed Control Room Layouts

HFE design objectives are initially developed by the reactor vendor in accordance with DCD Chapter 18. As a collaborative team, personnel from the reactor vendor design staff and personnel, including licensed operators, engineers, and I&C technicians from owner and other organizations in the nuclear industry, assess the design of the control room and man-machine interfaces to attain safe and efficient operation of the plant. See DCD Chapter 18 for additional details of HFE program management.

Modifications to the certified design of the control room or man-machine interface described in the DCD are reviewed per engineering procedures, as required by DCD Chapter 18, to evaluate the impact to plant safety. The senior manager facility engineering and technical support is responsible for the HFE design process and for the design commitment to HFE during construction and throughout the life of the plant. The HFE program is established in accordance with the description and commitments in DCD Chapter 18.

13AA.2.2 Preoperational and Startup Testing

The organization, responsibilities, and qualifications of personnel that conduct the ITP are described in Chapter 14. The scope of preoperational and startup testing is described in Chapter 14.

Procedures are written to describe organizational responsibilities and interfaces between staff, constructor, and reactor vendor, and to establish

direction in writing, reviewing, and performing tests. The construction organization, is depicted in Figure 13AA-201.

13AA.2.3 Development and Implementation of Staff Recruiting and Training Programs

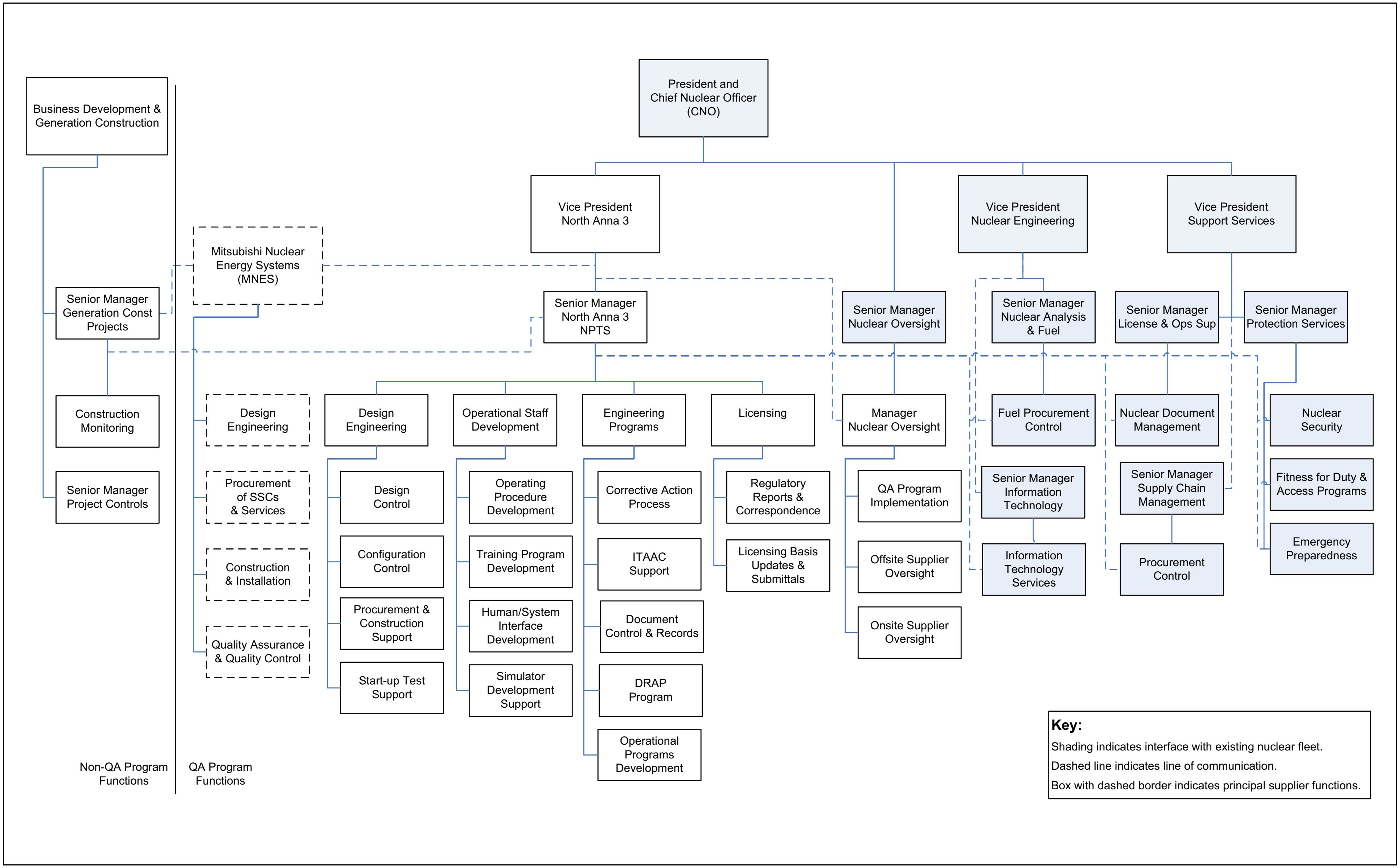
Staffing plans are developed with input from the reactor vendor for safe operation of the plant as determined by HFE. See DCD Section 18.5. These plans are developed under the direction and guidance of the vice president North Anna 3 (see Table 13.1-201 and Figure 13AA-201). Staffing plans will be completed and manager level positions filled prior to start of preoperational testing. Personnel selected to be ROs and along with other staff necessary to support the safe operation of the plant are hired with sufficient time available to complete appropriate training programs and become qualified and licensed (if required) prior to fuel being loaded in the RV. See Figure 13.1-202 for hiring and training requirements for operator and technical staff relative to fuel load.

Table 13.1-201 includes the initial estimated number of staff for selected positions that will be filled at the time of initial fuel load. Recruiting of personnel to fill positions is the shared responsibility of the manager human resources and the various heads of departments. The training program is described in Section 13.2.

13AA.2.4 Transition to Operating Phase

The vice president North Anna 3 is responsible for developing and implementing a plan for the organizational transition from the construction phase to the operating phase. The plan is fully implemented and transition completed prior to commencement of commercial operations with operational responsibility then fully under the direction of the CNO.

NAPS COL 13.1(1) **Figure 13AA-201 Construction Organization**



Appendix 13BB [Deleted]

14 Verification Programs

14.0 Verification Programs

14.1 Specific Information to Be Included in Preliminary/Final Safety Analysis Reports

This section of the referenced DCD is incorporated by reference with no departures or supplements.

14.2 Initial Plant Test Program

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

14.2.1 Summary of Test Program and Objective

NAPS DEP 14.2(1)

Replace the second sentence of the 11th paragraph of DCD Subsection 14.2.1 with the following.

A description of the program for testing of components and systems that are site-specific is discussed in Appendix 14AA.

14.2.1.1 Test Program for Nuclear and Balance of Plant Systems

NAPS DEP 14.2(2)

Delete the second sentence of the first paragraph of DCD Section 14.2.1.1.

Replace the fifth sentence of the first paragraph of DCD Section 14.2.1.1 with the following.

This manual contains the administrative procedures and requirements that govern the activities of the preoperational test and startup test organizations and their interface with other organizations.

Replace the first bullet of the second paragraph of DCD Section 14.2.1.1 with the following.

- Provide the organization of the preoperational test and startup test groups and staffing (Subsections 14.2.2 and 14.2.2.1).

14.2.1.2 Major Phases of the Test Program

14.2.1.2.1 Construction Tests

NAPS DEP 14.2(3)

Replace the content of DCD Subsection 14.2.1.2.1 with the following.

Construction and preliminary tests are not included in the scope of the ITP.

14.2.2 Organization and Staffing

NAPS COL 14.2(2)

Replace the first two sentences of the first paragraph with the following.

An organization is established to perform functions required for the ITP.

NAPS COL 14.2(2)
NAPS DEP 14.2(1)

Replace the second paragraph in DCD Subsection 14.2.2 with the following.

A description of the organizations responsible for all phases of the ITP and descriptions of the administrative controls that assure that experienced and qualified supervisory personnel and other principal participants are responsible for managing, developing and conducting the ITP is provided in Appendix 14AA. Appendix 14AA is an alternative to the US APWR Test Program Technical Report MUAP-08009 and addresses the administrative aspects of RG 1.68, Revision 3, "Initial Test Programs for Water-Cooled Nuclear Power Plants" and SRP 14.2, "Initial Plant Test Program - Design Certification and New License Applications."

14.2.2.1 Preoperational and Startup Organizations

NAPS DEP 14.2(2)

Replace the first three sentences of DCD Subsection 14.2.2.1 with the following.

The preoperational and startup test organizations are temporary organizations that perform the ITP. They administratively report to the construction and plant management organizations. They include members of onsite organizations such as Dominion Resources, MHI, MNES and others associated with the ITP.

14.2.2.2 Organizational Authorities and Responsibilities

NAPS DEP 14.2(2)

Replace the first paragraph of DCD Subsection 14.2.2.2 with the following.

The preoperational and startup test organizations plan and perform the preoperational and startup testing activities that occur between the completion of construction and the beginning of commercial operation of the plant. They also document the results of the ITP. The duties of the two organizations include the review and approval of the project test schedules and to propose and help implement changes to construction or testing to facilitate the ITP.

Replace the second sentence of the second paragraph of DCD Subsection 14.2.2.2 with the following.

MHI/MNES personnel are onsite to assist the constructor, the plant operator and the preoperational and startup test organizations.

14.2.3 Test Procedures

NAPS DEP 14.2(2)

Replace the first sentence of the second paragraph of DCD Subsection 14.2.3 with the following.

The preoperational and startup test organizations develop test procedures.

NAPS DEP 14.2(1)

Replace the third paragraph of DCD Subsection 14.2.3 with the following.

The process used to develop test procedures is described in Appendix 14AA.

STD COL 14.2(12)

Add the following sentence at the end of DCD Subsection 14.2.3.

Approved test procedures for satisfying testing requirements of Section 14.2 are made available to the NRC approximately 60 days prior to their intended use.

14.2.3.1 Organizational Functions during Development, Review and Approval of Test Procedures

NAPS DEP 14.2(2)

Replace the first paragraph of DCD Subsection 14.2.3.1 with the following.

The preoperational test organization conducts preoperational testing and the startup test organization conducts startup tests in accordance with approved procedures. Administrative procedures govern the activities of both organizations and the interfaces with other participants involved in the ITP. The review and approval processes for both initial procedures and subsequent revisions are defined.

Replace the last sentence of the third paragraph of DCD Subsection 14.2.3.1 with the following.

The test procedures are reviewed by the preoperational and startup test organizations and receive final approval by designated construction and plant management personnel.

14.2.4 Conduct of Test Program

NAPS DEP 14.2(2)

Replace the second sentence of DCD Subsection 14.2.4 with the following.

They contain requirements to control the activities of the preoperational and startup test organizations.

Replace the last bullet of the first paragraph of DCD subsection 14.2.4 with the following.

- Preoperational and startup test organization personnel qualifications and responsibilities

NAPS DEP 14.2(1)
NAPS DEP 14.2(2)

Replace the last paragraph of DCD subsection 14.2.4 with the following.

A description of the administrative controls that govern the conduct of the test program is provided in Appendix 14AA. The controls include requirements that govern the activities of the preoperational and startup test organizations and their interfaces with other organizations.

14.2.5 Review, Evaluation, and Approval of Test Results

NAPS DEP 14.2(2)

Replace the first sentence of the second paragraph of DCD Subsection 14.2.5 with the following.

Individual test results are evaluated and reviewed by members of the preoperational or startup test organizations, as applicable.

Replace the fourth sentence of the second paragraph of DCD Subsection 14.2.5 with the following.

Test results, including the resolutions of test deficiencies, are reviewed and initially approved by the designated preoperational or startup test organization personnel.

NAPS DEP 14.2(1)

Replace the last sentence of DCD Subsection 14.2.5 with the following.

A description of the specific controls for the review, evaluation and approval of the test results of the program by appropriate personnel and/or organizations, including the methods and sequence for approval of test data for each major phase, is provided in Appendix 14AA.

14.2.5.1 Review, Evaluation and Approval of Test Results for each Major Test Phase

NAPS DEP 14.2(2)

Replace the second sentence of the second paragraph of DCD Subsection 14.2.5.1 with the following.

The designated preoperational or startup test organization initially approves the test results of the major test phases.

14.2.5.3 Notification when Acceptance Criteria Not Met

NAPS DEP 14.2(2)

Replace the second sentence of the first paragraph of DCD Subsection 14.2.5.3 with the following.

Individual test results are evaluated and reviewed by members of the preoperational or startup test organizations, as applicable.

14.2.5.5 Test Data Approval

NAPS DEP 14.2(2)

Replace the third sentence of DCD Subsection 14.2.5.5 with the following.

The designated preoperational or startup test organization performs the initial approval and the designated level of plant management has the responsibility for the final review and approval of test results.

14.2.6 Test Records

NAPS DEP 14.2(1)

Replace the last paragraph of DCD Subsection 14.2.6 with the following.

A description of the specific controls for the preparation and retention of test records is provided in Appendix 14AA.

14.2.7 Conformance of Test Program with RGs

NAPS DEP 14.2(1)

Replace the content of DCD Section 14.2.7 with the following.

The preoperational and startup test programs were developed considering the guidance of RGs listed in DCD Table 14.2-2. Conformance with those RGs is shown in Table 1.9-202.

14.2.8.1 Preoperational and/or Startup Testing for Unique or First-of-a-Kind Principal Design Features

STD COL 14.2(11)

Replace the last sentence of the second paragraph in DCD Subsection 14.2.8.1 with the following.

First-plant-only and prototype tests are either performed in accordance with Subsection 14.2.8 or a justification is provided prior to initial fuel loading that the results of the First-plant-only tests and prototype test are applicable to a subsequent plant and are not required to be repeated.

14.2.8.2.1 Natural Circulation Testing

STD COL 14.2(11)

Add the following text at the end of DCD Subsection 14.2.8.2.1.

Natural circulation test is performed in accordance with Subsection 14.2.12.2.3.9 or a justification is provided based on Subsection 14.2.8.2.1 prior to initial fuel load that the results of the US-APWR prototype test are applicable to a subsequent plant and are not required to be repeated.

14.2.9 Trial Testing of Plant Operating and Emergency Procedures

NAPS COL 14.2(7)

Replace the last paragraph in DCD Subsection 14.2.9 with the following.

A schedule for the development of plant procedures required for use during preoperational testing will be available to the U.S. Nuclear Regulatory Commission (NRC) prior to the start of the corresponding preoperational tests. A schedule for the development of plant procedures required for use during startup testing is discussed in Section 14AA.11. The schedules provide sufficient detail to assure that the procedures required to support testing are available for test procedure preparation, review and performance.

14.2.11 Test Program Schedule

NAPS DEP 14.2(2)

Replace the first sentence of the fourth paragraph of DCD subsection 14.2.11 with the following.

As construction is completed on systems, the systems are turned over to the preoperational test organization for preoperational testing.

NAPS COL 14.2(7)

Replace the first and second sentences of the last paragraph in DCD Subsection 14.2.11 with the following.

An event-based schedule for conducting each major phase of the test program for Unit 3 relative to the start of fuel loading, will be provided to the NRC prior to the start of preoperational testing. The schedule will be periodically updated to reflect actual progress.

STD COL 14.2(7)

Replace the third sentence of the last paragraph in DCD Subsection 14.2.11 with the following.

Preoperational tests which satisfy inspections, tests analyses, and acceptance criteria (ITAAC) test requirements, and ITAAC test requirements which can be incorporated into preoperational tests, are correlated in Table 14.2-202. This correlation is used to assure that ITAAC test requirements are included in the development of preoperational testing procedures.

14.2.12 Individual Test Descriptions

NAPS COL 14.2(10)

Replace the first sentence of the last paragraph in DCD Subsection 14.2.12 with the following.

Testing outside the scope of the certified design is addressed in Subsections 14.2.12.1.93, 14.2.12.1.113, and 14.2.12.1.114. Additional testing for the FPS Preoperational Test is identified in Subsection 14.2.12.1.90. Table 14.2-201 shows the comprehensive list for the new added subsections.

14.2.12.1 Preoperational Tests

STD COL 14.2(10)

Add new item after item C.7 in DCD Subsection 14.2.12.1.90 as follows.

8. Verify that local offsite fire departments utilize hose threads or adapters capable of connecting with onsite hydrants, hose couplings, and standpipe risers.

NAPS DEP 9.2(1)

Replace DCD Section 14.2.12.1.93 with the following.

14.2.12.1.93 **Degasifier Subsystem Preoperational Test**

A. Objective

1. To demonstrate the operation of the degasifier subsystem, including the degasifier and its associated pumps, valves, tanks, and control circuits.

B. Prerequisites

1. Required construction testing is completed.
2. Component testing and instrument calibration is completed.
3. Test instrumentation is available and calibrated.
4. Required support systems are available.
5. The CCWS is available to supply cooling water.
6. The auxiliary steam system is available to supply steam to the system when required.
7. Water is available in holdup tanks to test the operation of the degasifier subsystem.

C. Test Method

1. The control circuitry and operation of system pumps and valves are verified.

2. The system is operated using demineralized water, and performance characteristics are measured.

D. Acceptance Criteria

1. System valves, pumps, and interlocks operated as designed.

2. The system has the capability to remove dissolved gases as designed.

STD COL 14.2(10)

Replace DCD Subsections 14.2.12.1.113 and 14.2.12.1.114 with the following.

14.2.12.1.113 **Ultimate Heat Sink (UHS) System Preoperational Test**

A. Objectives

1. To demonstrate operation of the UHS cooling towers and associated fans, essential service water (ESW) pumps, and UHS transfer pumps.

2. With the basin at minimum level (end of the 30 day emergency period), to demonstrate that the ESW pumps and the UHS transfer pumps maintain design flow rates.

3. To demonstrate the operation of the UHS transfer pumps.

4. To demonstrate the operation of the UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, basin water level logic, and associated blowdown equipment.

B. Prerequisites

1. Required construction testing is completed.

2. Component testing and instrument calibration is completed.

3. Test instrumentation is available and calibrated.

4. Required support systems are available.

5. Required system flushing/cleaning is completed.

6. Required electrical power supplies and control circuits are energized and operational.

7. Makeup water to the UHS basins is available.

C. Test Method

1. System component control and interlock circuits and alarms are verified, including cooling tower fan logic, basin water level sensors, makeup water control, basin process chemical sensors, blowdown control valves.

2. The performance of each ESW pump and UHS transfer pump are monitored as basin water level is decreased to the minimum water level (end of the 30 day emergency period).

3. Basin water level and chemistry controls are monitored during continuous operations in the water level and chemistry control mode using the ESWS blowdown feature.

4. The capability of the ESWS to provide water to the FSS is demonstrated by opening the isolation valves and obtaining a total flow of at least 150 gpm to the hose stations located in the R/B and ESWS pump house while maintaining required ESWS flows and pressures.

D. Acceptance Criteria

1. With the basin at minimum level (end of the 30 day emergency period), each ESW pump and UHS transfer pump maintain design flow rates.

2. UHS transfer pumps operate as discussed in Subsection 9.2.5.

3. UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, interlocks and associated blowdown equipment operate as discussed in Subsection 9.2.5.

4. ESWS maintains required flows and pressures while water is provided to the FSS as described in Subsection 9.2.1.3.

14.2.12.1.114 UHS ESW Pump House Ventilation System Preoperational Test

A. Objectives

1. To demonstrate operation of the UHS ESW pump house ventilation system.

B. Prerequisites

1. Required construction testing is completed.
2. Component testing and instrument calibration are completed.
3. Test instrumentation is available and calibrated.
4. Required support systems are available.

C. Test Method

1. Simulate interlock signals for each exhaust fan and unit heater and verify operation and annunciation.
2. Verify that alarms and status indications are functional.
3. Verify design airflow.

D. Acceptance Criteria

1. UHS ESW pump house ventilation system operates on the proper signal (see Subsection 9.4.5).
2. All alarms annunciate properly.

14.2.13 Combined License Information

Replace the content of DCD Subsection 14.2.13 with the following.

14.2(1) ***Deleted from the DCD***

NAPS COL 14.2(2)

14.2(2) ***Organization and staffing***

This COL item is addressed in Subsection 14.2.2.

14.2(3) ***Deleted from the DCD.***

14.2(4) ***Deleted from the DCD.***

14.2(5) ***Deleted from the DCD.***

14.2(6) ***Deleted from the DCD.***

NAPS COL 14.2(7)
STD COL 14.2(7)

14.2(7) ***Initial test program schedule and cross-reference of test abstracts with ITAAC***

This COL item is addressed in Subsections 14.2.9, 14.2.11 and Table 14.2-202.

14.2(8) ***Deleted from the DCD.***

14.2(9) ***Deleted from the DCD.***

NAPS COL 14.2(10)
STD COL 14.2(10)

14.2(10) ***Site-specific test abstracts***

This COL item is addressed in Subsections 14.2.12.1.90.C.8, 14.2.12.1.93, 14.2.12.1.113, and 14.2.12.1.114, Table 14.2-201, and Appendix 14A.

STD COL 14.2(11)

14.2(11) ***First-plant only tests and prototype test***

This COL item is addressed in Subsections 14.2.8.1 and 14.2.8.2.1.

STD COL 14.2(12)

14.2(12) ***Approved Test procedures***

This COL item is addressed in Subsection 14.2.3

Table 14.2-1R Comprehensive Listing of Tests (Sheet 3 of 5)

	Section	Test
	14.2.12.1.78	Process and Effluent Radiological Monitoring System, Area Radiation Monitoring System and Airborne Radioactivity Monitoring System Preoperational Test
	14.2.12.1.79	High-Efficiency Particulate Air Filters and Charcoal Adsorbers Preoperational Test
	14.2.12.1.80	Liquid Waste Management System Preoperational Test
	14.2.12.1.81	Gaseous Waste Management System Preoperational Test
	14.2.12.1.82	Solid Waste Management System Preoperational Test
	14.2.12.1.83	Steam Generator Blowdown System Preoperational Test
	14.2.12.1.84	Sampling System Preoperational Test
	14.2.12.1.85	Spent Fuel Pit Cooling and Purification System (SFPCS) Preoperational Test
	14.2.12.1.86	Fuel Handling System Preoperational Test
	14.2.12.1.87	Component Cooling Water System Preoperational Test
	14.2.12.1.88	Turbine Component Cooling Water System Preoperational Test
	14.2.12.1.89	Secondary Side Chemical Injection System Preoperational Test
	14.2.12.1.90	Fire Protection System Preoperational Test
	14.2.12.1.91	Instrument Air System Preoperational Test
	14.2.12.1.92	Station Service Air System Preoperational Test
NAPS DEP 9.2(1)	~~14.2.12.1.93~~	~~Boron Recycle System Preoperational Test~~
	14.2.12.1.94	Offsite Communication System Preoperational Test
	14.2.12.1.95	Inplant Communication System Preoperational Test
	14.2.12.1.96	Safeguard Component Area Heating, Ventilation, and Air Conditioning (HVAC) System Preoperational Test
	14.2.12.1.97	Emergency Feedwater Pump Area HVAC System Preoperational Test
	14.2.12.1.98	Class 1E Electrical Room HVAC System Preoperational Test
	14.2.12.1.99	Auxiliary Building HVAC System Preoperational Test
	14.2.12.1.100	Main Steam/Feedwater Piping Area HVAC System Preoperational Test
	14.2.12.1.101	Main Control Room (MCR) HVAC System Preoperational Test (including MCR Habitability)

Table 14.2-1R Comprehensive Listing of Tests (Sheet 3 of 5) ***(continued)***

Section	Test
14.2.12.1.102	Non-Class 1E Electrical Room HVAC System Preoperational Test
14.2.12.1.103	Technical Support Center HVAC System Preoperational Test
14.2.12.1.104	Non-Essential Chilled Water System Preoperational Test
14.2.12.1.105	Vessel Servicing Preoperational Test
14.2.12.1.106	Safety-Related Component Area HVAC System Preoperational Test
14.2.12.1.107	Pressurizer Heater and Spray Capability and Continuous Spray Flow Verification Test
14.2.12.1.108	Non-Essential Service Water (non-ESW) System Preoperational Test
14.2.12.1.109	Condensate Storage Facilities System Preoperational Test
14.2.12.1.110	Turbine Building Area Ventilation System (General Mechanical Area) Preoperational Test
14.2.12.1.111	Turbine Building Area Ventilation System (Electric Equipment Area) Preoperational Test
14.2.12.1.112	Reserved
14.2.12.1.113	Reserved
14.2.12.1.114	Reserved
14.2.12.1.115	RCPB Leak Detection Systems Preoperational Test
14.2.12.1.116	Equipment and Floor Drainage System Preoperational Test

Table 14.2-201 Comprehensive Listing of Additional Tests

	Section	Test
STD COL 14.2(10)	14.2.12.1.90.C.8	Local Fire Department Thread Compatibility Test
NAPS DEP 9.2(1)	14.2.12.1.93	Degasifier Subsystem Preoperational Test
STD COL 14.2(10)	14.2.12.1.113	Ultimate Heat Sink (UHS) Preoperational Test
STD COL 14.2(10)	14.2.12.1.114	UHS ESW Pump House Ventilation System Preoperational Test

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Reactor coolant system (RCS) Hot Functional	14.2.12.1.1	2.4.2
Pressurizer Pressure and Water Level Control	14.2.12.1.2	—
Reactor coolant pump (RCP) Initial Operation	14.2.12.1.3	2.4.2
Pressurizer Safety Depressurization Valve (SDV)	14.2.12.1.4	2.4.2
Pressurizer Relief Tank	14.2.12.1.5	—
RCS	14.2.12.1.6	2.4.2
Reactor Internals Vibration	14.2.12.1.7	2.4.1
RCS Cold Hydrostatic	14.2.12.1.8	2.4.1, 2.4.2
Reactor Control, Rod Control, and Rod Position Indication	14.2.12.1.9	(2.5.5)
Control rod drive mechanism (CRDM) Motor Generator Set	14.2.12.1.10	—
CRDM Initial Timing	14.2.12.1.11	—
Chemical and Volume Control System (CVCS) – Boric Acid Blending	14.2.12.1.12	2.4.6
CVCS – Charging and Seal Water	14.2.12.1.13	2.4.6
CVCS – Letdown	14.2.12.1.14	2.4.6
RCS Lithium Addition and Distribution	14.2.12.1.15	—
Primary Makeup Water System (PMWS)	14.2.12.1.16	—
Reactor Trip System and engineered safety features (ESF) System Response Time	14.2.12.1.17	—
Reactor Trip System and ESF System Logic	14.2.12.1.18	2.5.1, 2.7.1.1
Resistance Temperature Detectors (RTDs)/Thermocouple Cross-Calibration	14.2.12.1.19	—
Diverse Actuation System (DAS) Actuation	14.2.12.1.20	2.5.3
Main Steam Supply System	14.2.12.1.21	2.7.1.2
Residual Heat Removal System (RHRS)	14.2.12.1.22	2.4.5
Main Steam Isolation Valve (MSIV), Main Feedwater Isolation Valve (MFIV), and Main Steam Check Valve	14.2.12.1.23	2.7.1.2, 2.7.1.9
Motor-Driven Emergency Feedwater System	14.2.12.1.24	2.7.1.11

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Turbine-Driven Emergency Feedwater System	14.2.12.1.25	2.7.1.11
Extraction Steam	14.2.12.1.26	(2.7.1.1)
Turbine-Generator (T/G)	14.2.12.1.27	2.7.1.1
Condensate System	14.2.12.1.28	(2.7.1.9)
Feedwater System	14.2.12.1.29	2.7.1.9
Feedwater Heater and Drain Systems	14.2.12.1.30	(2.7.1.9)
Condensate Polishing System	14.2.12.1.31	—
Main Condenser Evacuation System	14.2.12.1.32	—
Circulating Water System	14.2.12.1.33	—
Essential Service Water System (ESWS)	14.2.12.1.34	2.7.3.1
Main and Unit Auxiliary Transformers	14.2.12.1.35	2.6.1
Reserve Auxiliary Transformers	14.2.12.1.36	(2.6.1)
Non-Class 1E Alternating Current (ac) Distribution	14.2.12.1.37	(2.6.1)
6.9 kV Class 1E System	14.2.12.1.38	2.6.1
480V Class 1E Switchgear	14.2.12.1.39	2.6.1
480V Class 1E Motor Control Center	14.2.12.1.40	2.6.1
120V ac Class 1E	14.2.12.1.41	2.5.1, 2.6.3
Emergency Lighting System	14.2.12.1.42	2.6.6
Normal Lighting System	14.2.12.1.43	(2.6.6)
Class 1E Gas Turbine Generator	14.2.12.1.44	2.6.4

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Class 1E Bus Load Sequence	14.2.12.1.45	2.4.1, 2.4.2, 2.4.4, 2.4.5, 2.4.6, 2.6.1, 2.6.3, 2.6.4, 2.7.1.2, 2.7.1.9, 2.7.1.10, 2.7.1.11, 2.7.3.1, 2.7.3.3, 2.7.3.5, 2.7.5.1, 2.7.5.2, 2.7.5.4, 2.7.6.3, 2.7.6.6, 2.7.6.7, 2.7.6.13, 2.11.2, 2.11.3
Alternate ac Power Sources for Station Black Out	14.2.12.1.46	2.6.5
125V Direct Current (dc) Class 1E	14.2.12.1.47	2.4.1, 2.4.2, 2.4.4, 2.4.5, 2.4.6, 2.6.2, 2.6.3, 2.7.1.2, 2.7.1.9, 2.7.1.10, 2.7.1.11, 2.7.3.1, 2.7.3.3, 2.7.3.5, 2.7.5.1, 2.7.5.2, 2.7.5.4, 2.7.6.3, 2.7.6.6, 2.7.6.7, 2.7.6.13, 2.11.2, 2.11.3
125 V DC Class 1E Minimum Load Voltage Verification	14.2.12.1.48	—
125 V DC non-Class 1E	14.2.12.1.49	—
Dynamic State Vibration Monitoring of Safety Related and High-Energy Piping	14.2.12.1.50	—
Steady State Vibration Monitoring of Safety Related and High-Energy Piping	14.2.12.1.51	—
Thermal Expansion Testing	14.2.12.1.52	—
Class 1E Gas Turbine Generator Sequence – Loss of Offsite Power (LOOP) Sequence and LOOP Sequence with Emergency Core Cooling System (ECCS) Actuation Signal	14.2.12.1.53	2.6.4

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Safety Injection System (SIS)	14.2.12.1.54	2.4.4
ECCS Actuation and Containment Isolation Logic	14.2.12.1.55	2.4.4, 2.11.2
Safety Injection Check Valve	14.2.12.1.56	2.4.4
Safety Injection Accumulator	14.2.12.1.57	2.4.4
Containment Spray System	14.2.12.1.58	2.11.3
Refueling Water Storage System	14.2.12.1.59	—
Essential Chilled Water System	14.2.12.1.60	2.7.3.5
Containment Structural Integrity	14.2.12.1.61	2.2
Containment Local Leakrate	14.2.12.1.62	2.2, 2.11.2
Containment Integrated Leak Rate	14.2.12.1.63	2.2
Containment Hydrogen Monitoring and Control System	14.2.12.1.64	2.11.4
CRDM Cooling System	14.2.12.1.65	(2.7.5.3)
Reactor Cavity Cooling System	14.2.12.1.66	(2.7.5.3)
Containment High Volume Purge System	14.2.12.1.67	2.8, (2.7.5.3)
Containment Low Volume Purge System	14.2.12.1.68	2.8, (2.7.5.3)
Containment Fan Cooler System	14.2.12.1.69	(2.7.5.3)
Annulus Emergency Exhaust System	14.2.12.1.70	2.7.5.2
RCS Leak Rate	14.2.12.1.71	—
Loose Parts Monitoring System	14.2.12.1.72	—
Seismic Monitoring System	14.2.12.1.73	—
Incore Instrumentation System	14.2.12.1.74	(2.5.5)
Nuclear Instrumentation System	14.2.12.1.75	(2.5.5)
Remote Shutdown	14.2.12.1.76	2.5.2
Miscellaneous Leakage Detection System	14.2.12.1.77	(2.7.6.8)
Process and Effluent Radiological Monitoring System, Area Radiation Monitoring System and Airborne Radioactivity Monitoring System	14.2.12.1.78	(2.5.5), (2.7.6.6), (2.7.6.13)
High-Efficiency Particulate Air Filters and Charcoal Adsorbers	14.2.12.1.79	2.7.5.1, 2.7.5.2

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Liquid Waste Management System	14.2.12.1.80	2.4.7, 2.7.4.1, (2.7.6.8)
Gaseous Waste Management System	14.2.12.1.81	2.7.4.2
Solid Waste Management System	14.2.12.1.82	(2.7.4.3)
Steam Generator Blowdown System	14.2.12.1.83	2.7.1.10
Sampling System	14.2.12.1.84	2.7.6.7
Spent Fuel Pit Cooling and Purification System (SFPCS)	14.2.12.1.85	2.7.6.3
Fuel Handling System	14.2.12.1.86	2.7.6.4
Component Cooling Water System	14.2.12.1.87	2.7.3.3
Turbine Component Cooling Water System	14.2.12.1.88	—
Secondary Side Chemical Injection System	14.2.12.1.89	—
Fire Protection System	14.2.12.1.90	2.7.6.9
Instrument Air System	14.2.12.1.91	—
Station Service Air System	14.2.12.1.92	—
~~Boron Recycle System~~ (NAPS DEP 9.2(1))	~~14.2.12.1.93~~	~~—~~
Offsite Communication System	14.2.12.1.94	2.7.6.10
Inplant Communication System	14.2.12.1.95	2.7.6.10
Safeguard Component Area Heating, Ventilation, and Air Conditioning (HVAC) System	14.2.12.1.96	2.7.5.2
Emergency Feedwater Pump Area HVAC System	14.2.12.1.97	2.7.5.2
Class 1E Electrical Room HVAC System	14.2.12.1.98	2.7.5.2
Auxiliary Building HVAC System	14.2.12.1.99	2.7.5.4, 2.8
Main Steam/Feedwater Piping Area HVAC System	14.2.12.1.100	2.7.5.4
Main Control Room (MCR) HVAC System (including MCR Habitability)	14.2.12.1.101	2.7.5.1
Non-Class 1E Electrical Room HVAC System	14.2.12.1.102	2.7.5.4
Technical Support Center HVAC System	14.2.12.1.103	2.7.5.4
Non-Essential Chilled Water System	14.2.12.1.104	2.7.3.6

NAPS COL 14.2(7)

Table 14.2-202 Comparison of Tier 2 Preoperational Tests with Tier 1 Test Requirements

Test Description	Tier 2 Section	Tier 1 Section
Vessel Servicing	14.2.12.1.105	2.7.6.5
Safety-Related Component Area HVAC System	14.2.12.1.106	2.7.5.2
Pressurizer Heater and Spray Capability and Continuous Spray Flow Verification	14.2.12.1.107	—
Non-Essential Service Water (non-ESW) System	14.2.12.1.108	—
Condensate Storage Facilities System	14.2.12.1.109	—
Turbine Building Area Ventilation System (General Mechanical Area)	14.2.12.1.110	—
Turbine Building Area Ventilation System (Electric Equipment Area)	14.2.12.1.111	—
RCPB Leak Detection Systems Preoperational Test	14.2.12.1.115	2.4.7
Equipment and Floor Drainage System Preoperational Test	14.2.12.1.116	2.7.6.8
Compressed Gas System Preoperational Test	14.2.12.1.117	—
Equipment Hatch Hoist Preoperational Test	14.2.12.1.118	—

Note: Tier 1 sections in parentheses indicate inspection activities.

14.3 Inspections, Tests, Analyses, and Acceptance Criteria

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

14.3.4.6 ITAAC for Electrical Systems

STD COL 14.3(1)

Add the following paragraph after the last paragraph in DCD Subsection 14.3.4.6.

The ITAAC for the site-specific interfaces in the electrical systems are developed to correspond to Section 3.2 of Tier 1 of the referenced DCD. The site-specific interfaces are with the offsite power system. The ITAAC for the interface requirement with the offsite power system are provided in Part 10 of the Combined License Application (COLA).

14.3.4.7 ITAAC for Plant Systems

NAPS COL 14.3(1)

Replace the last paragraph in DCD Subsection 14.3.4.7 with the following.

The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for ITAAC for site-specific systems. In general, the ITAAC for site-specific systems are developed to correspond to the interface requirements in Tier 1 of the referenced DCD. For those site-specific systems that do not have a safety function sufficiently significant to meet the selection criteria for ITAAC, the system is identified with the designation “No entry for this system”. ITAAC for the site-specific portion of the plant systems are provided in Part 10 of the Combined License Application (COLA). Site-specific systems, involving the UHS system and ESWS (portions outside the scope of the certified design) including the site-specific structures, the UHS ESWS pump house ventilation system, and the portions of the offsite power system and FPS outside the scope of the certified design, are addressed in Part 10 of the COLA.

14.3.4.8 ITAAC for Radiation Protection

NAPS SUP 14.3(1)

Add to the last paragraph of DCD Subsection 14.3.4.8 the following.

The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for the facility’s site-specific radiation protection ITAAC for

the IRSF. The ITAAC conform to the guidance in this subsection, as modified to reflect the design and site-specific radiation protection requirements for the IRSF. The design description and radiation protection ITAAC for the IRSF are provided in Part 10 of the COLA.

14.3.4.10 ITAAC for Emergency Planning

STD COL 14.3(2)

Replace the last paragraph in DCD Subsection 14.3.4.10 with the following.

The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for the facility's emergency planning ITAAC. The ITAAC conform to the guidance in this subsection, as modified to reflect the design and site-specific emergency planning program requirements. The ITAAC for the facility's emergency planning are provided in Part 10 of the COLA.

14.3.4.12 ITAAC for Physical Security Hardware

NAPS COL 14.3(3)

Replace the last paragraph in DCD Subsection 14.3.4.12 with the following.

The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for site-specific physical security hardware ITAAC not addressed in the DCD. The ITAAC conform to the guidance in this subsection and are consistent with the applicable generic physical security ITAAC in SRP 14.3.12 (Reference 14.3-16) developed by the NRC in coordination with NEI. The site-specific physical security hardware ITAAC are provided in Part 10 of the COLA.

Physical security ITAAC test abstracts supporting the site-specific physical security ITAAC are available for review and inspection prior to implementation.

14.3.6 Combined License Information

Replace the content of DCD Subsection 14.3.6 with the following.

STD COL 14.3(1)
NAPS COL 14.3(1)

14.3(1) ITAAC for site-specific systems

This COL item is addressed in Subsections 14.3.4.6 and 14.3.4.7

STD COL 14.3(2)

14.3(2) ***ITAAC for emergency planning***

This COL item is addressed in Subsection 14.3.4.10.

NAPS COL 14.3(3)

14.3(3) ***ITAAC For Physical Security Hardware***

This COL item is addressed in Subsection 14.3.4.12

Appendix 14A Comparison of RG 1.68 Appendix A versus US-APWR Test Abstracts

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 14.2(10) Add the following text after the last sentence.

The added test abstracts in the Final Safety Analysis Report (FSAR) are correlated to Regulatory Guide (RG) 1.68 Appendix A in Table 14A-201.

Table 14A-1R Conformance Matrix of RG 1.68 Appendix A Guidance Versus Typical Test Abstracts (Sheet 10 of 17)

	RG 1.68 Appendix A	Section Number	Typical Test
	1.n.(2)	14.2.12.1.60 14.2.12.1.87 14.2.12.1.88 14.2.12.1.104	Essential Chilled Water System Preoperational Test Component Cooling Water System Preoperational Test Turbine Component Cooling Water System Testing Non-Essential Chilled Water System Preoperational Test
	1.n.(3)	14.2.12.1.87	Component Cooling Water Preoperational Test
	1.n.(4)	14.2.12.1.16	Primary Makeup Water System (PMWS) Preoperational Test
	1.n.(5)	14.2.12.1.83 14.2.12.1.84	Steam Generator Blowdown System Preoperational Test Sampling System Preoperational Test
	1.n.(6)	14.2.12.1.89 14.2.12.1.12 14.2.12.1.15	Secondary Side Chemical Injections System Preoperational Test CVCS Preoperational Test - Boric Acid Blending RCS Lithium Addition and Distribution Test
	1.n.(7)	14.2.12.1.90	Fire Protection System Preoperational Test
	1.n.(8)	14.2.12.1.13	CVCS Preoperational Test - Charging and Seal Water
	1.n.(9)	14.2.12.1.116	Equipment and Floor Drainage System Preoperational Test
	1.n.(10)	14.2.12.1.14	CVCS Preoperational Test -Letdown
	1.n.(11)	14.2.12.1.91 14.2.12.1.92 14.2.12.1.117	Instrument Air System Preoperational Test Station Service Air System Preoperational Test Compressed Gas System Preoperational Test
NAPS DEP 9.2(1)	1.n.(12)	~~14.2.12.1.93~~	~~Boron Recycle System Preoperational Test~~ N/A
	1.n.(13)	14.2.12.1.94 14.2.12.1.95	Offsite Communication System Preoperational Test Inplant Communication System Preoperational Test
	1.n.(14) (a)	14.2.12.1.96	Safeguard Component Area HVAC System Preoperational Test
		14.2.12.1.97	Emergency Feedwater Pump Area HVAC System
		14.2.12.1.98	Preoperational Test Class 1E Electrical Room HVAC System Preoperational Test
		14.2.12.1.106	Safety Related Component Area HVAC System Preoperational Test

Table 14A-201 Conformance Matrix of RG 1.68 Appendix A Guidance versus Added Test Abstracts in the FSAR

	RG 1.68 Appendix A	Section Number	Typical Test
STD COL 14.2(10)	1.h.(7)	14.2.12.1.114	UHS ESW Pump House Ventilation System Preoperational Test
STD COL 14.2(10)	1.h.(10)	14.2.12.1.113	Ultimate Heat Sink (UHS) Preoperational Test
NAPS DEP 9.2(1)	1.n(10)	14.2.12.1.93	Degasifier Subsystem Preoperational Test
STD COL 14.2(10)	1.n(14)(a)	14.2.12.1.114	UHS ESW Pump House Ventilation System Preoperational Test

NAPS DEP 14.2(2)

Appendix 14AA Description of Initial Test Program Administration

14AA.1 Summary of Test Program and Objectives

14AA.1.1 Applicability

This appendix provides the requirements to be included in the Startup Administrative Manual (SAM), as discussed in DCD Section 14.2.2.1 (approved manual containing ITP controls). The information in and referenced in this appendix meets the ITP criteria of NUREG-0800 and is formatted to follow RG 1.206, Section C.I.14.2.

The ITP is applied to structures, systems, and components that perform the functions described in the RG 1.68 evaluation in DCD Appendix 14A. The ITP is also applied to other structures, systems, and components that meet any of the following criteria, even if not included in RG 1.68, Appendix A:

- Will be used for shutdown and cool down of the reactor under normal plant conditions, and for maintaining the reactor in a safe condition for an extended shutdown period.
- Will be used for shutdown and cool down of the reactor under transient (infrequent or moderately frequent events) conditions and postulated accident conditions, and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.
- Will be used to establish conformance with safety limits or limiting conditions for operation that will be included in the facility's Technical Specifications.
- Are classified as ESF or will be relied on to support or ensure the operation of ESF within design limits.
- Are assumed to function, or for which credit is taken, in the accident analysis of the facility, as described in the FSAR.
- Will be used to process, store, control, or limit the release of radioactive materials.
- Will be used in the special low power testing program to be conducted at power levels no greater than five percent for the purposes of providing meaningful technical information for resolution of TMI Action Plan item I.G.1.

- Identified as risk-significant as discussed and identified in Subsection 17.4.7.

The SAM includes a list of the APWR structures, systems, and components to which the ITP is applied.

14AA.1.2 Phases of the ITP

The ITP (per RG 1.68) has the following five phases:

1. Preoperational Testing
2. Initial Fuel Loading and Pre-Criticality Tests
3. Initial Criticality
4. Low-Power Tests
5. Power Ascension Tests

These phases are described in further detail in DCD Section 14.2.10 and in DCD Sections 14.2.12.1 and 14.2.12.2.

14AA.1.3 Objectives of Preoperational and Startup Testing

Objectives of Preoperational Testing are discussed in DCD Section 14.2.1.2.2 and the objectives of Startup Testing are discussed in DCD Section 14.2.1.2.3.

14AA.1.4 Testing of First of a Kind Design Features

First of a kind (FOAK) testing is described in DCD Section 14.2.8.1. FOAK testing may occur in any of the phases depending on the nature of the testing and required sequencing of the tests. When testing FOAK design features, applicable operating experience from previous test performance on other APWR plants is reviewed where available and the ITP modified as needed based on those lessons learned.

14AA.1.5 Credit for Previously Performed Testing of First of a Kind Design Features

In some cases, FOAK testing is required only for the first of a new design or for the first few plants of a standard design. In such cases, credit may be taken for the previously performed tests. A discussion is included in the startup test reports of the results of those tests that are credited.

14AA.2 Organization and Staffing

Administration of the ITP is governed by procedures in the SAM.

14AA.2.1 Organizational Description

The Plant Staff organization is described in Section 13.1. DCD Section 14.2.2 provides a description of the ITP test organization.

The ITP is performed by two testing groups: the Preoperational Test Group, which is responsible for conducting and documenting preoperational tests; and the Startup Test Group, which is responsible for conducting and documenting initial startup testing. Both groups consist of personnel drawn from various organizations such as plant staff, construction personnel, MHI/MNES, MNES, and other contractors, vendors and consultants. Figure 14AA-201 illustrates the organizational structure of a typical preoperational and startup test organization.

The preoperational test manager reports to the construction site manager. The Preoperational Test Group includes preoperational test directors (i.e., NSSS, BOP, Electrical, and others, as required) who report to the preoperational test manager. Preoperational test engineers are assigned to this group and report to one of the preoperational test directors. Qualifications of the preoperational test manager, preoperational test directors, and preoperational test engineers are set forth in Table 13.1-201.

The startup test manager reports to the senior manager operations and maintenance. The Startup Test Group includes startup test directors who report to the startup test manager. Startup test engineers are assigned to this group and report directly to one of the startup test directors. Qualifications of the startup test manager, startup test directors, and startup test engineers are set forth in Table 13.1-201.

14AA.2.2 Responsibilities

The operations manager coordinates with the preoperational test manager during the ITP to provide operations personnel to coordinate, support, and participate in preoperational testing. The operations manager is a voting member of the Joint Test Group (JTG) and the FSRC. Additional details on JTG and FSRC responsibilities are discussed in 14AA.2.2.9 and 14AA.2.2.10. The operations manager is responsible for safe operation of the plant and ensuring tests are performed efficiently and effectively.

14AA.2.2.1 **Preoperational Test Manager**

The preoperational test manager is responsible for:

- Staffing within the Preoperational Test Group
- Developing procedures associated with ITP
- Acting as Chairman of the JTG during preoperational testing activities
- Coordinating with station and construction department heads for assignment of staff personnel to accomplish the test program objectives

14AA.2.2.2 **Startup Test Manager**

The startup test manager is responsible for:

- Staffing within the Startup Test Group.
- Developing procedures associated with ITP.
- Acting as Chairman of the JTG during startup testing activities.
- Acting as an advisor to the FSRC for all matters associated with startup testing.
- Managing owner contracts associated with the ITP.
- Coordinating with station and construction department heads for assignment of staff personnel to accomplish the test program objectives.

14AA.2.2.3 **MHI/MNES Resident Site Manager**

The MHI/MNES resident site manager is responsible for assisting the Startup Test Group during the ITP as described in DCD Section 14.2.2.2. Qualifications of the MHI/MNES resident site manager are equivalent to the qualifications described in ANSI/ANS-3.1-1993 for a supervisor preoperational testing. Specific responsibilities are:

- Acting as liaison with MHI/MNES on testing matters involving MHI/MNES-supplied equipment.
- Reviewing preoperational and startup test procedures.
- Assisting in data reduction, analysis, and evaluation for completed tests.
- Acting as a voting member of JTG.
- Providing administrative support and supervision to MHI/MNES onsite personnel involved in the test program.

14AA.2.2.4 **Vendor Site Representative**

A vendor site representative is responsible for providing assistance during the preoperational phase of the test program. This position is filled as needed based on the scope of non-MHI/MNES supplied equipment that requires preoperational or startup testing. Specific responsibilities are:

- Acting as liaison with vendor on testing matters involving vendor supplied equipment.
- Reviewing preoperational tests involving vendor-supplied equipment.
- Assisting in data reduction, analysis, and evaluation for preoperational tests.

14AA.2.2.5 **Preoperational Test Director**

Preoperational test directors are responsible for:

- Supervising the preoperational test engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Acting as voting members of JTG.
- Assisting with preparing, reviewing, and performing preoperational test procedures.
- Reviewing preoperational test results and making recommendations based on the results.
- Resolving deficiencies identified during preoperational inspection and test activities.
- Ensuring preoperational test engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested.

14AA.2.2.6 **Startup Test Director**

Startup test directors are responsible for:

- Supervising the startup test engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Coordinating and directing testing for their shift via the operations shift manager for all initial startup testing.
- Assisting with preparing, reviewing, and performing startup test procedures.

- Reviewing, analyzing, and evaluating test results and data.
- Assisting in the resolution of deficiencies identified during startup testing activities.
- Coordinating with the planning and scheduling group for initial startup activities.
- Expediting testing progress as necessary to support project schedule.
- Ensuring startup test engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested.

14AA.2.2.7 **Preoperational Test Engineer**

Preoperational test engineers are responsible for:

- Determining the nature and degree of testing required for assigned systems.
- Developing test activity milestones, target dates, and manpower requirements.
- Following construction progress to support test program requirements.
- Preparing the required detailed preoperational test procedures and assuring they are available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Assuring test identification tagging and station tagging are implemented as necessary to support testing and turnover.
- Directing all participating groups during preparation for the execution of assigned tasks.
- Performing preoperational tests
- Identifying and assisting in the resolution of deficiencies and problems found during the construction and testing of assigned systems and areas.
- Reviewing and evaluating test results and preparing test summaries.

14AA.2.2.8 **Startup Test Engineer**

Startup test engineers are responsible for:

- Preparing the required detailed startup test procedures and making them available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Directing all participating groups during preparation for the execution of assigned tasks.
- Identifying and assisting in the resolution of deficiencies found during the construction and testing of assigned systems.
- Performing startup tests
- Reviewing and evaluating the test results and data.
- Coordinating with Operations during the execution of assigned tasks.

14AA.2.2.9 **Joint Test Group**

The JTG is the primary review and approval organization during the preoperational and startup test phases of the test program. The required JTG quorum is described in the SAM. The JTG is responsible for:

- Performing duties delineated in the SAM.
- Reviewing and approving all preoperational procedures prior to testing.
- Recommending approval of startup test procedures prior to review and approval by the FSRC.
- Reviewing and approving all major changes or revisions to JTG-approved test procedures.
- Reviewing and approving the overall preoperational and startup test schedule and sequence.
- Reviewing and approving the results of preoperational and startup tests.
- Recommending the disposition of test deficiencies.
- Recommending retests or supplemental tests as required.
- Determining system readiness for turnover to operations.

14AA.2.2.10 Facility Safety Review Committee

Upon initial fuel load, the FSRC assumes responsibility for some tasks previously assigned to the JTG. The FSRC is responsible for review of all procedures that require a regulatory evaluation under 10 CFR 50.59 and 10 CFR 72.48, as well as all tests and modifications that affect nuclear safety. The FSRC is responsible for review of all startup test procedures and completed startup tests. The organizational structure, functions, and responsibilities of FSRC are described in Appendix 17AA. During the startup test phase, the FSRC is advised by the manager in charge of the Startup Test Group and the MHI/MNES resident site manager.

14AA.2.3 Operating and Technical Staff Participation

Operating and technical staff qualifications and experience requirements are:

- Plant staff qualification and experience requirements are outlined in Chapter 13 and in this appendix.
- Contractor qualification and experience requirements are outlined in this appendix and in approved contractor procedures.

Plant staff participates in all phases of the ITP as described in DCD Section 14.2.2.3. Plant staff groups that participate include but are not limited to: QA staff, QC staff, Operations staff, Maintenance staff, Engineering staff, Planning, Scheduling and Outage Planning staff, and Work Management staff, including work planners and schedulers. Plant staff and Operations staff participates in preoperational testing as part of gaining experience as described in Section 13.2. Refer to Figure 14AA-201 for identification of organizations that have one or more participants in the ITP.

14AA.2.4 Conflict of Interest

DCD Section 14.2.2 describes the administrative controls on individuals responsible for the satisfactory performance of the systems being tested. Members of the Startup Test Group responsible for formulating and conducting startup tests are not the same individuals who designed or are responsible for satisfactory performance of the systems or design features being tested. This does not preclude members of the design organizations from participating in test activities.

14AA.2.5 Training Requirements

Training on the overall test program is conducted prior to scheduled preoperational and initial startup testing and as new employees are added to the test groups. A training program for each functional group in the organization is developed, with regard to the scheduled preoperational and startup testing, to ensure that the necessary plant staff is ready for commencement of the ITP. Additional discussion on staff training is found in Section 13.2, Appendix 13AA, and Figure 13.1-202. The training program includes:

- Systems to be tested.
- Training by selected major equipment vendors (e.g., turbine, plant control).
- A review of test program administration.
- Content of test procedures, including acceptance criteria review.
- Test sequence.
- Test conduct and closure.

Specific just-in-time (JIT) training is conducted for operating crews and other personnel conducting certain startup tests. This JIT training may involve simulator training. Criteria to be considered when determining if JIT is used for a test include complexity of the test and plant response, such as tests that result in plant trips or other transients, or where they may occur. Accredited training program procedures describe the process for determining training topics to be conducted. The intention is to be as well prepared as possible to operate the plant safely.

14AA.3 Test Procedures

14AA.3.1 Procedure Development

DCD Section 14.2.3 provides a general discussion concerning test procedure development and review. Section 13.5 provides detailed requirements for developing, reviewing, and scheduling administrative procedures.

Test procedures are written in accordance with a technical procedure writer's guide. This writer's guide provides for procedure validation. This validation may, in some cases, be through the use of an available plant reference simulator. The suitability of using the simulator to validate a test procedure is evaluated on a case by case basis. It may not be suitable,

for example, to use the simulator to validate a procedure whose results are required to validate the simulator modeling.

Test procedures maximize the use of plant operating and maintenance procedures for test tasks. This can take the form of referencing a plant procedure to perform a task, or extracting the steps from the plant procedure for use in the preoperational and startup test procedures. This includes the use of emergency procedures for verifying appropriate emergency actions as described in DCD Section 14.2.9. Step-by-step instructions on how to conduct the applicable test are described and are coordinated with plant procedures wherever applicable in the test procedure. Test procedures contain cautions, warnings, and notes, using criteria established in the technical procedure writer's guide.

14AA.3.2 **Procedure Format and Content Requirements**

DCD Section 14.2.3 discusses technical information to be provided by MHI/MNES and others that form the technical basis for test procedure objectives and acceptance criteria. The following supplements DCD Section 14.2.3.5 discussion on procedure format for preoperational and startup test procedures.

Each preoperational and startup test procedure includes the following:

- Cover page

  The cover page provides approval signatures and effective dates (signatures may be maintained on file and may not appear on the cover page). The title and the unit designator water mark appear on the cover page. If the test is considered an infrequently performed test, this would appear on the cover page.

- Table of Contents
- Prerequisites

  Each test of the operation of a system requires that certain other activities be performed first (e.g., completion of preliminary tests, inspections, and certain other preoperational tests or operations). Where appropriate, instructions are given pertaining to the system configuration, components that should or should not be operating, and other pertinent conditions that might affect the operation of the given system. The startup and preoperational testing procedures include, as appropriate, these specific prerequisites, as illustrated by the following examples:

- •• Field inspections have been conducted to ensure that the equipment is ready for operation, including inspection for proper fabrication and cleanliness, checkout of wiring continuity and electrical protective devices, adjustment of settings on torque-limiting devices and calibration of instruments, verification that all instrument loops are operable and respond within required response times, and adjustment and settings of temperature controllers and limit switches.
- •• Confirm that test equipment is operable and properly calibrated.
- •• Confirm communications systems are functional for conducting the test.
- •• Access control is in place for personnel safety.
- •• Support or interface systems are functional.
- •• Confirm that prerequisite tests are conducted on individual components or subsystems to demonstrate that they meet their functional requirements.

- Objectives

  This section identifies the goal of the specific startup or preoperational test. This is established by stating those systems, subsystems, or components that are included in the test, and a series of summarized specific functions to be demonstrated during the test. Objectives of the test are stated. Many system tests are intended to demonstrate that each of several initiating events produces one or more expected responses. These initiating events and the corresponding responses are identified.

- Special Precautions

  The test procedure highlights and clearly describes any and all precautions needed to ensure a reliable test or the safety of personnel or equipment including termination criteria for the test. Included are any special actions to be taken if the test is terminated at critical points in the test.

- Initial System Conditions
- This section lists the plant conditions required to perform the test.
- Environmental Conditions

Special environmental conditions are included in this section. Test procedures include provisions to test the equipment under environmental

conditions as close as practical to those the equipment will experience in both normal and accident situations. However, many tests are conducted at ambient conditions due to the impracticality of achieving normal and accident conditions during preoperational testing.

- Acceptance Criteria

  The test procedures clearly identify the criteria against which the success or failure of the test is judged, and account for measurement errors and uncertainties. In some cases, these are qualitative criteria. Where applicable, quantitative values with appropriate tolerances are designated as acceptance criteria. This section includes acceptance criteria for judgment of plant and system performance (as described in the applicable test specification). Those test criteria that show compliance with the Combined License ITAAC are identified in this section. When a test criterion for a startup or preoperational test is not met, the preoperational or startup test engineer documents the failure through the corrective action process and contacts the applicable test director to determine actions to take (e.g., submitting a work request).

  •• Acceptance criteria relate to the values of process variables assigned in the design or analysis of the plant and component systems or associated equipment. Violation of these acceptance criteria may have plant operational or plant safety implications. If an acceptance criterion for a startup test is not satisfied, the plant must be placed in a suitable hold condition that is judged to be satisfactory to safety based on the results of prior testing. The startup test engineer notifies the on-shift SRO, (who may declare the equipment inoperable), notifies the startup test director, enters the condition in the corrective action program, and issues work requests as needed. Plant operating or test procedures or the Technical Specifications guide the decision on the direction to be taken. Startup tests compatible with this hold condition may be continued. Resolution of the problem must be documented and pursued by appropriate equipment adjustments or through engineering support personnel. Following resolution, the applicable test portion must be repeated to verify that the acceptance criteria are ultimately satisfied. A description of the problem resolution shall be included in the report documenting the successful test.

- Data Sheets

  The test procedures prescribe the data to be collected and the form in which the data are to be recorded. All entries are permanent. The administrative controls include an acceptable method for correcting an entry.

- Detailed Procedures

  This section provides detailed step-by-step instructions for each test. To the extent practical, the test procedures use approved normal plant operating procedures. Expected plant results are explicitly or implicitly stated in the instructions through verification or measurement steps. Control measures such as jumper logs and check-off lists are specified. Nonstandard arrangements are carefully examined to ensure that temporary arrangements do not invalidate the test by interfering with proper testing of the as-built system.

- References

  This section lists documents used to prepare or revise the startup or performance test procedure and any documents used or referred to while performing the procedure.

- Test Equipment

  This section lists test equipment and special tools not routinely carried, plus any unusual expendable items recommended to perform the procedure. This section also identifies temporary test equipment installations and test equipment instructions.

- System Restoration

  This section lists documents used to provide test instruction for restoring systems to a desired status. Each procedure requires necessary nonstandard arrangements to be restored to their normal status after the test is completed. Nonstandard bypasses, valve configurations, and instrument settings are identified and highlighted for return to normal.

- Follow-on Task Section

  This section includes activities that must be performed to complete the test procedure.

  - Completion Notification

    This section is included to identify persons to be notified that the procedure has been satisfactorily or unsatisfactorily completed.

Upon completion of a given test, a preliminary evaluation is performed which confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers.

- Procedure Reviews

  Procedure reviews are described in the SAM.

- Records Disposition

  Records disposition guidance is described in the SAM.

- Attachments

  Test procedure attachments provide supporting information and equations and evaluation methods to be used to analyze the obtained data. This attachment lists the signals to be recorded by the data collection equipment. Analysis and evaluation attachments outline the calculations to be performed and provide for an evaluation of the test.

- Documentation of Test Results

  Records identify each observer and/or data recorder participating in the test, as well as the type of observation, identifying numbers of test or measuring equipment, results, acceptability, and action taken to correct any deficiencies. Administrative procedures specify the retention period of test result summaries, and require permanent retention of documented summaries and evaluations.

14AA.3.3 **Other Startup Test Procedures**

The need for special startup tests may arise due to unplanned conditions. The format and content requirements for startup and performance tests apply to these procedures.

14AA.3.4 **Test Procedure Changes**

If it is determined that procedure corrections (including changes in test sequence) are required before or during the conduct of the test, the test engineer suspends testing and notifies operations and test personnel of the required change. For all such corrections, the test engineer prepares and processes a procedure change request as delineated in a site-specific procedure for processing procedure changes. Revisions are classified into two categories (intent and non-intent) based on the scope

of the change. The intent of a procedure is the specific task or goal that is to be accomplished by the procedure.

Intent changes are changes to:

- Purpose.
- Initial conditions (or prerequisites).
- Acceptance criteria or tolerances.
- Scaling or setpoints.
- The method for meeting a commitment identified in the procedure.
- Step verification (independent or concurrent).
- System/component as-left condition(s).
- Reactivity management (changes that impact the operator's ability to monitor, control, or manipulate the reactor).
- Add or delete a subsection.
- Decrease personnel safety or fire protection effectiveness.
- Delete, relocate, or add a hold point.
- Caution or warning statements.
- Startup test procedure testing sequence.

Non-intent changes and revisions do not change the intent of the procedure (e.g., typographical error corrections). Review and approval requirements for procedure changes that do not change the intent are established in administrative procedures in the SAM.

Procedure changes that change the intent of the procedure receive the same level of review and approval as the original procedure. All test procedure intent changes will be reviewed against the following criteria (consistent with 10 CFR 50.59 and the design certification rule):

- Departure from Tier 1 information.
- Departure from Tier 2 information that significantly decreases the level of safety in accordance with 10 CFR 50.59(c)(1) and meets any one of eight criteria in 10 CFR 50.59(c)(2)(i) through (viii) or 10 CFR 52, Design Certification Appendix, Section VIII.B.5.b.
- Departure from Tier 2* information.
- Departure from Technical Specifications (for tests performed after fuel load).

Preoperational test procedure intent changes involving Tier 1, Tier 2*, Technical Specifications, or Tier 2 that require a license amendment must be approved by the NRC prior to procedure completion and approval. Startup test procedure intent changes involving Tier 1, Tier 2*, Technical Specifications, or Tier 2 that require a license amendment must be approved by the NRC prior to procedure use. In some cases, NRC approval may be required prior to acceptance of test results instead of test procedure use. These intent changes will be evaluated on a case-by-case basis. Timely notification of the NRC is made when procedures are changed that have been sent to the NRC.

14AA.4 Conduct of the ITP

14AA.4.1 Administrative Controls

ITP conduct is described in DCD Section 14.2.1.1 and Section 14.2.4. The SAM governs the ITP and will be issued no later than 60 days prior to the beginning of the preoperational phase. The SAM includes the process for test procedure review, approval and issuance, method for verifying the current revision, methods to change test procedures, methods used for initial review of individual parts of multiple tests in order to assure coordination of plant conditions related to these tests, criteria for test interruption, and methods for identifying test deficiencies, documenting their resolutions and retesting. Testing during all phases of the test program is conducted using approved test procedures. Preoperational test procedures will be issued at least 60 days prior to their intended use and startup test procedures will be issued no later than 60 days prior to fuel load.

14AA.4.2 Procedure Verification

Because procedures may be approved for implementation weeks or months in advance of the scheduled test date, a review of the approved test procedure is required before commencement of testing. The test engineer is responsible for ensuring:

- Drawing and document revision numbers listed in the reference section of the test procedure agree with the latest revisions.
- The procedure text reflects any design change(s) made since the procedure was originally approved for implementation in the areas of acceptance criteria, FSAR, Technical Specifications, piping changes, etc.

- Any new operating experience lessons learned (since preparation of the procedure) are incorporated into individual test procedures.

Test procedures which are required to be performed in parallel, sequentially, or are considered individual parts of multiple tests as specified or identified in the Chapter 14 test abstracts:

- are sent to the reviewing organizations at the same time,
- receive a detailed review to verify coordination of plant conditions with related tests,
- identify all interface requirements, restrictions, prerequisites and post-requisites with related test procedures, and
- include additional reviews for impacts to related procedures when revised or amended by a test procedure change.

Procedures require signoff of verification for prerequisites and instruction steps. This signoff includes identification of the person doing the signoff and the date and time of completion.

Test engineers maintain chronological logs of test status to facilitate turnover and aid in maintaining operational configuration control. These logs become part of the test documentation.

There is a documented turnover process to ensure that test status and equipment configuration are known when personnel transfer responsibilities, such as during a shift change.

Test briefings are conducted for each test in accordance with administrative procedures. When a shift change occurs before test completion, another briefing occurs before resumption or continuation of the test.

Data collected is marked or identified with test, date, and person collecting data. This data becomes part of the test documentation.

The plant corrective action program is used to document all deficiencies, discrepancies, exceptions, nonconformances and failures (collectively known as test exceptions) identified in the ITP. The corrective action documentation becomes part of the test documentation. MHI/MNES and/or other design organizations participate in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria.

The senior manager operations and maintenance approves proceeding from one test phase to the next during startup testing. Approvals are documented in an overall ITP governance document.

Administrative procedures detail the test documentation review and approval. Review and approval of test documentation includes the test engineer, testing supervisor, startup test manager, MHI/MNES site representative or appropriate vendor, and JTG or FSRC. Final approval is by the senior manager operations and maintenance.

Plant readiness reviews are conducted to assure that the plant staff and equipment are ready to proceed to the next test phase or plateau.

14AA.4.3 **Work Control**

The Preoperational Test Group and Startup Test Group are responsible for preparing work requests when Construction organization assistance is required. Work requests are issued in accordance with a site-specific procedure governing the work management process. The plant staff, upon identifying a need for Construction organization assistance, coordinates their requirements through the appropriate startup test engineer.

Activities requiring Construction organization work efforts are performed under the plant tagging procedures. Tagging requests are governed by a site-specific procedure for equipment clearance. Tagging procedures shall be used for protection of personnel and equipment and for jurisdictional or custodial conditions that have been turned over in accordance with the turnover procedure.

The Preoperational Test Group and Startup Test Group are responsible for supervising minor repairs and modifications, changing equipment settings, and disconnecting and reconnecting electrical terminations as stipulated in a specific test procedure. Preoperational test engineers and startup test engineers may perform independent verification of changes made in accordance with approved test procedures.

14AA.4.4 **Measuring and Test Equipment (M&TE)**

During the preoperational test program, as well as the startup test program, most activities that lead to plant commercial operation involve design value verifications. M&TE used during these activities are properly controlled, calibrated, and adjusted at specified intervals to maintain accuracy within necessary limits. M&TE is governed by a site-specific

procedure for control of M&TE. M&TE includes portable tools, gauges, instruments, and other measuring and testing devices not permanently installed.

A calibration program is implemented. For standard M&TE equipment, calibration procedures are prepared for each type of M&TE calibrated onsite. Calibration intervals are established for each item of M&TE. However, if the calibration requirement of a particular piece of M&TE is beyond the capabilities or resources of the plant staff, this M&TE may be sent to an offsite certified calibration or testing agency. If special test equipment is necessary only for the ITP, the responsible vendor provides this equipment with the appropriate calibration documentation.

14AA.4.5 **System Turnover**

During the construction phase, systems, subsystems, and equipment are completed and turned over in an orderly and well-coordinated manner. Guidelines are established to define the boundary and interface between related system/subsystem and are used to generate boundary scope documents; for example, marked-up piping and instrument diagrams (P&IDs), electrical schematic diagrams, for scheduling and subsequent development of component and system turnover packages. The system turnover process includes requirements for the following:

- Documenting inspections performed by the construction organization (e.g., highlighted drawings showing areas inspected).
- Documenting results of construction testing.
- Determining the construction-related inspections and tests that need to be completed before preoperational testing begins. Any open items are evaluated for acceptability of commencing preoperational testing.
- Developing and implementing plans for correcting adverse conditions and open items, and means for tracking such conditions and items.
- Verifying completeness of construction and documentation of incomplete items.
- Systems, structures or components that have satisfactorily completed preoperational testing will be turned over in an orderly phased approach that provides sufficient time to prepare to accept control, including maintenance and operator familiarization.

14AA.4.6 Preoperational Testing

During preoperational testing, it may be necessary to return system control to Construction organization to repair or modify the system or to correct deficiencies. Administrative procedures include direction for:

- Means of releasing control of systems and or components to construction.
- Methods used for documenting actual work performed and determining impact on testing.
- Identification of required testing to restore the system to operability/functionality/availability status, and to identify tests to be re-performed based on the impact of the work performed.
- Verifying retests stay in compliance with ITAAC.

14AA.4.7 Startup Testing

The startup testing program is based on increasing power in discrete steps. Major testing is performed at discrete power levels as described in DCD Section 14.2.11. The first tests during power ascension testing that verify movements and expansion of equipment are in accordance with design, and are conducted at a power level as low as practical (approximately 5 percent).

The governing power ascension test plan requires the following operations to be performed at appropriate steps in the power-ascension test phase:

- Conduct any tests that are scheduled at the test condition or power plateau.
- Confirm core performance parameters (core power distribution) are within expectations.
- Determine reactor power by heat balance, calibrate nuclear instruments accordingly, and confirm the existence of adequate instrumentation overlap between the startup range and power range detectors.
- Reset high-flux trips, just prior to ascending to the next level, to a value no greater than 20 percent beyond the power of the next level unless Technical Specification limits are more restrictive.
- Perform general surveys of plant systems and equipment to confirm that they are operating within expected values.

- Check for unexpected radioactivity in process systems and effluents.
- Perform reactor coolant leak checks.
- Review the completed testing program at each plateau; perform preliminary evaluations, including extrapolation core performance parameters for the next power level; and obtain the required management approvals before ascending to the next power level or test condition.

Upon completion of a given test, a preliminary evaluation is performed that confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers. This extrapolation is included in the analysis section of the lower power procedure.

Surveillance test procedures may be used to document portions of tests, and ITP tests or portions of tests may be used to satisfy Technical Specifications surveillance requirements in accordance with administrative procedures.

14AA.4.8 Conduct of Modifications during the ITP

Temporary modifications may be required to conduct certain tests as described in DCD Section 14.2.4.2. These modifications are documented in the test procedure. The test procedures contain restoration steps and retesting required to confirm satisfactory restoration to required configuration.

Modifications may be performed by the Construction organization or using plant staff processes prior to NRC issuance of the 10 CFR 52.103g finding and are reviewed by the appropriate design organization. If the modification invalidates a previously completed ITAAC, then that ITAAC is re-performed. Each modification is reviewed to determine the scope of post-modification testing that is to be performed. Testing is conducted and documented to ensure that preoperational testing and ITAAC remain valid. Modifications made following NRC issuance of the 10 CFR 52.103g finding are in accordance with plant staff processes and meet license conditions. Modifications that require change of ITAAC require prior NRC approval of the ITAAC change.

14AA.4.9 Conduct of Maintenance and Post-Maintenance Testing during the ITP

All corrective or preventive maintenance activities are reviewed to determine the scope of post-maintenance testing to be performed. Prior to NRC issuance of the 10 CFR 52.103g finding, post-maintenance testing is conducted and documented to ensure that associated preoperational testing and ITAAC remain valid. Maintenance performed following NRC issuance of the 10 CFR 52.103g finding is in accordance with plant staff processes and meets license conditions. Post-modification and post-maintenance testing is described in DCD Section 14.2.4.3.

14AA.4.10 Audits

A comprehensive system of planned and periodic audits is carried out to verify compliance with the ITP in accordance with the QAPD. Follow-up actions, including re-audit of deficient areas, are taken where indicated.

14AA.5 Review, Evaluation and Approval of Test Results

14AA.5.1 Review and Approval Responsibilities

MHI/MNES is responsible for reviewing and approving the results of all tests of supplied equipment. Other vendors' representatives review the results of all tests of supplied equipment. Plant staff review and approval responsibilities are in Section 14AA.2, Section 14.2.3.1 and DCD Section 14.2.5. Final approval of individual test completion is by the senior manager operations and maintenance after approval by the JTG or FSRC.

14AA.5.2 Technical Evaluation

Each completed test package is reviewed by technically qualified personnel to confirm satisfactory demonstration of plant, system or component performance and compliance with design and license criteria as described in DCD Section 14.2.5.

14AA.6 Test Records

Records retention requirements are in DCD Section 14.2.6 and in the QAPD.

14AA.6.1 Startup Test Reports

Startup test reports are generated describing and summarizing the completion of tests performed during the ITP. A startup report is required per RG 1.16 at the earliest of: 1) 9 months following initial criticality, 2) 90 days after completion of the ITP, or 3) 90 days after start of commercial operations. If one report does not cover all three events, then supplemental reports are submitted every three months until all three events are completed. These reports:

- Address each startup test described in the FSAR.
- Provide a general description of measured values of operating conditions or characteristics obtained from the ITP as compared to design or specification values.
- Describe any corrective actions that were required to achieve satisfactory operation.
- Include any other information required to be reported by license conditions due to RG commitments.

14AA.7 Test Program Conformance with Regulatory Guides

DCD Table 14.2-2 lists RGs associated with the ITP. The following RGs provide additional guidance for the ITP: These RGs contain guidance that is included in the content of test procedures.

- RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Hazardous Chemical Release."
- RG 1.152, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants."

14AA.8 Utilization of Operating Experience

Administrative procedures provide methodologies for evaluating and initiating action for operating experience information (OE). DCD Section 14.2.8 describes the general use of operating experience in the development of the ITP.

14AA.8.1 Sources and Types of Information Reviewed for ITP Development

Multiple sources of operating experience were reviewed to develop the description of the ITP administration program. These included:

- INPO Operating Experience Reports.
- INPO 06-001, “Operating Experience to apply to Advanced Light Water Reactor Designs,” March 2006
- INPO 06-001, “Operating Experience to Apply to Advanced Light Water Reactor Designs,” Addendum, March 2006.
- INPO 07-003, “INPO/Utility Benchmarking for New Plant Deployment,” June 2007.
- INPO 07-003, “INPO/Utility Benchmarking for New Plant Deployment,” Addendum, December 2007.
- INPO 86-023, “Guidelines for Nuclear Power Construction Projects.”
- INPO 94-005, “Standard Operation Support of Nuclear Plants.”
- INPO 94-03, “Review of Commercial Nuclear Power Industry Standardization Experience.”
- INPO Document AP-909, “Construction of Standard Nuclear Plants.”
- INPO NX-1067, “Browns Ferry Nuclear Plant Unit I Restart Operational Readiness Lessons Learned.”
- NRC RG 1.68, “Initial Test Programs For Water-Cooled Nuclear Power Plants.”
- SER 24-85, “Xenon Tilt Oscillation Following Control Rod Insertion Test (05-24-1985).”
- SER 29-86, “Inadvertent Rapid Cooldown and Depressurization During a Remote Shutdown Test (08-12-1986).”
- SOER 87-01, “Core Damaging Accident Following an Improperly Conducted Test (03-06-1987).”
- SOER 91-01, “Conduct of Infrequently Performed Tests or Evolutions.”

14AA.8.2 Conclusions from Review

The following conclusions are a result of the OE review conducted to develop the ITP administration program description:

- The test procedures should provide guidance as to the expected plant response and instructions concerning what conditions warrant aborting the test. Errors and problems with the procedures should be anticipated. A means for prompt but controlled approval of changes to test procedures is needed. Critical test procedures should provide specific criteria for test termination and specific steps to ensure termination is conducted in a safe and orderly manner. Providing procedural guidance for aborting the test could prevent delays in plant restoration. Conservative guidance for actions to be taken should be included in the procedures.
- Plant simulators may prove useful in preparing for special tests and verifying procedures.
- Appropriate component/system operability should be verified prior to critical tests.
- The need to perform physics tests that can produce severe power tilts should be evaluated, particularly if tests at other similar reactors have provided sufficient data to verify the adequacy of the nuclear physics analysis.
- Implement compensatory measures in accordance with guidance for infrequently performed tests or evolutions where appropriate.

14AA.8.3 Summary of Test Program Features Influenced by the Review

The conclusions from the preceding section were incorporated in Sections 14AA.3.1 and 14AA.3.2.

14AA.8.4 Use of OE during Test Procedure Preparation

Administrative procedures require review of recent internal and external operating experience when preparing test procedures.

14AA.8.5 Use of OE during Conduct of ITP

Administrative procedures require discussion of operating experience when performing pre-job briefs immediately prior to the conduct of a test.

14AA.9 Trial Use of Plant Operating Procedures and Emergency Procedures

14AA.9.1 Use of Plant Procedures during ITP

Whenever practical, plant procedures are used to perform system and component operation during the conduct of a test.

14AA.9.2 Operator Training and Participation during Certain Initial Tests (TMI Action Plan Item I.G.1, NUREG-0737)

The objectives of operator participation are to increase the capability of shift crews to operate facilities in a safe and competent manner by assuring that training for plant changes and off-normal events is conducted. DCD Section 14.2.2.5 discusses TMI action plan item I.G.1 training.

The major objective of TMI Action Plan Task I.G.1 was to use the preoperational and startup test programs as a training exercise for operating crews. NUREG-0933 contains a discussion of the proposed actions and the conclusions made. NUREG-0800, Section 14 was revised to address the original issue of this action item. NUREG-0933 discusses eight AOOs applicable to the APWR. These are Hi/Low pressurizer pressure, pressurizer safety or relief valve opening, inadvertent SIS, loss of RCS flow, closure of all MSIV’s, Sudden opening of secondary relief valves, loss of component cooling and loss of service water. These events are addressed in the abnormal operating procedures. Operators receive training on them as part of their initial training. Operators participate in preoperational and startup testing.

Operators are trained on the specifics of the ITP schedule, administrative requirements and tests. Specific JIT training is conducted for selected startup tests.

The ITP may result in discovery of acceptable plant or system response differing from expected response. Test results are reviewed to identify these differences and the training for operators is changed to reflect them. Training is conducted as soon as is practicable in accordance with training procedures.

14AA.10 Initial Fuel Loading and Initial Criticality

14AA.10.1 Prerequisites for Fuel Loading

- Prerequisites for fuel load are listed in DCD Section 14.2.12.2.1.3, Initial Fuel Loading.

- All outstanding maintenance work remaining after the construction and preoperational test phases must complete or verified as not required for fuel load and punchlist items have been approved by the JTG.

14AA.10.2 Fuel Loading Procedure Details

The fuel loading process is described in DCD Section 14.2.10.1 and related testing is discussed in more detail in Sections 14.2.12.1.1.4 through 14.2.12.1.1.14.

14AA.10.3 Fuel Loading Procedure Limitations and Actions

The fuel loading procedure includes the following limits and instructions:

- Minimum crew required to load fuel (the procedure requires the presence of at least two persons at any location where fuel handling is taking place, and a senior operator with no other concurrent duties be in charge).
- Crew work time limits per 10 CFR 26 are in effect.
- Established criteria for stopping fuel loading. Some circumstances that might warrant this are unexpected subcritical multiplication behavior, loss of communications between the control room and fuel loading station, inoperable source-range detector, and inoperability of the emergency boration system.
- Established criteria for emergency boron injection.
- Established criteria for containment evacuation.
- Actions to be performed in the event of fuel damage.
- Actions to be performed and/or approvals to be obtained before routine loading may resume after one of the above limitations has been reached or invoked.

14AA.10.4 Initial Criticality Procedure Requirements

The format and content requirements for startup tests apply to the initial criticality procedure. Plant operations are in accordance with plant operating procedures to the maximum extent possible. This procedure includes steps to ensure that the startup proceeds in a deliberate and orderly manner, changes in reactivity are continuously monitored, and inverse multiplication plots are maintained and interpreted.

The initial criticality procedure is described in DCD Section 14.2.12.2.2.

NAPS COL 14.2(7)

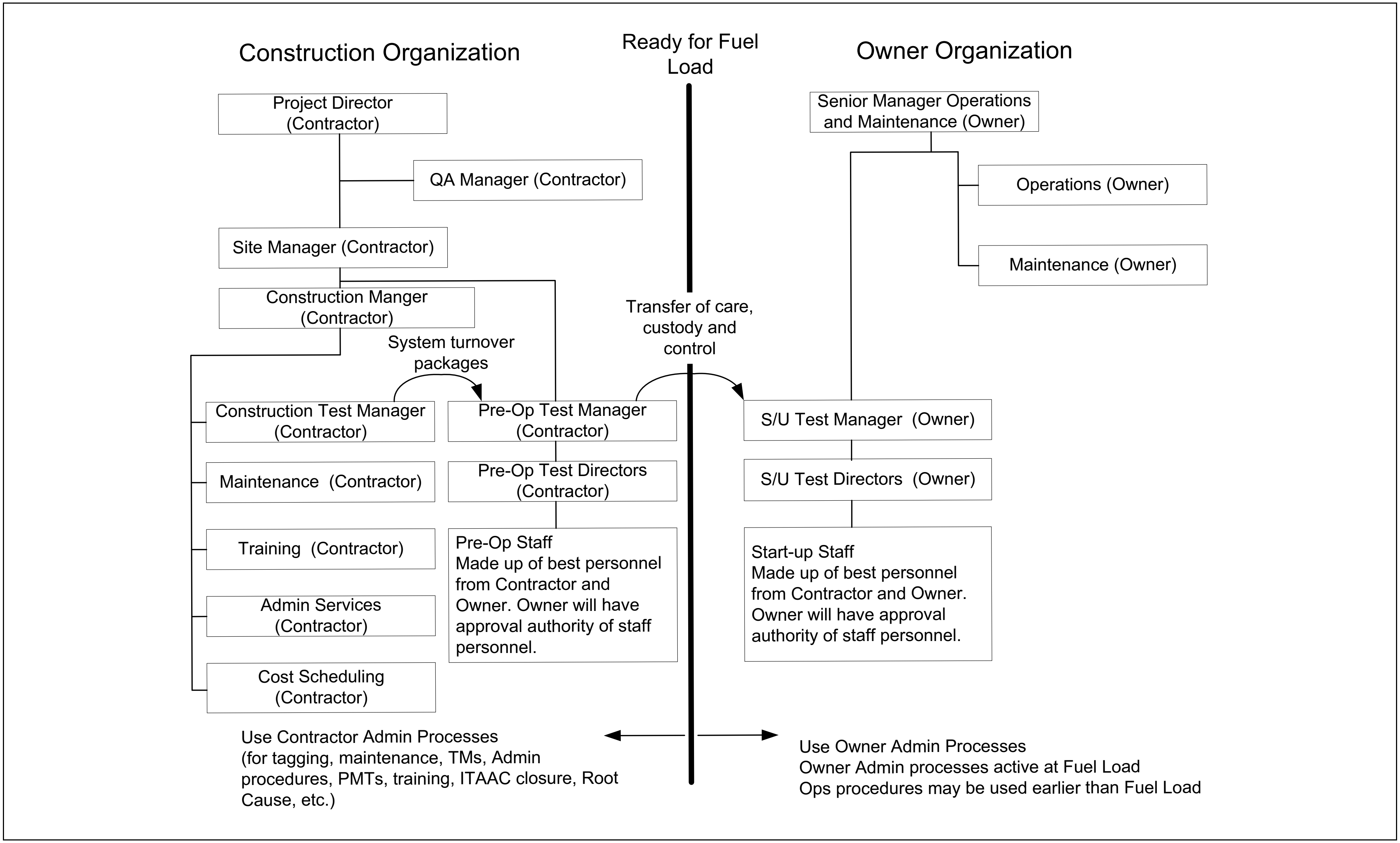
14AA.11 Plant Procedure Development Schedule

The milestone schedule for developing plant operating procedures is presented in Table 13.5-202 and discussed in Section 13.5.2.1. The operating and emergency procedures are available prior to start of licensed operator training and, therefore, are available for use during the ITP. Required or desired procedure changes may be identified during their use. Administrative procedures describe the process for revising plant operating procedures.

14AA.12 Individual Test Descriptions

Individual test descriptions can be found in DCD Section 14.2.12.1 and in Section 14.2.12.2.

Figure 14AA-201 Preoperational and Startup Test Organization (Typical)



15 Transient and Accident Analyses

15.0 Transient and Accident Analyses

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

15.0.3.3 Atmospheric Dispersion Factors

STD COL 15.0(1)

Replace the last paragraph in DCD Subsection 15.0.3.3 with the following.

The site-specific χ/Q values in Subsection 2.3.4 are bounded by the χ/Q values in Tables 15.0-13 and 15A-18 through 15A-24 of the DCD.

15.0.4 Combined License Information

Replace the content of DCD Subsection 15.0.4 with the following.

STD COL 15.0(1)

15.0(1) ***Site-specific χ/Q values***

This Combined License (COL) item is addressed in Subsection 15.0.3.3.

15.1 Increase In Heat Removal by the Secondary System

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.2 Decrease in Heat Removal by the Secondary System

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.3 Decrease in Reactor Coolant System Flow Rate

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.4 Reactivity and Power Distribution Anomalies

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.5 Increase in Reactor Coolant Inventory

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.6 Decrease in Reactor Coolant Inventory

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.7 Radioactive Release from a Subsystem or Component

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.8 Anticipated Transients Without Scram

This section of the referenced DCD is incorporated by reference with no departures or supplements.

15.9 ESP Information

NAPS SUP 15.9-1
NAPS ESP VAR 2.0-6

SSAR Chapter 15 is incorporated by reference for historical purposes.

Appendix 15A Evaluation Models and Parameters for Analysis of Radiological Consequences of Accidents

This section of the referenced DCD is incorporated by reference with no departures or supplements.

16 Technical Specifications

16.0 Technical Specifications

16.1 Technical Specifications

This section of the referenced Design Control Document (DCD) is incorporated by reference with the following departures and/or supplements.

16.1.1 Introduction to Technical Specifications

NAPS SUP 16.1(1)

Add the following text to the end of this section.

The US-APWR generic technical specifications and bases in Chapter 16 of the DCD are not considered Tier 2 information; therefore they are not incorporated by reference within this FSAR. However, the generic technical specifications and bases provided with Chapter 16 of the DCD are incorporated directly into the plant-specific technical specifications and bases provided in Part 4 of the COL application.

16.1.1.2 Technical Specification Content

NAPS COL 16.1(1)
NAPS COL 16.1(2)

Delete the following paragraphs from this section:

3. Deleted
4. Deleted
6. Deleted

16.1.2 References

NAPS COL 16.1(1)
NAPS COL 16.1(2)

Delete the following references from this section:

16.1-9 - Deleted

16.1-10 - Deleted

16.2 Combined License Information

This section of the referenced Design Control Document (DCD) is incorporated by reference with the following departures and/or supplements.

Add the following to the beginning of this section.

The COL Items listed in this section are addressed in Subsection 16.1.1.2 or Part 4 of the COLA.

17 Quality Assurance and Reliability Assurance

17.0 Quality Assurance and Reliability Assurance

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 17.5(1)

Add the following paragraph after the paragraph in DCD Section 17.0.

The Quality Assurance Program (QAP) described in Sections 17.1, 17.2, 17.3 and 17.5 is applicable for the site-specific design, construction and operation.

17.1 Quality Assurance During the Design Phase

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 17.5(1)

Replace the last paragraph in DCD Section 17.1 with the following.

Quality Assurance (QA) for the site-specific design is described in Sections 17.3 and 17.5.

NAPS SUP 17.1(1)

QA applied during the preparation of the ESPA is described in SSAR Chapter 17, which is incorporated by reference.

17.2 Quality Assurance During the Construction and Operation Phases

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 17.5(1)

Replace the paragraph in DCD Section 17.2 with the following.

QA for construction and operation is described in Sections 17.3 and 17.5.

17.3 Quality Assurance Program

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 17.5(1)

Replace the last paragraph in DCD Section 17.3 with the following.

QA for the site-specific design and for the plant construction and operation phases is addressed in Section 17.5.

17.4 Reliability Assurance Program

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

17.4.3 Scope

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraph after the last paragraph in DCD Subsection 17.4.3.

The site-specific phase, Phase II D-RAP, introduces the site-specific design to the D-RAP process. Phase III, the last phase of the D-RAP, implements procurement, fabrication, construction, and pre-operational testing in accordance with the site-specific D-RAP. The operational reliability assurance activities are conducted during site-specific plant operation, surveillance and maintenance. As described in DCD Subsection 17.4.2 of US-APWR DCD, the objective of these activities is to ensure that the reliability of the SSCs within the scope of the RAP is maintained during plant operation. The RAP activities are integrated into the existing operational programs (i.e., maintenance rule, surveillance testing, ISI, IST, and QA) in the operations phase.

The Phase II and Phase III programs continue the structure and quality controls of the Phase I process used in the Design Certification of the US-APWR as described in DCD Subsection 17.4.4. Phases II and III of the D-RAP program use the processes and information developed for Phase I and supplement them with input from site-specific organizations (e.g. Engineering, Procurement, Construction and Startup, etc.). The Phase I program migrates through Phases II and III to become the basis for reliability assurance after fuel load.

17.4.4 Quality Controls

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraphs after the last paragraph of "a. Organization" in DCD Subsection 17.4.4.

Phases II and III of the D-RAP occur before initial fuel load. Two organizations are responsible for the testing of the plant and verification of the plant design. The preoperational test organization is responsible for performing the phases of the ITP that occur before fuel load. This temporary group administratively reports to the construction executive and includes members from the construction organization, to include

MNES and construction test personnel, as well as personnel from on-site organizations such as Operations, Engineering, and QA.

The startup organization is responsible for all testing activities from fuel load to the completion of startup testing. This temporary group administratively reports to the plant operations organization and incudes members from on-site organizations such as Operations, Engineering, and QA. Technical assistance is provided by MNES.

Members of these test organizations gain experience from the preoperational and startup test programs and apply the experience to commercial operation of the plant. Test results are integrated into RAPs such as maintenance rule, surveillance testing, ISI, IST, and QA.

During plant operations, reliability assurance activities will transition to designated onsite organizations that will ensure that reliability assurance objectives are incorporated into operational programs. At this stage, all D-RAP SSCs must be included in the high safety significance category within the initial scope of the Maintenance Rule Program. These organizations will provide input to an expert panel, which will periodically evaluate the reliability assumptions based on actual equipment, train and system performance and operational experience and take into account considerations such as changes in individual component reliability throughout the course of plant life due to aging and changes in suppliers and technology. The expert panel provides interface among key organizations and ensures that reliability assurance objectives are properly considered in plant activities.

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraph after the last paragraph of "b. Design Control" in DCD Subsection 17.4.4.

Design control during Phases II and III of the D-RAP and during operational reliability assurance activities is accomplished within the framework of the QAPD described in Section 17.3 and Section 17.5.

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraph after the last paragraph of "c. Procedures and Instructions" in DCD Subsection 17.4.4.

The procedures and instructions of Phases II and III of the D-RAP and during operational reliability assurance activities are accomplished within the framework of the QAPD described in Section 17.3 and Section 17.5.

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraph after the last paragraph of "d. Records" in DCD Subsection 17.4.4.

The records of Phases II and III of the D-RAP and during operational reliability assurance activities are accomplished within the framework of the QAPD described in Sections 17.3 and 17.5.

17.4.5 Integration into Existing Operational Programs

NAPS COL 17.4(2)

Add the following paragraphs after the last paragraph in DCD Subsection 17.4.5.

Reliability assurance activities during the operations phase are integrated into the Maintenance Rule Program (Section 17.6), and other operational programs as listed below. The D-RAP SSCs are included in the HSS category within the scope of the Maintenance Rule Program. The Maintenance Rule Program incorporates the evaluation process of risk-significant SSCs, the maintenance of the reliability of risk-significant SSCs, and monitoring of the effectiveness of maintenance needed for reliability assurance. Industry operational experience will be used in the monitoring process to verify that reliability assumptions remain valid.

QAP	See Table 13.4-201
Maintenance Rule Program	See Table 13.4-201
ISI Program	See Table 13.4-201
Maintenance Programs	
Technical Specification Surveillances	See Section 16 (TS 5.5.8)
IST Program	See Table 13.4-201
RV Material Surveillance Program	See Table 13.4-201

The scope of the Maintenance Rule Program includes safety-related SSCs and certain nonsafety-related SSCs, as determined using a maintenance rule scoping procedure, consistent with SECY 95-132. Procurement, fabrication, construction, and test specifications for safety-related and nonsafety-related SSCs within the scope of the RAP are prepared and implemented under QAPs referenced in Sections 17.1, 17.2, 17.3, and 17.5. These elements of the QAPs provide adequate confidence that SSCs will perform satisfactorily in service and ensure

that significant assumptions, such as equipment reliability, are realistic and achievable.

17.4.7 D-RAP

NAPS COL 17.4(1)
NAPS COL 17.4(2)

Add the following paragraphs after the paragraph in DCD Subsection 17.4.7.

Phases II and III of the D-RAP occur before initial fuel load.

Phase II, the site-specific phase, introduces the site-specific design information to the D-RAP process.

The program of Phase III, the last phase of the D-RAP, is established prior to the procurement, fabrication, construction, and pre-operational testing.

Reliability assurance objectives are integrated into operational programs (maintenance rule, surveillance testing, ISI, IST and QA, as appropriate, in accordance with the implementation milestones indicated in Table 13.4-201).

STD COL 17.4(1)

Add the following new Subsection after the last paragraph in DCD Subsection 17.4.7.3.

17.4.7.4 Phase II D-RAP Implementation and SSCs included

Implementation of the Phase II D-RAP is site-specific. The SSCs included in Phase II are listed in Table 17.4-201 and DCD Table 17.4-1 (incorporated by reference).

17.4.8 ITAAC for the D-RAP

STD COL 17.4(1)

Add the following paragraph after the last paragraph in DCD Subsection 17.4.8.

A list of the risk-significant SSCs for the Phase II D-RAP is provided in Table 17.4-201 and DCD Table 17.4-1 (incorporated by reference).

17.4.9 Combined License Information

Replace the contents of DCD Subsection 17.4.9 with the following.

STD COL 17.4(1)
NAPS COL 17.4(1)

17.4(1) ***Implementation of Phases II and III of the D-RAP***

This COL item is addressed in Subsections 17.4.3, 17.4.4, 17.4.7, 17.4.8, and Table 17.4-201.

NAPS COL 17.4(2)

17.4(2) ***Implementation of the O-RAP***

This COL item is addressed in Subsections 17.4.3, 17.4.4, 17.4.5, and 17.4.7.

NAPS COL 17.4(1)

Table 17.4-201 Risk-Significant SSC's (Phase II D-RAP)

#	Systems, Structures or Component (SSCs)	Rationale[(1)]	Insights and Assumption
1	Ultimate Heat Sink Cooling Tower Fan 1 [UHS-MFN-001A(B,C,D)] Ultimate Heat Sink Cooling Tower Fan 2 [UHS-MFN-002A(B,C,D)]	RAW/CCF/LPSD	The ESWS transfers heat from the CCWS to the ultimate heat sink (UHS), which is the cooling towers. This system supports the CCWS, which supports various safety and non-safety mitigation systems. Accordingly, reliability of the CCWS and EFW systems has significant impact on risk. Since ESWS consists of four independent trains, failure of one train does not have a significant impact on risk. However, failures of SSCs that impact multiple trains have significant impact on risk. Accordingly, SSCs that have potential to cause common cause failures among multiple trains are risk significant.
2	UHS Cooling Tower Isolation Valve [UHS-MOV-509A (B,C,D)]	RAW/CCF	The two valves are interlocked. When main flowpath valves are opened during normal operation, the bypass valves are normally closed. When bypass mode is applied to prevent freezing of ESWS, the bypass valves associated with the standby towers will stay closed regardless of the bypass valve position of the operating cooling tower. If an accident occurs during bypass mode, the valves will be automatically returned to their normal position upon detection of signal.
3	UHS Cooling Tower Bypass Valve [UHS-MOV-510A (B,C,D)]	RAW/CCF	

Notes:

1. Definition of Rationale Terms:
   RAW = risk achievement worth
   CCF = common cause failure
   LPSD = low-power and shut down operation

17.5 Quality Assurance Program Description

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Replace the last paragraph in DCD Section 17.5 with the following.

NAPS SUP 17.5(1)

QA applied during the preparation of the ESP application is described in SSAR Chapter 17.

NAPS COL 17.5(1)

QA applied to safety-related activities performed prior to June 30, 2009 (e.g., site investigation, design and safety analysis, early procurements) is described in the Dominion Nuclear Facility QAPD (Reference 17.5-201) topical report for the Dominion operating nuclear plants as supplemented by North Anna 3 procedures.

QA applied to safety-related activities on or after June 30, 2009 (including site-specific design activities, construction and operation) is addressed in the Dominion QAPD (Appendix 17AA). The QAPD is based on NEI 06-14A (Reference 17.5-202).

QA applied to nonsafety-related SSCs, for which 10 CFR 50, Appendix B is not applicable, that are significant contributors to plant safety (on or after June 30,2009), is addressed in the Dominion QAPD (Appendix 17AA), Part III.

The implementation milestones for the Operational QAP are provided in Section 13.4.

17.5.1 Combined License Information

Replace the last paragraph in DCD Section 17.5 with the following.

STD COL 17.5(1)
NAPS COL 17.5(1)

17.5(1) ***Development and implementation of the QAP for the site specific design activities (i.e., non-standard plant design) and for the construction and operation***

This COL item is addressed in Sections 17, 17.1, 17.2 17.3 and 17.5.

17.5.2 References

Add the following at the end of this section.

17.5-201 Dominion Virginia Power, “Dominion Nuclear Facility Quality Assurance Program Description,” DOM-QA-1.

17.5-202 Nuclear Energy Institute, "Quality Assurance Program Description," NEI 06-14A, Revision 7.

NAPS SUP 17.5(1)

17.5.3 Evaluation of QAPD Against the SRP and QAPD Submittal Guidance

Table 1.9-201 contains a detailed summary of Quality Assurance Plan conformance to Standard Review Plan Section 17.5 acceptance criteria.

The QAPD, Appendix 17AA, Part II, Section 1, identifies the organizational interfaces for activities affecting quality, including those QA functions that are implemented within the QA organization and those that are delegated to other organizations, and the responsibilities for, and control over, those portions of the QA program delegated to other organizations. QAPD Part II, Section 1.3, specifies the organizational responsibilities for oversight and coordination of construction contractors.

QAPD Part II, Section 2, describes the assessment and audit of delegated responsibilities performed under a supplier's or principal contractor's QA Program, as well as routine interfaces with the supplier's personnel to provide added assurance that quality expectations are met.

QAPD Part II, Section 7.1 describes measures to assess the quality of purchased items and services, whether purchased directly or through contractors. QAPD Part II, Section 18.1 describes the responsibility and conduct of external audits to determine the adequacy of supplier and contractor QAPs.

17.6 Description of the Applicant's Program for Implementation of 10 CFR 50.65, The Maintenance Rule

Replace the contents of DCD Section 17.6 with the following.

17.6.1 Combined License Information

STD COL 17.6(1)

17.6(1) ***Implementation of the Maintenance Rule.***

This COL item is addressed in Section 17.6.

17.6.2 Maintenance Rule Program

This subsection incorporates by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," (Reference 17.6-201) which was approved by the NRC.

The text of the template provided in NEI 07-02A is generically numbered as "17.X" and "17.Y." When the template is incorporated by reference into this FSAR, section numbering is changed from "17.X" to "17.6.2" and from "17.Y" to "17.4."

Descriptions of the programs listed in Subsection 17.6.2.3 of NEI 07-02A are provided in the following FSAR chapters/sections or Part 4:

- Maintenance Rule Program (Section 17.6)
- Quality Assurance Program (Chapter 17)
- ISI Program (Sections 5.2 and 6.6)
- IST Program (Sections 3.9 and 5.2)
- Technical Specifications Surveillance Test Program (Part 4)

NAPS SUP 17.6(1)

Condition monitoring of underground or inaccessible cables is incorporated into the maintenance rule program. The cable condition monitoring program incorporates lessons learned from industry operating experience, addresses regulatory guidance, and utilizes information from detailed design and procurement documents to determine the appropriate inspections, tests and monitoring criteria for underground and inaccessible cables within the scope of the maintenance rule (i.e., 10 CFR 50.65).

17.6.3 Reference

17.6-201 *Generic FSAR Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52*, NEI 07-02A, Revision 0, NEI, March 2008.

NAPS SUP 17.5(2)

Appendix 17AA North Anna Power Station Unit 3 Quality Assurance Program Description

North Anna Unit 3 Quality Assurance Program Description

Topical Report
DOM-QA-2

Revision 4

Policy
Quality Assurance During Construction and Operation

Dominion Virginia Power (Dominion) shall design, procure, construct and operate the North Anna Unit 3 nuclear plant in a manner that will ensure the health and safety of the public and workers. These activities shall be performed in compliance with the requirements of the Code of Federal Regulations (CFR), the applicable Nuclear Regulatory Commission (NRC) Facility Operating Licenses, and applicable laws and regulations of the state and local governments.

The Dominion North Anna Unit 3 Quality Assurance Program (QAP) is the Quality Assurance Program Description (QAPD) provided in this document and the associated implementing documents. Together they provide for control of Dominion activities that affect the quality of safety-related nuclear plant structures, systems, and components (SSCs) and include all planned and systematic activities necessary to provide adequate confidence that such SSCs will perform satisfactorily in service. The QAPD may also be applied to certain equipment and activities that are not safety-related, but support safe plant operations, or where other NRC guidance establishes program requirements.

The QAPD is the top-level policy document that establishes the manner in which quality is to be achieved and presents Dominion's overall philosophy regarding achievement and assurance of quality. Implementing documents assign more detailed responsibilities and requirements and define the organizational interfaces involved in conducting activities within the scope of the QAP. Compliance with the QAPD and implementing documents is mandatory for personnel directly or indirectly associated with implementation of the Dominion North Anna Unit 3 QAP.

Signed *Signature on file*

David A. Heacock

President and Chief Nuclear Officer

LIST OF EFFECTIVE PARTS

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Part I Introduction

Section 1 General

Dominion's North Anna Unit 3 (North Anna 3) Quality Assurance Program Description (QAPD) is the top-level policy document that establishes the quality assurance policy and assigns major functional responsibilities for combined construction and operating license (COL) activities conducted by or for Dominion. The QAPD describes the methods and establishes quality assurance (QA) and administrative control requirements that meet 10 CFR 50, Appendix B, and 10 CFR 52. The QAPD is based on the requirements and recommendations of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," Parts I, II and III, as specified in this document.

The QA program (QAP) is defined by the NRC-approved regulatory document that describes the QA elements (i.e., the QAPD), along with the associated implementing documents. Procedures and instructions that control North Anna 3 activities will be developed prior to commencement of those activities. Dominion policies establish high-level responsibilities and authority for carrying out important administrative functions. Procedures establish practices for certain activities that are common to all Dominion nuclear business unit organizations performing those activities so that the activity is controlled and carried out in a manner that meets QAPD requirements. Procedures specific to a site, organization, or group establish detailed implementation requirements and methods, and may be used to implement policies or be unique to particular functions or work activities.

1.1 Scope/Applicability

The QAPD applies to COL, construction/pre-operation and operations, activities affecting the quality and performance of safety-related structures, systems, and components, including, but not limited to:

Designing	Cleaning
Siting	Testing
Training	Inspecting
Constructing	Preoperational activities (including ITAAC*)
Procuring	Startup
Receiving	Operating
Storing	Maintaining
Handling	Repairing
Shipping	Refueling
Erecting	Modifying
Installing	
Fabricating	

* ITAAC are those Inspections, Tests, Analyses, and Acceptance Criteria the applicant must satisfy as determined by the Commission in accordance with 10 CFR Part 52.

Safety-related SSCs, under the control of the QAPD, are identified by design documents. The technical aspects of these items are considered when determining program applicability, including, as appropriate, the item's design safety function. The QAPD may be applied to certain activities where regulations other than 10 CFR 50 and 10 CFR 52 establish QA requirements for activities within their scope.

The policy of Dominion is to assure a high degree of availability and reliability of the nuclear plant while ensuring the health and safety of its workers and the public. To this end, selected elements of the QAPD are also applied to certain equipment and activities that are not safety-related, but support safe, economic, and reliable plant operations, or where other NRC guidance establishes quality assurance requirements. Implementing documents establish program element applicability.

The definitions provided in ASME NQA-1-1994, Part 1, Section 1.4, apply to select terms as used in this document.

Part II QAPD Details

Section 1 Organization

This section describes the Dominion organizational structure, functional responsibilities, levels of authority and interfaces for establishing, executing, and verifying QAPD implementation. The organizational structure includes corporate support and onsite functions for North Anna 3 including interface responsibilities for multiple organizations that perform quality-related functions. Implementing documents assign more specific responsibilities and duties, and define the organizational interfaces involved in conducting activities and duties within the scope of the QAPD. Management gives careful consideration to the timing, extent and effects of organizational structure changes.

Dominion's senior manager of nuclear oversight is responsible to size the Quality Assurance staff commensurate with the duties and responsibilities assigned.

The following sections describe the reporting relationships, functional responsibilities and authorities for organizations implementing and supporting the North Anna 3 QA Program. Titles used herein are generic functional descriptions. Administrative documents are maintained to relate the generic titles to the Dominion specific titles. The Dominion organizations for the North Anna 3 developmental (preconstruction), construction and operational phases are shown in Figures II-1, II-2, and II-3, respectively.

1.1 Chief Nuclear Officer

The Chief Nuclear Officer (CNO) has overall responsibility and authority for implementing all activities associated with the safe and reliable design, construction, operation, and decommissioning of Dominion's nuclear facilities. The CNO establishes the North Anna 3 quality assurance policy and provides guidance regarding its implementation. The CNO has delegated the responsibility and authority for approval of the QAPD to the senior manager of the group responsible for nuclear oversight. The CNO has the authority to resolve disputes related to implementation of the QAPD for which resolution is not achieved at lower levels within the organization. There are three primary phases for the North Anna 3 COL activities: (1) nuclear development where the COL application is submitted and updated to lead to the eventual license issuance; (2) nuclear plant construction where the engineering, procurement, and construction (EPC) contract is in place for the final design and construction activities; and (3) nuclear operations where the nuclear fuel is loaded, plant start-up testing is conducted, and the plant is taken to commercial operation. During the operational phase, the CNO is responsible for appointing an Independent Review Committee (IRC) chair and assuring the IRC functions as described in Part V, Section 2.2. Throughout the three phases there are six functional organizations reporting to the CNO that affect the safety of the nuclear facilities. Three of these functional groups exist during

specific phases of the project: Nuclear Development, Nuclear Plant Construction, and North Anna 3 Operations. The remaining three have functions during each of the three phases of the project: Nuclear Oversight, Engineering Services, and Nuclear Support Services.

1.2 Nuclear Development

The Vice President North Anna 3 is responsible for the development of new nuclear power plants. This includes activities associated with new nuclear plant engineering, analysis, design, procurement, pre-construction preparation, preparing applications, and obtaining permits and licenses for potential construction. Where implementation of any or all of these functions is delegated to organizations outside Dominion, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this executive management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions. While in this developmental phase of the North Anna 3 Project, this portion of the organization will be structured as depicted in Figure II-1, later to be integrated into the Nuclear Plant Construction Organization, Figure II-2.

NOTE: Dominion's Business Development and Generation Construction (BDGC) organization will be responsible for managing the project schedule and budget for construction of North Anna 3. To support this responsibility, lines of communication are established between this group, the North Anna 3 Nuclear Project Technical Support organization, and the principal supplier, Mitsubishi Nuclear Energy Systems (MNES). The BDGC organization does not have any duties or authorities in implementing the North Anna 3 QA program.

1.2.1 Nuclear Project Technical Support

The senior manager of North Anna 3 Nuclear Project Technical Support (NPTS) is responsible for the COL application and interfacing with suppliers regarding design information necessary to support the application. This manager also interfaces as necessary with Dominion fleet organizations for support in developing the content of the application and establishing procurement documents for the engineering, procurement, and construction of the facility. As described below, four functional groups report to this management position and one principal supplier is contracted to provide engineering support.

1.2.1.1 Design Engineering

The North Anna 3 design engineering group is responsible for the technical aspects of the COL application that affect nuclear safety. This group establishes interfaces with suppliers and other Dominion groups as necessary. Engineering develops the technical requirements for the procurement of items and services, including the

engineering, procurement, and construction (EPC) contract for North Anna 3. This group also is responsible for the document control and records functions within the project through an interface with the responsible Dominion fleet organization.

1.2.1.2 Engineering Programs

The North Anna 3 engineering programs group is responsible for the development of operational programs specified in the FSAR, Chapter 13.4. This group also manages the corrective action program for the project, interfaces with the construction experience program in accordance with INPO guidelines, and manages the development of the ITAAC closure plans and the Design Reliability Assurance Program. This group interfaces with the existing North Anna units regarding engineering and design control for implementation of site modifications necessary to support construction of the North Anna 3 unit.

1.2.1.3 Licensing

The North Anna 3 licensing group is responsible for developing, maintaining. changing, and controlling the COL Application, including interfacing with the NRC on the review of the application. The licensing group is responsible for ensuring NRC reporting requirements for the project are met, including 10 CFR Part 21 and 10 CFR 50.55(e). This group maintains and interprets the licensing basis for North Anna 3 and develops and manages the licensing commitment program. Additional licensing functions include developing and implementing a process for communicating with the NRC regarding ITAAC closure, and ensuring project personnel meet the training requirements consistent with the QAP requirements.

1.2.1.4 Operational Staff Development

The North Anna 3 operational staff development group is responsible for the development of the 10 CFR 50.120 training program. This group works with the selected reactor vendor and industry groups in performing this function. This group also interfaces with the reactor supplier in the development of the human-system interface (HSI) and control room design.

1.2.1.5 Engineering Support Services

Dominion has contracted with MNES as the principal supplier to provide the necessary services for developing license application information, including design information necessary to support the safety analysis, and planning construction activities. Dominion has delegated the responsibility of establishing and executing quality assurance measures for these activities to MNES in accordance with their approved quality assurance program.

1.3 Nuclear Plant Construction

The Vice President North Anna 3 is responsible for construction of the North Anna 3 nuclear power plant in accordance with the COL and the QA program. This position assists in establishing procurement contracts, and provides technical oversight and coordination of design engineering and construction activities. Suppliers will be used to perform the majority of engineering, procurement, and construction (EPC) activities. The suppliers will be delegated, through contractual means, the necessary duties and authorities for achieving and assuring quality of the SSCs, however, Dominion retains the overall responsibility for quality.

NOTE: Dominion's BDGC organization will monitor the North Anna 3 construction project, including managing the project schedule and budget for construction of North Anna 3. To support this responsibility, lines of communication are established between this group, the NPTS organization, and MNES. Although present at the site, this organization does not have any duties or authorities in implementing the North Anna 3 QA program.

1.3.1 Nuclear Project Technical Support

The senior manager of North Anna 3 Nuclear Project Technical Support (NPTS) is responsible for interfacing with contractors to assure the quality of work is achieved while the project cost and schedule are maintained. The senior manager North Anna 3 NPTS ensures a process is developed and implemented to identify and resolve construction interferences so that changes are reflected back to the design and as-built configuration of the plant. The senior manager North Anna 3 NPTS establishes appropriate interface documents to address coordination of work between the Dominion project personnel and suppliers. The senior manager of North Anna 3 NPTS may use the services of other suppliers (e.g. an Owner's Engineer) to provide advice on the design and construction efforts of the EPC suppliers.

1.3.1.1 Design Engineering

The design engineering group is responsible for design control of the North Anna 3 project activities. This group is also responsible for maintaining configuration control of design and construction documents. Design engineering provides support in resolving technical issues related to procurement and construction including concurrence with resolution to nonconformances that are dispositioned accept-as-is or repair. This group provides technical support for start-up testing.

1.3.1.2 Engineering Programs

The engineering programs group is responsible for managing the North Anna 3 project corrective action process (including evaluation of construction experience), supporting long-lead procurements, supporting the completion and documentation

of ITAAC, and managing the Design Reliability Assurance Program. Engineering programs is responsible for developing the operational programs specified in the FSAR, Chapter 13.4. This group also provides support for configuration management for the project.

1.3.1.3 Licensing

The licensing group is responsible for maintaining and updating the North Anna 3 licensing basis, corresponding with the NRC or other government agencies regarding license and permit actions such as revisions to licenses or permits, completion of ITAAC, and supporting NRC inspection activities. This group is also responsible for preparing necessary reports such as for 10 CFR Part 21 or 10 CFR 50.55(e), and submitting them in accordance with regulatory requirements.

1.3.1.4 Operational Staff Development

The operational staff development group is responsible for developing the operational training program that meets the requirements of 10 CFR 50.120, including development of training material for the operators (senior, licensed, and non-licensed), maintenance personnel, radiation protection technicians, chemistry technicians, and engineering support personnel. This group is also responsible for supporting the development of the simulator and its inclusion in the training program. This group supports the reactor plant supplier in development of the Human/System interface. The operational staff development group also is responsible for the development of operating procedures and validating their usage through system walkdowns, training, and participation in the preoperational and start-up test programs.

1.3.2 Mitsubishi Nuclear Energy Systems, Inc.

Dominion will procure the services of Mitsubishi Nuclear Energy Systems, Inc. (MNES) to develop and implement the North Anna 3 construction project (i.e., the EPC contractor). MNES is delegated the duties and authorities to construct an Advanced Pressurized Water Reactor for the US (US-APWR) at the North Anna site. This includes developing detailed design and construction engineering, procuring necessary items and services, and the construction and installation of SSCs for the facility. Dominion delegates through appropriate procurement documents the duties of and authorities for establishing and executing a QA program for the design, final siting, construction, procurement, receipt, storage, handling, shipping, erection, fabrication, installation, inspection, cleaning, and testing of SSCs for the North Anna 3 facility. MNES may use qualified suppliers in accordance with their QA Program to accomplish these duties.

1.4 North Anna 3 Operations

The Vice President of North Anna 3 is responsible for overall operating activities of the North Anna 3 nuclear facility. This executive is responsible for implementing the quality assurance program during operating activities.

The necessary responsibility and authority for the management and direction of all activities related to safe and efficient operation has been delegated by the CNO. This responsibility includes ensuring quality through implementation of the QAPD in all the activities related to operation such as maintenance, testing, start-up and shutdown, refueling, fuel storage, and modification.

1.4.1 Facility Operations and Maintenance

A senior management position is responsible for safe operations and maintenance of the nuclear facilities including those activities necessary for initial plant preoperational and start-up testing. The position responsibilities include: directing the operations, maintenance, planning, and site services groups; implementing facility modifications; and maintaining compliance with requirements of the operating license, Technical Specifications, and applicable federal, state, and local laws, regulations, and codes.

1.4.1.1 Operations

Operations is responsible for operating the facility in accordance with the applicable license. Overall facility operation is directed by a management position responsible for operating activities.

Operating activities include the performance of preoperational and start-up testing; monitoring and controlling day-to-day operation of the nuclear facility; responding to alarms; manipulating facility equipment; performing technical specification surveillances; coordinating facility operations to manage work such as maintenance, testing, and modifications; and moving nuclear fuel. The operations organization contains supervision and staff for shift operations, including shift managers, unit supervisors, licensed control room operators, and non-licensed operators. Operations is also responsible for the shift technical advisor function. Operations is also responsible for oversight of fire protection measures.

1.4.1.2 Maintenance

Maintenance is responsible for directing and coordinating facility maintenance activities including on-line maintenance, installation, alterations, adjustment and calibration, replacement and repair of plant electrical and mechanical equipment, and instruments and controls. The responsibilities include performance of surveillances required by Technical Specifications, establishing standards and

frequency of calibration for instrumentation and control devices, and ensuring instrumentation and related testing equipment are properly used, inspected and maintained.

1.4.1.3 Outage and Planning

Outage and planning is responsible for planning and scheduling online-maintenance and outage activities.

1.4.1.4 Site Services

Site services is responsible for facility construction and/or modification support, including project management and project controls.

1.4.2 Safety and Licensing

A senior management position is responsible for ensuring that facility safety and licensing requirements are implemented. This position is responsible for directing and coordinating training, radiological protection, chemistry, and assessment of nuclear safety issues at the facility. The responsibilities also include managing licensing activities; interfacing with corporate management on operating experience and licensing issues, managing facility procedures, and administering the facility environmental compliance program. This position is independent of cost and scheduling concerns associated with operations, maintenance, and modification activities.

1.4.2.1 Organizational Effectiveness

Organizational effectiveness is responsible for the corrective action program and the operating experience program.

1.4.2.2 Radiological Protection and Chemistry

Radiological protection and chemistry carries out health physics and chemistry functions and maintains sufficient organizational freedom and independence from operating pressures as required by the facility Technical Specifications. A qualified supervisor or manager is assigned to fulfill the radiological protection manager position described in ANS-3.1-1993. The radiological protection responsibilities include scheduling and conducting radiological surveys, contamination sample collection, determining contamination levels, assigning work restrictions through radiation work permits, administering the personnel monitoring program, and maintaining required records in accordance with federal and state codes. The chemistry responsibilities include maintaining primary and secondary plant chemistry in accordance with established program requirements.

1.4.2.3 Procedures and Records

The procedures and records group is responsible for ensuring that procedures are prepared in accordance with applicable regulatory requirements, industry quality standards, and the QAPD. This group manages the document control system and is responsible for the collection and storage of North Anna 3 QA Records.

1.4.2.4 Licensing

The licensing group is responsible for corresponding with the NRC on license related matters and supporting arrangements for NRC inspections.

1.4.2.5 Training

The training group is responsible for the development and implementation of a training program for the operating unit that meets the requirements of 10 CFR 50.120.The training group maintains sufficient organizational freedom and independence from operating pressures as required by the facility Technical Specifications. Certain functional groups may be assigned responsibility for the development and conduct of their own training programs provided these groups are not required to have a systems approach to training under 10 CFR 50.120.

1.4.3 Facility Engineering and Technical Support

A senior management position is responsible for managing engineering resources providing day-to-day technical support for facility operations and maintenance. The functions include engineering and technical support at a system and component level to ensure optimum design basis performance, system reliability, and optimum component performance and reliability. Support is also provided in developing and implementing testing programs, tracking and scheduling test performance, and evaluating test results. The test programs include inservice inspections, Technical Specification surveillances, post-modification and post-maintenance testing, and nondestructive examinations.

1.4.3.1 Design Engineering

The design engineering group is responsible for maintaining the North Anna 3 design basis. This responsibility includes design and configuration control for modifications to the facility, evaluating design problems and proposing solutions, and maintaining the setpoint control program. This group also provides technical support for preoperational and startup testing.

1.4.3.1.1 Fire Protection Engineering

Fire protection engineering is responsible for maintaining the fire protection design basis and assisting with the resolution of problems related to fire protection at the site.

1.4.3.2 System Engineering

The system engineering group is responsible for monitoring plant systems and components to ensure reliable operation. The responsibilities include monitoring Maintenance Rule equipment performance, evaluating and proposing solutions for system and equipment problems, providing reactor engineering functions, and supporting evaluations of equipment operability. This group also provides support in the development of operating and maintenance procedures, and the performance of technical specification surveillances.

1.4.3.3 Engineering Technical Support

The engineering technical support group is responsible for managing the inservice inspection and testing (ISI/IST) program and performance of the nondestructive examination (NDE) program. This group also provides advice to the maintenance group regarding the preventive and corrective maintenance programs and scheduling support for periodic technical specification surveillance compliance.

1.5 Nuclear Oversight

The senior manager of nuclear oversight is responsible for the verification of effective Dominion and supplier QA program development, documentation, and implementation. This position is independent of cost and scheduling concerns associated with construction, operations, maintenance, and modification activities for performing quality assurance program verification. Where implementation of any or all of these functions is delegated to suppliers, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this senior management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions. This management position has the necessary authority and responsibility for verifying quality achievement; identifying quality problems, recommending solutions and verifying implementation of the solutions; and escalating quality problems to higher management levels. This position has the authority to suspend unsatisfactory work and control further processing or installation of non-conforming materials. The authority to stop work delegated to nuclear oversight personnel is delineated in procedures. Nuclear oversight is responsible for the development and implementation of training to qualify and maintain qualification of department personnel in their assigned functions.

1.5.1 Nuclear Development and Construction Phases

Nuclear oversight is responsible for QA oversight of the North Anna 3 project. The oversight includes activities in development of the license application, design, procurement, construction, and related activities that affect the quality of SSCs.

1.5.1.1 QA Program Development

This group is responsible for development and maintenance of the QAPD. This group is responsible for verification of the development of the construction QA program through review of and concurrence in quality-related procedures for design, construction, and installation. This group also performs audits of the effectiveness of the North Anna 3 QA program implementation within Dominion.

1.5.1.2 Site QA/QC

This group is responsible for quality oversight of supplier conducted activities at the North Anna 3 construction site through a system of planned audits, surveillances, and inspections as appropriate to the activity and based on the importance of the item or activity to the safety of the plant. This group is responsible for performance of inspections for Dominion activities on SSCs that have been turned over to Dominion for operation.

1.5.1.3 Supplier QA/QC

This group is responsible for quality oversight of suppliers, except for activities conducted at the North Anna 3 site, and is performed through a system of audits, surveillances, and inspections as appropriate to the activity and based on the importance of the item or activity to the safety of the plant. This oversight is typically conducted at supplier facilities. In performance of the oversight, this group may interface with Dominion's existing systems and groups for qualifying suppliers and performing verification activities.

1.5.2 Operations Phase

Nuclear oversight is responsible for the evaluation of suppliers' quality programs through a system of external audits, evaluations, and reviews of supplier performance in accordance with quality assurance requirements. A list of approved suppliers is maintained. Nuclear oversight is responsible for assuring Dominion compliance with the QAPD through administration of a comprehensive and systematic internal audit program.

Nuclear oversight is responsible for developing and maintaining an appropriate quality verification inspection program for the facility operating organization functions.

1.5.2.1 Facility Oversight

A management position is responsible for the effective performance of nuclear oversight activities. This position performs independent assessment through a system of planned and systematic audits and surveillances of facility operations related to quality and safety with lines of communication to the Vice President North Anna 3.

1.5.2.1.1 Quality Control Inspection

The quality control inspection group plans and conducts inspections of operating facility maintenance and modification activities to ensure quality in accordance with the requirements of the QA program.

1.6 Nuclear Engineering

The Vice President of Nuclear Engineering is responsible to provide support for the Dominion fleet of nuclear facilities with design engineering functions and other technical activities. The responsibilities include, as needed, performing independent design checks and reviews, developing and maintaining engineering programs, including those for nondestructive examination (NDE), and the facility inservice inspection and test (ISI/IST) programs; configuration management including design and configuration control, and developing and revising facility drawings; and engineering technical support at the operating facilities.

1.6.1 Nuclear Analysis and Fuel

A senior management position is responsible for activities related to safety and management of nuclear fuel. Nuclear Analysis and Fuel (NAF) is a Dominion corporate Support group that is responsible for engineering activities, evaluation, and analysis of: core design, fuel and reactor performance, probabilistic risk assessment, spent fuel storage, and radiological effects. NAF provides reactor-engineering support for the operating power stations. NAF is responsible for nuclear fuel procurement, assurance of nuclear fuel quality through surveillances and inspections at Dominion and supplier facilities, and special nuclear material accountability. This position has the authority to control further processing or installation of nonconforming materials. The authority delegated to inspection and surveillance personnel is delineated in procedures.

1.6.2 Information Technology

A senior management position is responsible for direction and support of information technology for the nuclear organizations and facilities. Responsibilities include: network infrastructure maintenance and upgrade, network and application security, network operations; automation strategy, application development and support, automation

training; development and maintenance of the software control program; and oversight, maintenance, and repair of the Emergency Response Facility Computer System.

1.7 Support Services

The Vice President of Support Services is responsible to provide support for the Dominion fleet of nuclear facilities in the areas of security, emergency preparedness, training, and procurement, as needed. Where implementation of any or all of these functions is delegated to organizations outside Dominion, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this executive management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions.

1.7.1 Protection Services and Emergency Preparedness

A senior management position is responsible for providing nuclear facility security, and overall management of nuclear emergency preparedness activities.

1.7.1.1 Protection Services

Protection services is responsible for facility protective services, including physical security, nuclear facility access programs, and fitness for duty programs. Protection Services is also responsible for industrial safety and loss prevention including oversight of fire protection measures.

1.7.1.2 Emergency Preparedness

Emergency preparedness is responsible for development and maintenance of Dominion radiological emergency plans and coordination with required off-site radiological emergency response groups for the nuclear facilities. This includes managing the overall scheduling and coordination of emergency plan testing, training and exercises with federal, state, and local agencies, and working with corporate and facility personnel to ensure emergency plans meet all the requirements and commitments.

1.7.2 Supply Chain Management

A senior management position is responsible for purchasing and procurement engineering during all phases. During the operations phase, the responsibilities also include supplier surveillance functions, material management, and source and receipt inspection. This position has the authority to control further processing or installation of nonconforming materials. This authority is delegated to inspection and surveillance personnel as delineated in procedures.

1.7.3 Nuclear Document Management

Nuclear document management is responsible for the collection, retention, and preservation of quality assurance records.

1.8 Authority to Stop Work

Quality assurance and inspection personnel have the authority, and the responsibility, to stop work in progress which is not being done in accordance with approved procedures or where safety or SSC integrity may be jeopardized. This extends to offsite work performed by suppliers that furnish safety-related materials and services to Dominion.

1.9 Quality Assurance Organizational Independence

For the COL construction activities, independence shall be maintained between the organization or organizations performing the checking (quality assurance and control) functions and the organizations performing the functions. This provision is not applicable to design review/verification.

1.10 NQA-1-1994 Commitment

In establishing its organizational structure, Dominion commits to compliance with NQA-1-1994, Basic Requirement 1 and Supplement 1S-1.

Figure II-1 Nuclear Developmental QA Organization

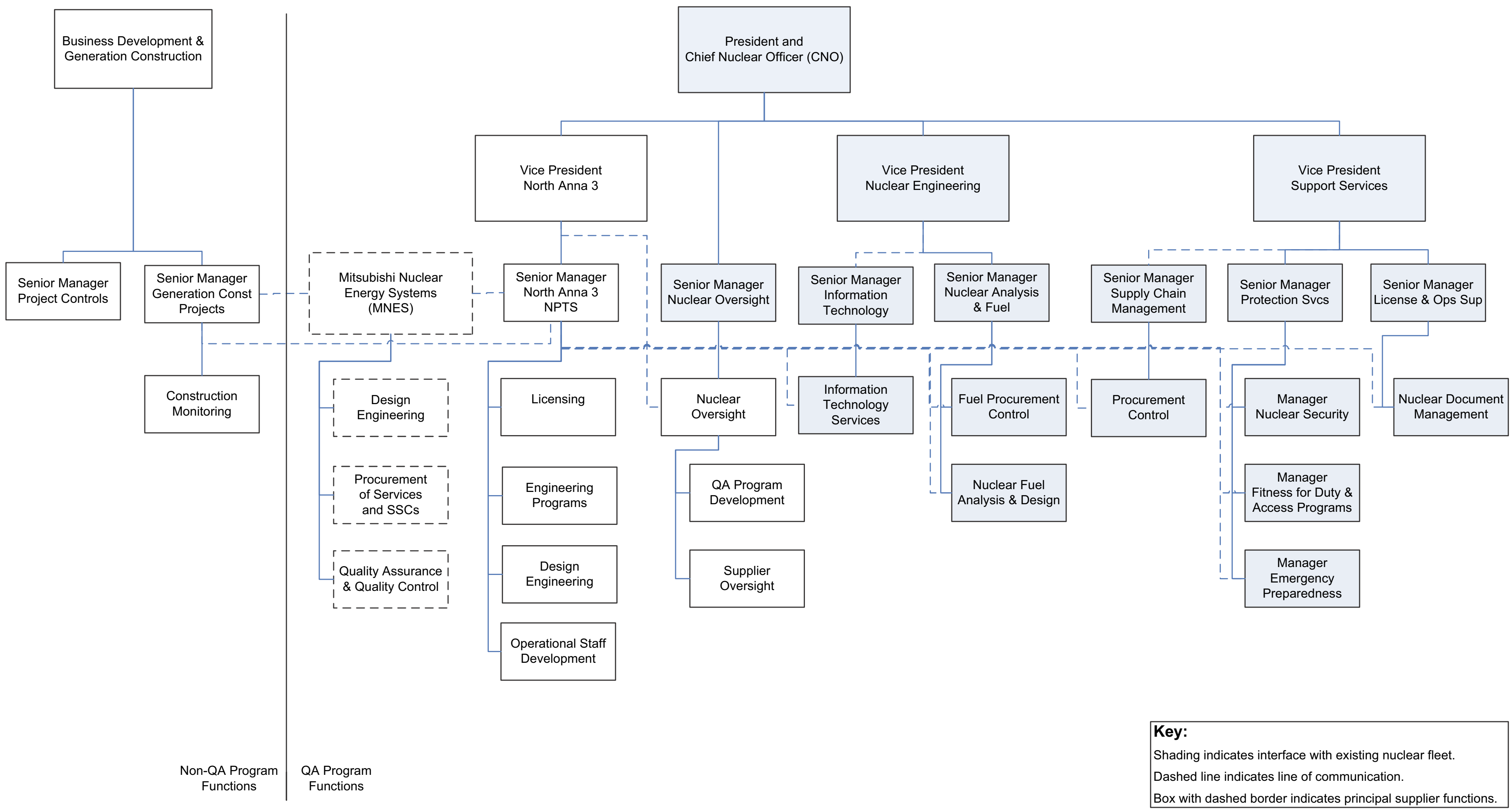
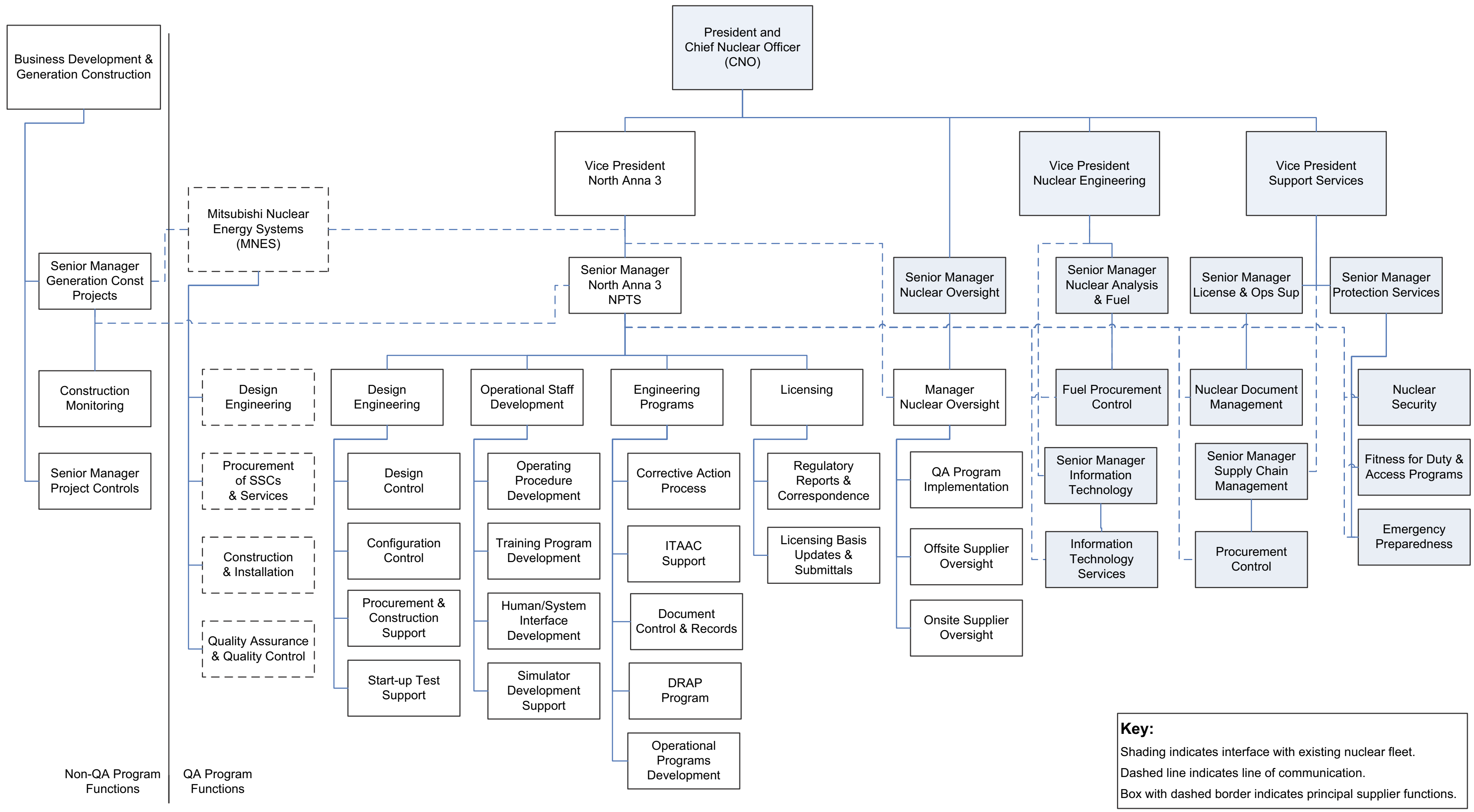
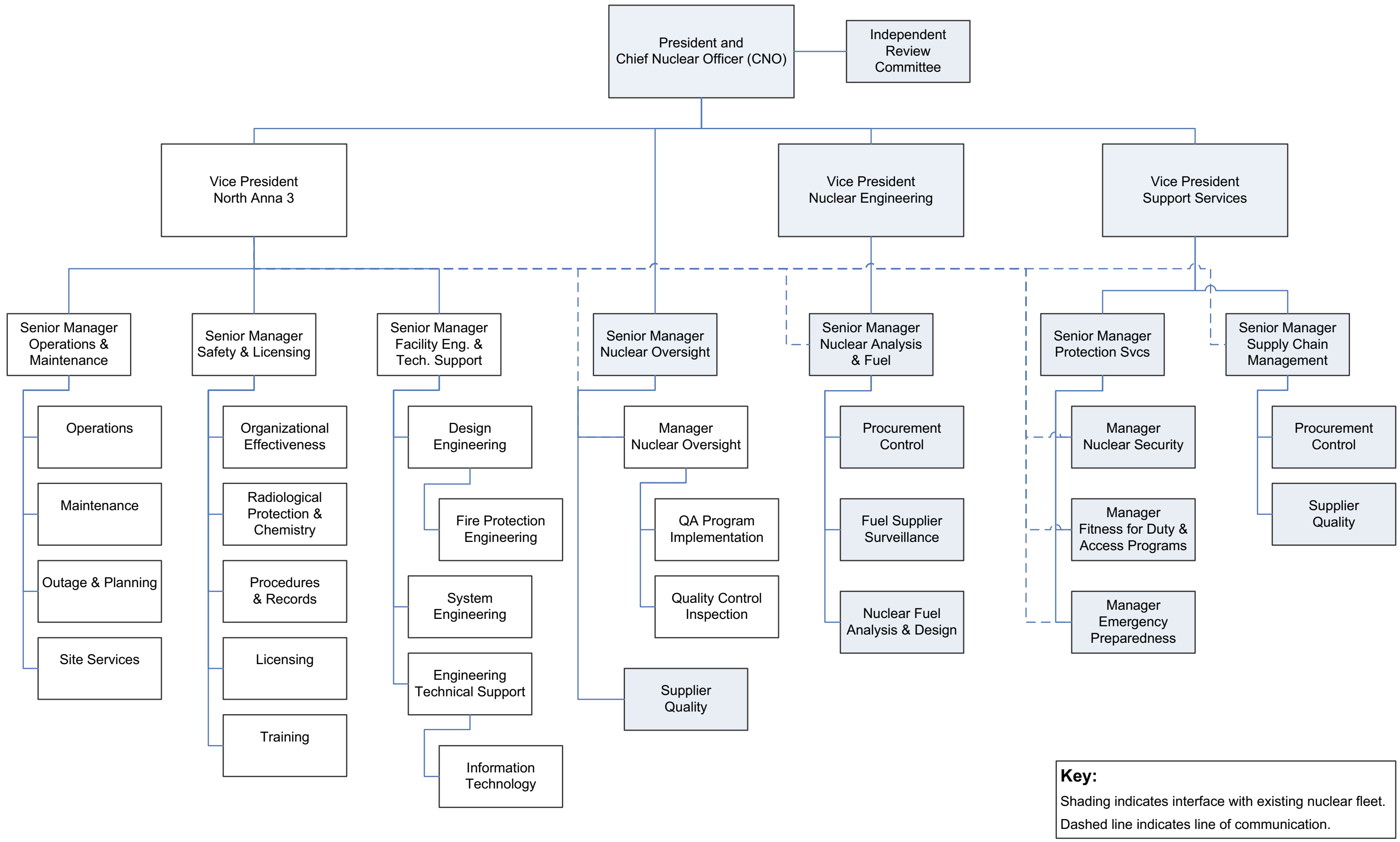


Figure II-2 Nuclear Construction QA Organization



Key:
Shading indicates interface with existing nuclear fleet.
Dashed line indicates line of communication.
Box with dashed border indicates principal supplier functions.

Figure II-3 Nuclear Operational QA Organization



Section 2 Quality Assurance Program

Dominion has established the necessary measures and governing procedures to implement the QAP as described in the QAPD. Dominion is committed to implementing the QAP in all aspects of work that are important to the safety of the nuclear plant as described and to the extent delineated in the QAPD. Further, Dominion ensures through the systematic process described herein that its suppliers of safety-related equipment or services meet the applicable requirements of 10 CFR 50, Appendix B. Senior management is regularly apprised of the adequacy of implementation of the QAP through the audit functions described in Part II, Section 18.

The objective of the QAP is to assure that the North Anna 3 nuclear generating plant is designed, constructed, and operated in accordance with governing regulations and license requirements. The program is based on the requirements of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," as further described in this document. The QAP applies to those quality-related activities that involve the functions of safety-related SSCs associated with the design (excluding Design Certification activities), fabrication, construction, and testing of the facility SSCs, and to the managerial and administrative controls used to assure safe operations. Examples of COL safety-related activities include, but are not limited to, site-specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis. A list or system that identifies SSCs and activities to which this program applies is maintained at the appropriate facility. The Design Certification Document is used as the basis for this list or system. Cost and scheduling functions do not prevent proper implementation of the QAP.

As described in Part III of the QAPD, specific program controls are applied to nonsafety-related SSCs, for which 10 CFR 50, Appendix B, is not applicable, that are significant contributors to plant safety. The specific program controls consistent with applicable sections of the QAPD are applied to those items in a selected manner, targeted at those characteristics or critical attributes that render the SSC a significant contributor to plant safety.

Delegated responsibilities may be performed under a supplier's or principal contractor's QAP provided that the supplier or principal contractor has been approved as a supplier in accordance with the QAPD. Periodic audits and assessments of supplier QA programs are performed to assure compliance with the supplier's or principal contractor's QAPD and implementing procedures. In addition, routine interfaces with supplier's personnel provide added assurance that quality expectations are met.

For the COL application, the QAPD applies to those North Anna 3 and Dominion activities that can affect either directly or indirectly the safety-related site characteristics or analysis of those characteristics. In addition, the QAPD applies to engineering activities that are used to characterize the site or analyze that characterization.

New nuclear plant construction will be the responsibility of Dominion's North Anna 3 organization. Detailed engineering specifications and construction procedures will be developed to implement the QAPD and EPC QA programs prior to commencement of construction (COL) activities. Examples of Limited Work Authorization (LWA) activities that could impact safety-related SSCs include impacts of construction to existing facilities and for construction of new plants, the interface between nonsafety-related and safety-related SSCs, and the placement of seismically-designed backfill.

In general, the program requirements specified herein are detailed in implementing procedures that are either Dominion/North Anna 3 implementing procedures, or supplier implementing procedures governed by a supplier quality assurance program.

A grace period of 90 days may be applied to provisions that are required to be performed on a periodic basis unless otherwise noted. Annual evaluations and audits that must be performed on a triennial basis are examples where the 90 day grace period could be applied. The grace period does not allow the "clock" for a particular activity to be reset forward. The "clock" for an activity is reset backwards by performing the activity early. Audit schedules are based on the month in which the audit starts.

2.1 Responsibilities

Personnel who work directly or indirectly for Dominion are responsible for achieving acceptable quality in the work covered by the QAPD. This includes those activities delineated in Part I, Section 1.1. Dominion personnel performing verification activities are responsible for verifying the achievement of acceptable quality. Activities governed by the QAPD are performed as directed by documented instructions, procedures, and drawings that are of a detail appropriate for the activity's complexity and effect on safety. Instructions, procedures, and drawings specify quantitative or qualitative acceptance criteria, as applicable or appropriate for the activity, and verification is against these criteria. Provisions are established to designate or identify the proper documents to be used in an activity, and to ascertain that such documents are being used. The North Anna 3 nuclear oversight manager is responsible to verify that processes and procedures comply with the QAPD and other applicable requirements, that such processes or procedures are implemented, and that management appropriately ensures compliance.

2.2 Delegation of Work

Dominion retains and exercises the responsibility for the scope and implementation of an effective QAP. Positions identified in Part II, Section 1, may delegate all or part of the activities of planning, establishing, and implementing the program for which they are responsible to others, but retain the responsibility for the program's effectiveness. Decisions

affecting safety are made at the level appropriate for its nature and effect, and with any necessary technical advice or review.

2.3 Site-Specific Safety-Related Design Basis Activities

Site-specific safety-related design basis activities are defined as those activities, including sampling, testing, data collection, and supporting engineering calculations and reports, that will be used to determine the bounding physical parameters of the site. Appropriate quality assurance measures are applied.

2.4 Periodic Review of the Quality Assurance Program

Management of those organizations implementing the QA program, or portions thereof, assess the adequacy of that part of the program for which they are responsible to assure its effective implementation at least once each year or at least once during the life of the activity, whichever is shorter. However, the period for assessing QA programs during the operations phase may be extended to once every two years.

2.5 Issuance and Revision to Quality Assurance Program

Administrative control of the QAPD will be in accordance with 10 CFR 50.55(f) and 10 CFR 50.54(a), as appropriate. Changes to the QAPD are evaluated by the nuclear oversight manager to ensure that such changes do not degrade previously approved quality assurance controls specified in the QAPD. This document shall be revised as appropriate to incorporate additional QA commitments, that may be established during the COL application development process. New revisions to the document will be reviewed, at a minimum, by the Dominion manager responsible for North Anna 3 nuclear oversight and approved by the senior manager responsible for Dominion's nuclear oversight group.

Regulations require that the SAR include, among other things, the managerial and administrative controls to be used to assure safe operation, including a discussion of how the applicable requirements of Appendix B will be satisfied. In order to comply with this requirement, the SAR references the QAPD and, as a result, the requirements of 10 CFR 50.54(a) are satisfied by and apply to the QAPD.

2.6 Personnel Qualifications

Personnel assigned to implement elements of the QAPD shall be capable of performing their assigned tasks. To this end, Dominion establishes and maintains formal indoctrination and training programs for personnel performing, verifying, or managing activities within the scope of the QAPD to assure that suitable proficiency is achieved and maintained. Plant and support staff minimum qualification requirements are as delineated in the unit Technical Specifications. Other qualification requirements may be established but will not reduce those

required by Technical Specifications. Sufficient managerial depth is provided to cover absences of incumbents. When required by code, regulation, or standard, specific qualification and selection of personnel is conducted in accordance with those requirements as established in the applicable Dominion procedures. Indoctrination includes the administrative and technical objectives, requirements of the applicable codes and standards, and the QAPD elements to be employed. Training for positions identified in 10 CFR 50.120 is accomplished according to programs accredited by the National Nuclear Accrediting Board of the National Academy of Nuclear Training that implement a systematic approach to training. Records of personnel training and qualification are maintained.

The minimum qualifications of the senior manager of nuclear oversight and the manager of nuclear oversight for North Anna 3 are that each holds an engineering or related science degree and a minimum of four years of related experience including two years of nuclear power plant experience, one year of supervisory or management experience, and one year of the experience is in performing quality verification activities. Special requirements shall include management and supervisory skills and experience or training in leadership, interpersonal communication, management responsibilities, motivation of personnel, problem analysis and decision making, and administrative policies and procedures. Individuals who do not possess these formal education and minimum experience requirements should not be eliminated automatically when other factors provide sufficient demonstration of their abilities. These other factors are evaluated on a case-by-case basis and approved and documented by senior management.

The minimum qualifications for the individuals responsible for supervising QA or QC personnel are that each has: a high school diploma or equivalent, at least 1 year of nuclear plant experience, and a minimum of 1 year of experience performing quality verification activities. Individuals who do not possess these formal education and experience requirements should not be eliminated automatically when other factors provide sufficient demonstration of their abilities. These other factors are evaluated on a case-by-case basis and approved and documented by senior management.

The minimum qualifications of the individuals responsible for planning, implementing, and maintaining the QAPD are that each has a high school diploma or equivalent and a minimum of one year of related experience. Individuals who do not possess these formal education and minimum experience requirements should not be eliminated automatically when other factors provide sufficient demonstration of their abilities. These other factors are evaluated on a case-by-case basis and approved and documented by senior management.

2.7 NQA-1-1994 Commitment/Exceptions

In establishing qualification and training programs, Dominion commits to compliance with NQA-1-1994, Basic Requirement 2 and Supplements 2S-1, 2S-2, 2S-3 and 2S-4, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 2S-1
  - Supplement 2S-1 will include use of the guidance provided in Appendix 2A-1 the same as if it were part of the Supplement. During the operations phase, the following two alternatives may be applied to the implementation of this Supplement and Appendix:
    - (1) In lieu of being certified as Level I, II, or III in accordance with NQA-1-1994, personnel that perform independent quality verification inspections, examinations, measurements, or tests of material, products, or activities will be required to possess qualifications equal to or better than those required for performing the task being verified; and the verification is within the skills of these personnel and/or is addressed by procedures. These individuals will not be responsible for the planning of quality verification inspections and tests (i.e., establishing hold points and acceptance criteria in procedures, and determining who will be responsible for performing the inspections), evaluating inspection training programs, nor certifying inspection personnel.
    - (2) A qualified engineer may be used to plan inspections, evaluate the capabilities of an inspector, or evaluate the training program for inspectors. For the purpose of these functions, a qualified engineer is one who has a baccalaureate in engineering in a discipline related to the inspection activity (such as electrical, mechanical, civil) and has a minimum of five years engineering work experience with at least two years of this experience related to nuclear facilities.
- NQA-1-1994, Supplement 2S-2
  - In lieu of Supplement 2S-2, for qualification of nondestructive examination personnel, North Anna 3 will follow the applicable standard cited in the version(s) of Section III and Section XI of the ASME Boiler and Pressure Vessel Code approved by the NRC for use at the North Anna 3 site.
- NQA-1-1994, Supplement 2S-3

- The requirement that prospective Lead Auditors have participated in a minimum of five (5) audits in the previous three (3) years is replaced by the following, “The prospective lead auditor shall demonstrate his/her ability to properly implement the audit process, as implemented by Dominion, to effectively lead an audit team, and to effectively organize and report results, including participation in at least one nuclear audit within the year preceding the date of qualification.”

Section 3 Design Control

Dominion has established and implements a process to control the design, design changes, and temporary modifications (e.g., temporary bypass lines, electrical jumpers and lifted wires, and temporary setpoints) of items that are subject to the provisions of the QAPD. The design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces within Dominion and with suppliers. These provisions assure that design inputs (such as design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions) so that the final design output can be related to the design input in sufficient detail to permit verification. Design change processes and the division of responsibilities for design-related activities are detailed in North Anna 3 and supplier procedures. The design control program includes interface controls necessary to control the development, verification, approval, release, status, distribution, and revision of design inputs and outputs. Design changes and disposition of nonconforming items as “use as is” or “repair” are reviewed and approved by the North Anna 3 design organization or by other organizations so authorized by Dominion.

Design documents are reviewed by individuals knowledgeable in QA to ensure the documents contain the necessary QA requirements.

3.1 Design Verification

Dominion design processes provide for design verification to ensure that items and activities subject to the provisions of the QAPD are suitable for their intended application, consistent with their effect on safety. Design changes are subjected to these controls, which include verification measures commensurate with those applied to original plant design.

Design verifications are performed by competent individuals or groups other than those who performed the original design but who may be from the same organization. The verifier shall not have taken part in the selection of design inputs, the selection of design considerations, or the selection of a singular design approach, as applicable. This verification may be performed by the originator’s supervisor provided the supervisor did not specify a singular design approach, rule out certain design considerations, and did not establish the design inputs used in the design, or if the supervisor is the only individual in the organization competent to perform the verification. If the verification is performed by the originator’s supervisor, the justification of the need is documented and approved in advance by management.

The extent of the design verification required is a function of the importance to safety of the item under consideration, the complexity of the design, the degree of standardization, the state-of-the-art, and the similarity with previously proven designs. This includes design inputs, design outputs, and design changes. Design verification procedures are established and

implemented to assure that an appropriate verification method is used, the appropriate design parameters to be verified are chosen, the acceptance criteria are identified, and the verification is satisfactorily accomplished and documented. Verification methods may include, but are not limited to, design reviews, alternative calculations and qualification testing. Testing used to verify the acceptability of a specific design feature demonstrates acceptable performance under conditions that simulate the most adverse design conditions expected for the item's intended use.

Dominion normally completes design verification activities before the design outputs are used by other organizations for design work, and before they are used to support other activities such as procurement, manufacture, or construction. When such timing cannot be achieved, the design verification is completed before relying on the item to perform its intended design or safety function.

3.2 Design Records

Dominion maintains records sufficient to provide evidence that the design was properly accomplished. These records include the final design output and any revisions thereto, as well as record of the important design steps (e.g., calculations, analyses and computer programs) and the sources of input that support the final output.

Plant design drawings reflect the properly reviewed and approved configuration of the plant.

3.3 Computer Application and Digital Equipment Software

The QAPD governs the development, procurement, testing, maintenance, and use of computer application and digital equipment software when used in safety-related applications and designated nonsafety-related applications. Dominion and suppliers are responsible for developing, approving, and issuing procedures, as necessary, to control the use of such computer application and digital equipment software. The procedures require that the application software be assigned a proper quality classification and that the associated quality requirements be consistent with this classification. Each application software and revision thereto is documented and approved by the code manager as delineated in the software control procedures. The QAPD is also applicable to the administrative functions associated with the maintenance and security of computer hardware where such functions are considered essential in order to comply with other QAPD requirements such as QA records.

3.4 Setpoint Control

Instrument and equipment setpoints that could affect nuclear safety shall be controlled in accordance with written instructions. As a minimum, these written instructions shall:

(1) Identify responsibilities and processes for reviewing, approving, and revising setpoints and setpoint changes originally supplied by the reactor plant supplier, the A/E, and the plant's technical staff.

(2) Ensure that setpoints and setpoint changes are consistent with design and accident analysis requirements and assumptions.

(3) Provide for documentation of setpoints, including those determined operationally.

(4) Provide for access to necessary setpoint information for personnel who write or revise plant procedures, operate or maintain plant equipment, develop or revise design documents, or develop or revise accident analyses.

3.5 NQA-1-1994 Commitment/Exceptions

In establishing its program for design control and verification, Dominion commits to compliance with NQA-1-1994, Basic Requirement 3, and Supplement 3S-1, the subsurface investigation requirements in Subpart 2.20, and the standards for computer software in Subpart 2.7.

Section 4 Procurement Document Control

Dominion has established the necessary measures and governing procedures to assure that purchased items and services are subject to appropriate quality and technical requirements. Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents. These controls include provisions such that:

- Where original technical or quality assurance requirements cannot be determined, an engineering evaluation is conducted and documented by qualified staff to establish appropriate requirements and controls to assure that interfaces, interchangeability, safety, fit and function, as applicable, are not adversely affected or contrary to applicable regulatory requirements.
- Applicable technical, regulatory, administrative, quality and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, and 10 CFR 21) are invoked for procurement of items and services. 10 CFR 21 requirements for posting, evaluating, and reporting will be followed and imposed on suppliers when applicable. Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services. To the extent necessary, procurement documents shall require suppliers to have a documented QA program that is determined to meet the applicable requirements of 10 CFR 50, Appendix B, as appropriate to the circumstances of procurements (or the supplier may work under Dominion's North Anna 3 approved QA program).

Reviews of procurement documents shall be performed by personnel who have access to pertinent information and who have an adequate understanding of the requirements and intent of the procurement documents.

4.1 NQA-1-1994 Commitment/Exceptions

In establishing controls for procurement, Dominion commits to compliance with NQA-1-1994, Basic Requirement 4 and Supplement 4S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 4S-1
  - Section 2.3 of this Supplement 4S-1 includes a requirement that procurement documents require suppliers to have a documented QAP that implements NQA-1-1994, Part 1. In lieu of this requirement, Dominion may require suppliers to have a documented supplier QAP that is determined to meet the applicable requirements of 10 CFR 50, Appendix B, as appropriate to the circumstances of the procurement.
  - With regard to service performed by a supplier, Dominion procurement documents may allow the supplier to work under the North Anna 3 QAP, including implementing procedures, in lieu of the supplier having its own QAP.

- Section 3 of this Supplement 4S-1 requires procurement documents to be reviewed prior to bid or award of contract. The quality assurance review of procurement documents is satisfied through review of the applicable procurement specification, including the technical and quality procurement requirements, prior to bid or award of contract. Procurement document changes (e.g., scope, technical or quality requirements) will also receive the quality assurance review.
- Procurement documents for Commercial Grade Items that will be procured by Dominion for North Anna 3 for use as safety-related items shall contain technical and quality requirements such that the procured item can be appropriately dedicated.

Section 5 Instructions, Procedures, and Drawings

Dominion has established the necessary measures and governing procedures to ensure that activities affecting quality are prescribed by and performed in accordance with instructions, procedures, or drawings of a type appropriate to the circumstances and which, where applicable, include quantitative or qualitative acceptance criteria to implement the QAP as described in the QAPD. Such documents are prepared and controlled according to Part II, Section 6. In addition, means are provided to disseminate to the staff instructions of both general and continuing applicability, as well as those of short-term applicability. Provisions are included for reviewing, updating, and canceling such procedures.

5.1 Procedure Adherence

Dominion's policy is that procedures are followed, and the requirements for use of procedures have been established in administrative procedures. Where procedures cannot be followed as written, provisions are established for making changes in accordance with Part II, Section 6. Requirements are established to identify the manner in which procedures are to be implemented, including identification of those tasks that require: (1) the written procedure to be present and followed step-by-step while the task is being performed, (2) the user to have committed the procedure steps to memory, (3) verification of completion of significant steps, by initials or signatures or use of check-off lists. Procedures that are required to be present and referred to directly are those developed for extensive or complex jobs where reliance on memory cannot be trusted, tasks that are infrequently performed, and tasks where steps must be performed in a specified sequence.

In cases of emergency, personnel are authorized to depart from approved procedures when necessary to prevent injury to personnel or damage to the plant. Such departures are recorded describing the prevailing conditions and reasons for the action taken.

5.2 Procedure Content

The established measures address the applicable content of procedures as described in the introduction to Part II of NQA-1-1994. In addition, procedures governing tests, inspections, operational activities and maintenance will include as applicable, initial conditions and prerequisites for the performance of the activity.

5.3 NQA-1-1994 Commitment

In establishing procedural controls, Dominion commits to compliance with NQA-1-1994, Basic Requirement 5.

Section 6 Document Control

Dominion has established the necessary measures and governing procedures to control the preparation of, issuance of, and changes to documents that specify quality requirements or prescribe how activities affecting quality, including organizational interfaces, are controlled to assure that correct documents are being employed. The control systems (including electronic systems used to make documents available) are documented and provide for the following:

a. identification of documents to be controlled and their specified distribution;

b. a method to identify the correct document (including revision) to be used and control of superseded documents;

c. identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents;

d. review of documents for adequacy, completeness, and correctness prior to approval and issuance;

e. a method for providing feedback from users to continually improve procedures and work instructions; and

f. coordinating and controlling interface documents and procedures.

The types of documents to be controlled include:

a. drawings such as design, construction, installation, and as-built drawings;

b. engineering calculations;

c. design specifications;

d. purchase orders and related documents;

e. vendor-supplied documents;

f. audit, surveillance, and quality verification/inspection procedures;

g. inspection and test reports;

h. instructions and procedures for activities covered by the QAPD including design, construction, installation, operating (including normal and emergency operations), maintenance, calibration, and routine testing;

i. technical specifications; and

j. nonconformance reports and corrective action reports.

During the operational phase, where temporary procedures are used, they shall include a designation of the period of time during which it is acceptable to use them.

6.1 Review and Approval of Documents

Documents are reviewed for adequacy by qualified persons other than the preparer. During the construction phase, procedures for design, construction, and installation are also reviewed by the nuclear oversight group to ensure quality assurance measures have been appropriately applied. The documented review signifies concurrence.

During the operations phase, documents affecting the configuration or operation of the station as described in the SAR are screened to identify those that require review by the IRC prior to implementation as described in Part V, Section 2.2.

To ensure effective and accurate procedures during the operational phase, applicable procedures are reviewed, and updated as necessary, based on the following conditions:

a. following any modification to a system;

b. following an unusual incident, such as an accident, significant operator error, or equipment malfunction;

c. when procedure discrepancies are found;

d. prior to use if not used in the previous two years; or

e. results of QA audits conducted in accordance with Part II, Section 18.1.

Prior to issuance or use, documents including revisions thereto, are approved by the designated authority. A listing of all controlled documents identifying the current approved revision, or date, is maintained so personnel can readily determine the appropriate document for use.

6.2 Changes to Documents

Changes to documents, other than those defined in implementing procedures as minor changes, are reviewed and approved by the same organizations that performed the original review and approval unless other organizations are specifically designated. The reviewing organization has access to pertinent background data or information upon which to base their approval. Where temporary procedure changes are necessary during the operations phase, changes that clearly do not change the intent of the approved procedure may be implemented provided they are approved by two members of the staff knowledgeable in the areas affected by the procedures. Minor changes to documents, such as inconsequential editorial corrections, do not require that the revised documents receive the same review and approval as the original documents. To avoid a possible omission of a required review, the

type of minor changes that do not require such a review and approval and the persons who can authorize such a classification are clearly delineated in implementing procedures.

6.3 NQA-1-1994 Commitment

In establishing provisions for document control, Dominion commits to compliance with NQA-1-1994, Basic Requirement 6 and Supplement 6S-1.

Section 7 Control of Purchased Material, Equipment, and Services

Dominion has established the necessary measures and governing procedures to control the procurement of items and services to assure conformance with specified requirements. Such control provides for the following as appropriate: source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services.

7.1 Acceptance of Item or Service

Dominion establishes and implements measures to assess the quality of purchased items and services, whether purchased directly or through contractors, at intervals and to a depth consistent with the item's or service's importance to safety, complexity, quantity, and the frequency of procurement. Verification actions include testing, as appropriate, during design, fabrication, construction, and operation activities. Verifications occur at the appropriate phases of the procurement process, including, as necessary, verification of activities of suppliers below the first tier.

Measures to assure the quality of purchased items and services include the following, as applicable:

- Items are inspected, identified, and stored to protect against damage, deterioration, or misuse.
- Prospective suppliers of safety-related items and services are evaluated to assure that only qualified suppliers are used. Qualified suppliers are audited on a triennial basis. In addition, if a subsequent contract or a contract modification significantly enlarges the scope of, or changes the methods or controls for activities performed by the same supplier, an audit of the modified requirements is conducted, thus starting a new triennial period. North Anna 3 may utilize audits conducted by outside organizations for supplier qualification provided that the scope and adequacy of the audits meet North Anna 3 requirements. Documented annual evaluations are performed for qualified suppliers to assure they continue to provide acceptable products and services. Industry programs, such as those applied by ASME, Nuclear Procurement Issues Committee (NUPIC), or other established utility groups, are used as input or the basis for supplier qualification whenever appropriate. The results of the reviews are promptly considered for effect on a supplier's continued qualification and adjustments made as necessary (including corrective actions, adjustments of supplier audit plans, and input to third party auditing entities, as warranted). In addition, results are reviewed periodically to determine if, as a whole, they constitute a significant condition adverse to quality requiring additional action.

- Provisions are made for accepting purchased items and services, such as source verification, receipt inspection, pre- and post-installation tests, certificates of conformance, and document reviews (including Certified Material Test Report/Certificate). Acceptance actions/documents should be established by the Purchaser with appropriate input from the Supplier and be completed to ensure that procurement, inspection, and test requirements, as applicable, have been satisfied before relying on the item to perform its intended safety function.
- Controls are imposed for the selection, determination of suitability for intended use (critical characteristics), evaluation, receipt and acceptance of commercial-grade services or items to assure they will perform satisfactorily in service in safety-related applications.
- If there is insufficient evidence of implementation of a QA program, the initial evaluation is of the existence of a QA program addressing the scope of services to be provided. The initial audit is performed after the supplier has completed sufficient work to demonstrate that its organization is implementing a QA program.

7.2 NQA-1-1994 Commitment/Exceptions

In establishing procurement verification controls, North Anna 3 commits to compliance with NQA-1-1994, Basic Requirement 7 and Supplement 7S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 7S-1
    - North Anna 3 considers that other 10 CFR 50 licensees, Authorized Nuclear Inspection Agencies, National Institute of Standards and Technology, or other State and Federal agencies which may provide items or services to the Dominion North Anna 3 plant are not required to be evaluated or audited.
    - When purchasing commercial grade calibration services from a calibration laboratory, procurement source evaluation and selection measures need not be performed provided each of the following conditions are met:
        - (1) The purchase documents impose any additional technical and administrative requirements, as necessary, to comply with the North Anna 3 QA program and technical provisions. At a minimum, the purchase document shall require that the calibration certificate/report include identification of the laboratory equipment/standard used.
        - (2) The purchase documents require reporting as-found calibration data when calibrated items are found to be out-of-tolerance.
        - (3) A documented review of the supplier's accreditation will be performed and will include a verification of each of the following:

- The calibration laboratory holds a domestic (United States) accreditation by any one of the following bodies, which are recognized by the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA):
  - National Voluntary Laboratory Accreditation Program (NVLAP), administered by the National Institute of Standards & Technology;
  - American Association for Laboratory Accreditation (A2LA);
  - ACLASS Accreditation Services (ACLASS);
  - International Accreditation Service (IAS);
  - Laboratory Accreditation Bureau (L-A-B);
  - Other NRC-approved laboratory accrediting body.
- The accreditation encompasses ANS/ISO/IEC 17025, “General Requirements for the Competence of Testing and Calibration Laboratories.”
- The published scope of accreditation for the calibration laboratory covers the necessary measurement parameters, range, and uncertainties.

•• For Section 8.1, Dominion considers documents that may be stored in approved electronic media under Dominion or vendor control, not physically located on the plant site, but are accessible from the respective nuclear facility site, as meeting the NQA-1 requirement for documents to be available at the site. When construction is complete, sufficient as-built documentation will be turned over to Dominion to support operations. The Dominion records management system will provide for timely retrieval of necessary records.

•• In lieu of the requirements of Section 10, Commercial Grade Items, controls for commercial grade items and services are established in North Anna 3 documents using 10 CFR 21 and the guidance of EPRI NP-5652 as discussed in Generic Letter 89-02 and Generic Letter 91-05.

– For commercial grade items, special quality verification requirements are established and described in Dominion documents to provide the necessary assurance an item will perform satisfactorily in service. The Dominion documents address determining the critical characteristics that ensure an item is suitable for its intended use, technical evaluation of the item, receipt requirements, and quality evaluation of the item.

– Dominion will also use other appropriate approved regulatory means and controls to support Dominion commercial grade dedication activities. Dominion will assume 10 CFR 21 reporting responsibility for all items that Dominion dedicates as safety-related.

Section 8 Identification and Control of Materials, Parts, and Components

Dominion has established the necessary measures and governing procedures to identify and control items to prevent the use of incorrect or defective items. This includes controls for consumable materials and items with limited shelf life. The identification of items is maintained throughout fabrication, erection, installation and use so that the item can be traced to its documentation, consistent with the item’s effect on safety. Identification locations and methods are selected so as not to affect the function or quality of the item.

8.1 NQA-1-1994 Commitment

In establishing provisions for identification and control of items, Dominion commits to compliance with NQA-1-1994, Basic Requirement 8 and Supplement 8S-1.

Section 9 Control of Special Processes

Dominion has established the necessary measures and governing procedures to assure that special processes that require interim process controls to assure quality, such as welding, heat treating, and nondestructive examination, are controlled. These provisions include assuring that special processes are accomplished by qualified personnel using qualified procedures and equipment. Personnel are qualified and special processes are performed in accordance with applicable codes, standards, specifications, criteria or other specially established requirements. Special processes are those where the results are highly dependent on the control of the process or the skill of the operator, or both, and for which the specified quality cannot be fully and readily determined by inspection or test of the final product.

9.1 NQA-1-1994 Commitment

In establishing measures for the control of special processes, Dominion commits to compliance with NQA-1-1994, Basic Requirement 9 and Supplement 9S-1.

Section 10 Inspection

Dominion has established the necessary measures and governing procedures to implement inspections that assure items, services, and activities affecting safety meet established requirements and conform to applicable documented specifications, instructions, procedures, and design documents. Inspection may also be applied to items, services, and activities affecting plant reliability and integrity. Types of inspections may include those verifications related to procurement, such as source, in-process, final, and receipt inspection, as well as construction, installation, maintenance, modification, inservice, and operations activities. Inspections are carried out by properly qualified persons independent of those who performed or directly supervised the work. Inspection results are documented.

10.1 Inspection Program

The inspection program establishes inspections (including surveillance of processes), as necessary to verify quality: (1) at the source of supplied items or services, (2) in-process during fabrication at a supplier's facility or at a Company facility, (3) for final acceptance of fabricated and/or installed items during construction, (4) upon receipt of items for a facility, and (5) during maintenance, modification, inservice, and operating activities.

The inspection program establishes requirements for planning inspections, such as the group or discipline responsible for performing the inspection, where inspection hold points are to be applied, determining applicable acceptance criteria, the frequency of inspection to be applied, and identification of special tools needed to perform the inspection. Inspection planning is performed by personnel qualified in the discipline related to the inspection and includes qualified inspectors or engineers. Inspection plans are based on, as a minimum, the importance of the item to the safety of the facility, the complexity of the item, technical requirements to be met, and design specifications. Where significant changes in inspection activities for the facilities are to occur, management responsible for the inspection programs evaluate the resource and planning requirements to ensure effective implementation of the inspection program.

Inspection program documents establish requirements for performing the planned inspections, and documenting required inspection information such as rejection, acceptance, and reinspection results, and the person(s) performing the inspection.

Inspection results are documented by the inspector, reviewed by authorized personnel qualified to evaluate the technical adequacy of the inspection results, and controlled by instructions, procedures, and drawings.

10.2 Inspector Qualification

Dominion has established qualification programs for personnel performing quality inspections. The qualification program requirements are described in Part II, Section 2.6. These qualification programs are applied to individuals performing quality inspections regardless of the functional group where they are assigned.

10.3 NQA-1-1994 Commitment/Exceptions

In establishing inspection requirements, Dominion commits to compliance with NQA-1-1994, Basic Requirement 10, Supplement 10S-1 and Subpart 2.4, with the following clarification. In addition, Dominion commits to compliance with the requirements of Subparts 2.5 and 2.8 for establishing appropriate inspection requirements.

- Subpart 2.4 commits Dominion to IEEE Std. 336-1985. IEEE Std. 336 1985 refers to IEEE Std. 498-1985. Both IEEE Std. 336-1985 and IEEE Std. 498-1985 use the definition of "Safety Systems" from IEEE Std. 603-1980. North Anna 3 commits to the definition of Safety Systems in IEEE Std. 603 1980, but does not commit to the balance of that standard. This definition is only applicable to equipment in the context of Subpart 2.4.
- An additional exception to Subpart 2.4 is addressed in Part II, Section 12 of the QAPD.
- Where inspections at the operating facility are performed by persons within the same organization (e.g., Maintenance group), Dominion takes exception to the requirements of NQA-1-1994, Supplement 10S-1, Section 3.1, in that the inspectors report to the site's Senior Manager for Safety and Licensing while performing those inspections.

Section 11 Test Control

Dominion has established the necessary measures and governing procedures to demonstrate that items subject to the provisions of the QAPD will perform satisfactorily in service, that the plant can be operated safely and as designed, and that the coordinated operation of the plant as a whole is satisfactory. These programs include criteria for determining when testing is required, such as proof tests before installation, pre-operational tests, post-maintenance tests, post-modification tests, in-service tests, and operational tests (such as surveillance tests required by Plant Technical Specifications), to demonstrate that the performance of plant systems is in accordance with design. Programs also include provisions to establish and adjust test schedules, and to maintain status for periodic or recurring tests. Tests are performed according to applicable procedures that include, consistent with the effect on safety: (1) instructions and prerequisites to perform the test, (2) use of proper test equipment, (3) acceptance criteria, and (4) mandatory verification points as necessary to confirm satisfactory test completion. Test results are documented and evaluated by the organization performing the test and reviewed by a responsible authority to assure that the test requirements have been satisfied. If acceptance criteria are not met, retesting is performed as needed to confirm acceptability following correction of the system or equipment deficiencies that caused the failure.

The initial start-up test program is planned and scheduled to permit safe fuel loading and start-up; to increase power in safe increments; and to perform major testing at specified power levels. If tests require the variation of operating parameters outside of their normal range, the limits within which such variation is permitted will be prescribed. The scope of the testing demonstrates, insofar as practicable, that the plant is capable of withstanding the design transients and accidents. For new facility construction, the suitability of facility operating procedures is checked to the maximum extent possible during the preoperational and initial start-up test programs.

Tests are performed and results documented in accordance with applicable technical and regulatory requirements, including those described in the Technical Specifications and SAR. Test programs ensure appropriate retention of test data in accordance with the records requirements of the QAPD. Personnel that perform or evaluate tests are qualified in accordance with the requirements established in Part II, Section 2.6.

11.1 NQA-1-1994 Commitment

In establishing provisions for testing, Dominion commits to compliance with NQA-1-1994, Basic Requirement 11 and Supplement 11S-1.

11.2 NQA-1-1994 Commitment for Computer Program Testing

Dominion establishes and implements provisions to assure that computer software used in applications affecting safety is prepared, documented, verified and tested, and used such that

the expected output is obtained and configuration control maintained. To this end, Dominion commits to compliance with the requirements of NQA-1-1994, Supplement 11S-2 and Subpart 2.7 to establish the appropriate provisions.

Section 12 Control of Measuring and Test Equipment

Dominion has established the necessary measures and governing procedures to control the calibration, maintenance, and use of measuring and test equipment (M&TE) that provides information important to safe plant operation. The provisions of such procedures cover equipment such as indicating and actuating instruments and gages, tools, reference and transfer standards, and nondestructive examination equipment. The suppliers of commercial-grade calibration services are controlled as described in Part II, Section 7.

12.1 Installed Instrument and Control Devices

For the operations phase of the facilities, Dominion has established and implements procedures for the calibration and adjustment of instrument and control devices installed in the facility. The calibration and adjustment of these devices is accomplished through the facility maintenance programs to ensure the facility is operated within design and technical requirements. Appropriate documentation will be maintained for these devices to indicate the control status, when the next calibration is due, and identify any limitations on use of the device.

12.2 NQA-1-1994 Commitment/Exceptions

In establishing provisions for control of measuring and test equipment, Dominion commits to compliance with NQA-1-1994, Basic Requirement 12 and Supplement 12S-1 with the following clarification and exception:

- The out of calibration conditions described in paragraph 3.2 of Supplement 12S-1 refers to when the M&TE is found out of the required accuracy limits (i.e., out of tolerance) during calibration.
- Measuring and test equipment are not required to be marked with the calibration status where it is impossible or impractical due to equipment size or configuration (such as the label will interfere with operation of the device) provided the required information is maintained in suitable documentation traceable to the device. This exception also applies to the calibration labeling requirement stated in NQA-1-1994, Subpart 2.4, Section 7.2.1 (ANSI/IEEE Std. 336-1985).

Section 13 Handling, Storage, and Shipping

Dominion has established the necessary measures and governing procedures to control the handling, storage, packaging, shipping, cleaning, and preservation of items to prevent inadvertent damage or loss, and to minimize deterioration. These provisions include specific procedures, when required to maintain acceptable quality of the items important to the safe operations of the plant. Items are appropriately marked and labeled during packaging, shipping, handling and storage to identify, maintain, and preserve the item's integrity and indicate the need for special controls. Special controls (such as containers, shock absorbers, accelerometers, inert gas atmospheres, specific moisture content levels and temperature levels) are provided when required to maintain acceptable quality.

Special or additional handling, storage, shipping, cleaning and preservation requirements are identified and implemented as specified in procurement documents and applicable procedures. Where special requirements are specified, the items and containers (where used) are suitably marked.

Special handling tools and equipment are used and controlled as necessary to ensure safe and adequate handling. Special handling tools and equipment are inspected and tested at specified time intervals and in accordance with procedures to verify that the tools and equipment are adequately maintained.

Operators of special handling and lifting equipment are experienced or trained in the use of the equipment. During the operational phase, Dominion establishes and implements controls over hoisting, rigging and transport activities to the extent necessary to protect the integrity of the items involved, as well as potentially affected nearby structures and components. Where required, Dominion complies with applicable hoisting, rigging and transportation regulations and codes.

13.1 Housekeeping

Housekeeping practices are established to account for conditions or environments that could affect the quality of structures, systems and components within the plant. This includes control of cleanness of facilities and materials, fire prevention and protection, disposal of combustible material and debris, control of access to work areas, protection of equipment, radioactive contamination control and storage of solid radioactive waste. Housekeeping practices help assure that only proper materials, equipment, processes and procedures are used and that the quality of items is not degraded. Necessary procedures or work instructions, such as for electrical bus and control center cleaning, cleaning of control consoles, and radioactive decontamination are developed and used.

13.2 NQA-1-1994 Commitment/Exceptions

In establishing provisions for handling, storage and shipping, Dominion commits to compliance with NQA-1-1994, Basic Requirement 13 and Supplement 13S-1. Dominion also commits, during the construction and operational phases of the plant, to compliance with the requirements of NQA-1-1994, Subpart 2.1, Subpart 2.2, Subpart 2.3, and Subpart 3.2, Appendix 2.1, with the following clarifications and exceptions:

- NQA -1-1994, Subpart 2.1
  - Subpart 2.1, Sections 3.1 and 3.2 establish criteria for classifying items into cleanness classes and requirements for each class. During the operational phase, instead of using the cleanness level system of Subpart 2.1, Dominion may establish cleanness requirements on a case-by-case basis, consistent with the other provisions of Subpart 2.1. Dominion establishes appropriate cleanliness controls for work on safety-related equipment to minimize introduction of foreign material and maintain system/component cleanliness throughout maintenance or modification activities, including documented verification of absence of foreign material prior to system closure.
- NQA -1-1994, Subpart 2.2
  - Subpart 2.2, Section 2.2 establishes criteria for classifying items into protection levels. Instead of classifying items into protection levels during the operational phase, Dominion may establish controls for the packaging, shipping, handling, and storage of such items on a case-by-case basis with due regard for the item's complexity, use, and sensitivity to damage. Prior to installation or use, the items are inspected and serviced as necessary to assure that no damage or deterioration exists which could affect their function.
  - Subpart 2.2, Section 6.6, “Storage Records:” This section requires written records be prepared containing information on personnel access. As an alternative to this requirement, North Anna 3 documents establish controls for storage areas that describe those authorized to access areas and the requirements for recording access of personnel. However, these records of access are not considered quality records and will be retained in accordance with the administrative controls of the applicable plant.
  - Subpart 2.2, Section 7.1 refers to Subpart 2.15 for requirements related to handling of items. The scope of Subpart 2.15 includes hoisting, rigging and transporting of items for the nuclear power plant during construction.
- NQA-1-1994, Subpart 2.3

- •• Subpart 2.3, Section 2.3 requires the establishment of five zone designations for housekeeping cleanliness controls. During the operational phase, instead of the five-level zone designation, Dominion bases its control over housekeeping activities on a consideration of what is necessary and appropriate for the activity involved. The controls are implemented through procedures or instructions which, in the case of maintenance or modification work, are developed on a case-by-case basis. Factors considered in developing the procedures and instructions include cleanliness control, personnel safety, fire prevention and protection, radiation control and security. The procedures and instructions make use of standard janitorial and work practices to the extent possible.

- NQA-1-1994, Subpart 3.2
  - •• Subpart 3.2, Appendix 2.1: Only Section 3 precautions are being committed to in accordance with RG 1.37. In addition, a suitable chloride stress-cracking inhibitor should be added to the fresh water used to flush systems containing austenitic stainless steels.

Section 14 Inspection, Test, and Operating Status

Dominion has established the necessary measures and governing procedures to identify the inspection, test, and operating status of items and components subject to the provisions of the QAPD in order to maintain personnel and reactor safety and avoid inadvertent operation of equipment. Where necessary to preclude inadvertent bypassing of inspections or tests, or to preclude inadvertent operation, these measures require the inspection, test, or operating status be verified before release, fabrication, receipt, installation, test, or use. These measures also establish the necessary authorities and controls for the application and removal of status indicators or labels.

In addition, temporary design changes (temporary modifications), such as temporary bypass lines, electrical jumpers and lifted wires, and temporary trip-point settings, are controlled by procedures that include requirements for appropriate installation and removal, independent/concurrent verifications, and status tracking.

Administrative procedures also describe the measures taken to control altering the sequence of required tests, inspections, and other operations. Review and approval for these actions is subject to the same control as taken during the original review and approval of tests, inspections, and other operations.

14.1 NQA-1-1994 Commitment

In establishing measures for control of inspection, test, and operating status, Dominion commits to compliance with NQA-1-1994, Basic Requirement 14.

Section 15 Nonconforming Materials, Parts, or Components

Dominion has established the necessary measures and governing procedures to control items, including services, that do not conform to specified requirements to prevent inadvertent installation or use. Instructions require that the individual discovering a nonconformance identify, describe, and document the nonconformance in accordance with the requirements of Part II, Section 16. Controls provide for identification, documentation, evaluation, segregation when practical, and disposition of nonconforming items, and for notification to affected organizations. Controls are provided to address conditional release of nonconforming items for use on an at-risk basis prior to resolution and disposition of the nonconformance, including maintaining identification of the item and documenting the basis for such release. Conditional release of nonconforming items for installation requires the approval of the designated management. Nonconformances are corrected or resolved prior to depending on the item to perform its intended safety function. Nonconformances are evaluated for impact on operability of quality structures, systems, and components to assure that the final condition does not adversely affect safety, operation, or maintenance of the item or service. Nonconformances to design requirements dispositioned repair or use-as-is are subject to design control measures commensurate with those applied to the original design. Nonconformance dispositions are reviewed for adequacy, analysis of quality trends, and reports provided to the designated management. Significant trends are reported to management in accordance with Dominion procedures, regulatory requirements, and industry standards.

15.1 Interface with the Reporting Program

Dominion has appropriate interfaces between the QAP for identification and control of nonconforming materials, parts, or components and the non-QA reporting program to satisfy the requirements of 10 CFR 52, 10 CFR 50.55 and/or 10 CFR 21 during COL design and construction, and 10 CFR 21 during operations.NQA-1-1994 Commitment

In establishing measures for nonconforming materials, parts, or components, Dominion commits to compliance with NQA-1-1994, Basic Requirement 15, and Supplement 15S-1.

Section 16 Corrective Action

Dominion has established the necessary measures and governing procedures to promptly identify, control, document, classify, and correct conditions adverse to quality. Dominion procedures assure that corrective actions are documented and initiated following the determination of conditions adverse to quality in accordance with regulatory requirements and applicable quality standards. Dominion procedures require personnel to identify known conditions adverse to quality. When complex issues arise where it cannot be readily determined if a condition adverse to quality exists, Dominion documents establish the requirements for documentation and timely evaluation of the issue. Reports of conditions adverse to quality are analyzed to identify trends. Significant conditions adverse to quality and significant adverse trends are documented and reported to responsible management. In the case of a significant condition adverse to quality, the cause is determined and actions to preclude recurrence are taken.

In the case of suppliers working on safety-related activities, or other similar situations, Dominion may delegate specific responsibilities for corrective actions but Dominion maintains responsibility for the effectiveness of corrective action measures.

16.1 Interface with the Reporting Program

Dominion has appropriate interfaces between the QAP for corrective actions and the non-QA reporting program to satisfy the requirements of 10 CFR 52, 10 CFR 50.55 and/or 10 CFR Part 21, during COL design and construction, and 10 CFR 21 during operations.

16.2 NQA-1-1994 Commitment

In establishing provisions for corrective action, Dominion commits to compliance with NQA-1-1994, Basic Requirement 16.

Section 17 Quality Assurance Records

Dominion has the necessary measures and governing procedures to ensure that sufficient records of items and activities affecting quality are developed, reviewed, approved, issued, used, and revised to reflect completed work. The provisions of such procedures establish the scope of the records retention program for Dominion and include requirements for records administration, including receipt, preservation, retention, storage, safekeeping, retrieval, access controls, user privileges, and final disposition.

17.1 Record Retention

Measures are established that ensure that sufficient records of completed items and activities affecting quality are appropriately stored. Records of activities for design, engineering, procurement, manufacturing, construction, inspection and test, installation, pre-operation, startup, operations, maintenance, modification, and audits and their retention times are defined in appropriate procedures. The records and retention times are based on Regulatory Position C.2 and Table 1 of Regulatory Guide 1.28, Revision 3, for design, construction and initial startup. Retention times for operations phase records are based on construction records that are similar in nature. In all cases where state, local, or other agencies have more restrictive requirements for record retention, those requirements will be met.

17.2 Electronic Records

When using optical disks for electronic records storage and retrieval systems, Dominion complies with the NRC guidance in Generic Letter 88-18, “Plant Record Storage on Optical Disks.” Dominion will manage the storage of QA Records in electronic media consistent with the intent of RIS 2000-18 and associated NIRMA Guidelines TG 11-1998, TG15-1998, TG16-1998, and TG21-1998.

17.3 NQA-1-1994 Commitment/Exceptions

In establishing provisions for records, Dominion commits to compliance with NQA-1-1994, Basic Requirement 17 and Supplement 17S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 17S-1
    - Supplement 17S-1, Section 4.2(b) requires records to be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers. For hard-copy records maintained by Dominion, the records are suitably stored in steel file cabinets or on shelving in containers, except that methods other than binders, folders, or envelopes may be used to organize the records for storage.

Section 18 Audits

Dominion has established the necessary measures and governing procedures to implement audits to verify that activities covered by the QAPD are performed in conformance with the requirements established. The audit programs are themselves reviewed for effectiveness as a part of the overall audit process.

18.1 Performance of Audits

Internal audits of selected aspects of design, construction and operating activities are performed with a frequency commensurate with safety significance and in a manner which assures that audits of safety-related activities are completed. During the early portions of North Anna 3 COL activities, audits will focus on areas including, but not limited to, site investigation, procurement, and corrective action. Functional areas of an organization's QA program for auditing include, at a minimum, verification of compliance and effectiveness of implementation of internal rules, procedures (e.g., operating, design, procurement, maintenance, modification, refueling, surveillance, and test), Technical Specifications, regulations and license conditions, programs for training, retraining, qualification and performance of operating staff, corrective actions, and observation of performance of operating, refueling, maintenance and modification activities, including associated recordkeeping.

The audits are scheduled on a formal preplanned audit schedule. The audit system is reviewed periodically and revised as necessary to assure coverage commensurate with current and planned activities. Additional audits may be performed as deemed necessary by management. The scope of the audit is determined by the quality status and safety importance of the activities being performed. These audits are conducted by trained personnel not having direct responsibilities in the area being audited and in accordance with preplanned and approved audit plans or checklists, under the direction of a qualified lead auditor and the cognizance of the manager for the North Anna Unit 3 nuclear oversight group.

Dominion is responsible for conducting periodic internal and external audits. Internal audits are conducted to determine the adequacy of programs and procedures (by representative sampling), and to determine if they are meaningful and comply with the overall QAPD. External audits determine the adequacy of supplier and contractor quality assurance program.

The results of each audit are reported in writing to the CNO, and the executives responsible for the area audited. Additional internal distribution is made to other concerned management levels in accordance with approved procedures.

Management responds to all audit findings and initiates corrective action where indicated. Where corrective action measures are indicated, documented follow-up of applicable areas

through inspections, review, re-audits, or other appropriate means is conducted to verify implementation of assigned corrective action.

Audits of suppliers of safety-related components and/or services are conducted as described in Section 7.1.

18.2 Internal Audits

Internal audits of organization and facility activities, conducted prior to placing the facility in operation, should be performed in such a manner as to assure that an audit of all applicable QA program elements is completed for each functional area at least once each year or at least once during the life of the activity, whichever is shorter.

Internal audits of activities, conducted after placing the facility in operation, should be performed in such a manner as to assure that an audit of all applicable QA program elements is completed for each functional area within a period of two years. Internal audit frequencies of well established activities, conducted after placing the facility in operation, may be extended one year at a time beyond the above two-year interval based on the results of an annual evaluation of the applicable functional area and objective evidence that the functional area activities are being satisfactorily accomplished. The evaluation should include a detailed performance analysis of the functional area based upon applicable internal and external source data and due consideration of the impact of any functional area changes in responsibility, resources. or management. However, the internal audit frequency interval should not exceed a maximum of four years. If an adverse trend is identified in the applicable functional area, the extension of the internal audit frequency interval should be rescinded and an audit scheduled as soon as practicable.

During the operations phase, audits are performed at a frequency commensurate with the safety significance of the activities and in such a manner to assure audits of all applicable QA program elements are completed within a period of two years. These audits will include, as a minimum, activities in the following areas:

(1) The conformance of facility operation to provisions contained within the Technical Specifications and applicable license conditions including administrative controls.

(2) The performance, training, and qualifications of the facility staff.

(3) The performance of activities required by the QAPD to meet the criteria of 10 CFR 50, Appendix B.

(4) The Fire Protection Program and implementing procedures. A fire protection equipment and program implementation inspection and audit are conducted utilizing either a qualified offsite licensed fire protection engineer or an outside qualified fire protection consultant.

(5) Other activities and documents considered appropriate by the corporate executive for nuclear operations, or the CNO.

Audits may also be used to meet the periodic review requirements of the code for the Security, Emergency Preparedness, and Radiological Protection programs within the provisions of the applicable code.

Internal audits include verification of compliance and effectiveness of the administrative controls established for implementing the requirements of the QAPD; regulations and license provisions; provisions for training, retraining, qualification, and performance of personnel performing activities covered by the QAPD; corrective actions taken following abnormal occurrences; and, observation of the performance of construction, fabrication, operating, refueling, maintenance and modification activities including associated record keeping.

18.3 NQA-1-1994 Commitment

In establishing the independent audit program, Dominion commits to compliance with NQA-1-1994, Basic Requirement 18 and Supplement 18S-1.

Part III Nonsafety-Related SSC Quality Control

Section 1 Nonsafety-Related SSCs - Significant Contributors to Plant Safety

Specific program controls are applied to nonsafety-related SSCs, for which 10 CFR 50, Appendix B is not applicable, that are significant contributors to plant safety. The specific program controls consistent with applicable sections of the QAPD are applied to those items in a selected manner, targeted at those characteristics or critical attributes that render the SSC a significant contributor to plant safety.

The following clarify the applicability of the QA Program to the nonsafety-related SSCs and related activities, including the identification of exceptions to the QA Program described in Part II, Sections 1 through 18 taken for nonsafety-related SSCs.

1.1 Organization

Verification activities described in this part may be performed by the Dominion line organization, the QA organization described in Part II is not required to perform these functions.

1.2 QA Program

Dominion QA requirements for nonsafety-related SSCs are established in the QAPD and appropriate procedures. Suppliers of these SSCs or related services describe the quality controls applied in appropriate procedures. A new or separate QA program is not required.

1.3 Design Control

Dominion has design control measures to ensure that the contractually established design requirements are included in the design. These measures ensure that applicable design inputs are included or correctly translated into the design documents, and deviations from those requirements are controlled. Design verification is provided through the normal supervisory review of the designer’s work.

1.4 Procurement Document Control

Procurement documents for items and services obtained by or for Dominion include or reference documents describing applicable design bases, design requirements, and other requirements necessary to ensure component performance. The procurement documents are controlled to address deviations from the specified requirements.

1.5 Instructions, Procedures, and Drawings

Dominion provides documents such as, but not limited to, written instructions, plant procedures, drawings, vendor technical manuals, and special instructions in work orders, to direct the performance of activities affecting quality. The method of instruction employed provides an appropriate degree of guidance to the personnel performing the activity to achieve acceptable functional performance of the SSC.

1.6 Document Control

Dominion controls the issuance and change of documents that specify quality requirements or prescribe activities affecting quality to ensure that correct documents are used. These controls include review and approval of documents, identification of the appropriate revision for use, and measures to preclude the use of superseded or obsolete documents.

1.7 Control of Purchased Items and Services

Dominion employs measures, such as inspection of items or documents upon receipt or acceptance testing, to ensure that all purchased items and services conform to appropriate procurement documents.

1.8 Identification and Control of Purchased Items

Dominion employs measures where necessary, to identify purchased items and preserve their functional performance capability. Storage controls take into account appropriate environmental, maintenance, or shelf life restrictions for the items.

1.9 Control of Special Processes

Dominion employs process and procedure controls for special processes, including welding, heat treating, and nondestructive testing. These controls are based on applicable codes, standards, specifications, criteria, or other special requirements for the special process.

1.10 Inspection

Dominion uses documented instructions to ensure necessary inspections are performed to verify conformance of an item or activity to specified requirements or to verify that activities are satisfactorily accomplished. These inspections may be performed by knowledgeable personnel in the line organization. Knowledgeable personnel are from the same discipline and have experience related to the work being inspected.

1.11 Test Control

Dominion employs measures to identify required testing that demonstrates that equipment conforms to design requirements. These tests are performed in accordance with test

instructions or procedures. The test results are recorded, and authorized individuals evaluate the results to ensure that test requirements are met.

1.12 Control of Measuring and Test Equipment (M&TE)

Dominion employs measures to control M&TE use, and calibration and adjustment at specific intervals or prior to use.

1.13 Handling, Storage, and Shipping

Dominion employs measures to control the handling, storage, cleaning, packaging, shipping, and preservation of items to prevent damage or loss, and to minimize deterioration. These measures include appropriate marking or labels, and identification of any special storage or handling requirements.

1.14 Inspection, Test, and Operating Status

Dominion employs measures to identify items that have satisfactorily passed required tests and inspections and to indicate the status of inspection, test, and operability as appropriate.

1.15 Control of Nonconforming Items

Dominion employs measures to identify and control items that do not conform to specified requirements to prevent their inadvertent installation or use.

1.16 Corrective Action

Dominion employs measures to ensure that failures, malfunctions, deficiencies, deviations, defective components, and nonconformances are properly identified, reported, and corrected.

1.17 Records

Dominion employs measures to ensure records are prepared and maintained to furnish evidence that the above requirements for design, procurement, document control, inspection, and test activities have been met.

1.18 Audits

Dominion employs measures for line management to periodically review and document the adequacy of the process, including taking any necessary corrective action. Audits independent of line management are not required. Line management is responsible for determining whether reviews conducted by line management or audits conducted by any organization independent of line management are appropriate. If performed, audits are conducted and documented to verify compliance with design and procurement documents, instructions, procedures, drawings, and inspection and test activities. Where the measures of

this part (Part III) are implemented by the same programs, processes, or procedures as the comparable activities of Part II, the audits performed under the provisions of Part II may be used to satisfy the review requirements of this Section (Part III, Section 1.18).

Section 2 Nonsafety-Related SSCs Credited for Regulatory Events

The following criteria apply to fire protection (10 CFR 50.48), anticipated transients without scram (ATWS) (10 CFR 50.62), and the station blackout (SBO) (10 CFR 50.63) SSCs that are not safety-related:

Dominion implements quality requirements for the fire protection system in accordance with Regulatory Position 1.7, “Quality Assurance,” in Regulatory Guide 1.189, “Fire Protection for Operating Nuclear Power Plants,” as identified in SAR Chapter 1 and as described in Chapter 9, Section 9.5.

Dominion implements the quality requirements for ATWS equipment in accordance with Part III, Section 1.

Dominion implements quality requirements for SBO equipment in accordance with Part III, Section 1.

Part IV Regulatory Commitments

Section 1 NRC Regulatory Guides and Quality Assurance Standards

This section identifies the NRC Regulatory Guides and the other quality assurance standards which have been selected to supplement and support the Dominion North Anna Unit 3 QAPD. Dominion commits to compliance with these standards to the extent described herein. Commitment to a particular Regulatory Guide or other QA standard does not constitute a commitment to the Regulatory Guides or QA standards that may be referenced therein.

1.1 Regulatory Guides

Regulatory Guide 1.8, Rev. 3, May 2000 - Qualification and Training of Personnel for Nuclear Power Plants

Regulatory Guide 1.8 provides guidance that is acceptable to the NRC staff regarding qualifications and training for nuclear power plant personnel. Dominion commits to the applicable regulatory position guidance provided in this regulatory guide during the operational phase of North Anna 3 with the clarifications and exceptions for the applicable regulatory position guidance below.

- Regulatory Position C.2 states that the qualification criteria described in Section 4 of ANSI/ANS-3.1-1993 are acceptable to the NRC staff with some exceptions delineated in subsections that follow the paragraph. Dominion commits to the identified exceptions with the clarification that in lieu of the plant manager approval discussed in paragraphs 2.1.1 and 2.1.3, the following alternative requirement for approval of the equivalents will be used by replacing the second sentence in each of the above paragraphs with the following sentence:

  These other factors are to be evaluated on a case-by-case basis and approved and documented by the plant manager or the responsible executive.

- Where reference is made to the training and qualification requirements of ANSI/ASME NQA-1-1983, Dominion commits to the applicable equivalent requirements of NQA-1-1994 as clarified in Part II, Section 2.
- Regarding the qualification requirements for independent review personnel discussed in Regulatory Positions C.2.14 and C.2.15, Dominion commits to the qualification requirements described in Part V, Section 2.2.
- As a further alternative to the selection and qualification requirements for licensed operators contained in ANS-3.1-1993, the requirements of NEI 06-13-A, Rev. 1 may be used for cold-licensing of operators.

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

Regulatory Guide 1.26 defines classification of systems and components.

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna 3 components outside the scope of the DCD.

Regulatory Guide 1.28, Revision 3, August 1985 - Quality Assurance Program Requirements (Design and Construction)

Regulatory Guide 1.28 describes a method acceptable to the NRC staff for complying with the provisions of Appendix B to 10 CFR Part 50 with regard to establishing and implementing the requisite quality assurance program for the design and construction of nuclear power plants.

Dominion identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in the following paragraphs.

- Regulatory Guide 1.28, Rev. 3 identifies that the basic and supplementary requirements included in ANSI/ASME NQA-1-1983 and the NQA-1a-1993 Addenda provide an adequate basis for complying with the pertinent QA requirements of Appendix B during the design and construction phases of nuclear plants. Dominion commits to the basic and supplementary requirements of NQA-1-1994 in lieu of the 1993 edition and addendum of NQA-1 subject to the clarifications contained in Parts II, IV, and V.
- Regulatory Position C.1 addresses the qualification requirements for inspection and test personnel. Dominion commits to these requirements subject to the clarifications identified in Part II, Section 2.7.
- Regulatory Position C.2 addresses the retention of Quality Assurance Records. Dominion commits to these requirements and the record types and retention times listed in Table 1 of the Regulatory Guide as clarified in Part II, Section 17.
- Regulatory Position C.3 addresses requirements for audits. Dominion commits to these requirements as clarified in Part II, Sections 7 and 18.

Regulatory Guide 1.29, Revision 4, March 2007- Seismic Design Classification

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna 3 systems outside the scope of the DCD.

Regulatory Guide 1.30 (Safety Guide 30), Revision 0, August 1972 - Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment

Regulatory Guide 1.30 found ANSI N45.2.4-1972 to be acceptable in establishing QA requirements for the installation, inspection, and testing of nuclear power plant instrumentation and electric equipment.

In lieu of a commitment to Regulatory Guide 1.30, Dominion commits to the QA requirements of NQA-1-1994, Subpart 2.4 (ANSI/IEEE Std. 336-1985), IEEE Standard Installation, Inspection, and

Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities, as clarified in Part II, Section 10.

Regulatory Guide 1.33, Revision 2, February 1978 - Quality Assurance Program Requirements (Operations)

Regulatory Guide 1.33 describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to overall quality assurance program requirements for the operational phase of nuclear power plants.

Dominion identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in the following paragraphs.

- Regulatory Guide 1.33 identifies that the overall quality assurance program requirements for the operational phase that are included in ANSI N18.7-1976/ANS-3.2 are acceptable to the NRC staff and provide an adequate basis for complying with the quality assurance program requirements of Appendix B to 10 CFR Part 50, subject to the clarifications and supplementary guidance provided in the regulatory positions. In lieu of a commitment to ANSI N18.7-1976/ANS-3.2, Dominion commits to implementing the QA program requirements contained in NQA-1-1994 as clarified in the QAPD as well as the additional requirements specified in the QAPD.
- In meeting the intent of Regulatory Position C.1, Dominion prepares and controls procedures for the operational phase of the plant as described in Part II, Sections 5 and 6, and Part V, Section 3. The guidance of Reg. Guide 1.33, Appendix A is utilized to help determine the types of activities that affect the quality of safe operation of SSCs subject to the QAPD and, thus, are to be performed in accordance with approved procedures.
- In meeting the intent of Regulatory Position C.2, Dominion's commitment to Regulatory Guides governing QA is specified in Parts II, IV, and V.
- In meeting the intent of Regulatory Position C.3, Dominion describes the requirements for independent review of technical specification changes and license amendments by the IRC in Part V, Section 2.2.
- In meeting the intent of Regulatory Position C.4, Dominion describes the internal audit function, scheduling, and frequency in Part II, Section 18. Program elements for corrective action are included in each audit. The audit scheduling process takes into consideration the need for increased auditing in areas that indicate ineffective performance.
- In meeting the intent of Regulatory Position C.5, Dominion has included comparable requirements in the QAPD to govern the operating phase QA program.

Regulatory Guide 1.37, Revision 1, March 2007 - Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

Regulatory Guide 1.37 provides guidance on specifying water quality and precautions related to the use of alkaline cleaning solutions and chelating agents.

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna 3 as clarified in Part II, Section 13.

Regulatory Guide 1.38, Revision 2, May 1977 - Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants

Regulatory Guide 1.38 provides guidance on assuring the quality of items to be used in safety-related applications of a nuclear power plant during shipping, storage, and handling of items including provisions for packaging, receipt, and maintenance while in storage. This Regulatory Guide identified that the provisions of ASME N45.2.2-1972 are acceptable to the NRC staff subject to certain specific regulatory positions.

In lieu of a commitment to Regulatory Guide 1.38, Dominion commits to the QA requirements of NQA-1-1994, Subpart 2.2, as clarified in Part II, Section 13.

Regulatory Guide 1.39, Revision 1, October 1976 - Housekeeping Requirements for Water-Cooled Nuclear Power Plants

Regulatory Guide 1.39 found the requirements on the control of work activities, conditions, and environments at water-cooled nuclear power plant sites in ANSI N45.2.3-1973 to be acceptable to the NRC staff with certain provisions.

In lieu of a commitment to Regulatory Guide 1.39, Dominion commits to the QA requirements of NQA-1-1994, Subpart 2.3, as clarified in Part II, Section 13.

Regulatory Guide 1.54, Revision 1, July 2000 - Service Level I, II, and III Protective Coatings applied to Nuclear Power Plants

Regulatory Guide 1.54 provides guidance on the application of protective coatings within nuclear power plants to protect surfaces from corrosion, contamination from radionuclides, and for wear protection. Dominion commits to the guidance provided in this Regulatory Guide.

Regulatory Guide 1.94, Revision 1, April 1976 - Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants

Regulatory Guide 1.94 found that the requirements and guidelines in ANSI N45.2.5-1974 for installation, inspection, and testing of structural concrete and structural steel during the construction phase of nuclear power plants are generally acceptable to the NRC staff subject to certain specific regulatory positions.

In lieu of a commitment to Regulatory Guide 1.94, Dominion commits to the requirements of NQA-1-1994, Subpart 2.5, subject to the clarifications in the following paragraphs.

- Where important to safety structures other than concrete reactor vessels and containments are constructed or modified, other appropriate industry codes and standards may be invoked in place of ACI 359 as specified by the responsible design organization so long as they meet any current licensing commitments.
- With regard to Section 7.7, "Curing," ASTM C 1315 is added to the first paragraph as another applicable standard for test methods for curing compounds.

Regulatory Guide 1.116, Revision 0-R, June 1976, Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems

Regulatory Guide 1.116 found the requirements for installation, inspection, and testing of mechanical equipment and systems of water-cooled nuclear power plants that are included in ANSI N45.2.8 to be acceptable to the NRC staff subject to certain specific regulatory positions.

In lieu of a commitment to Regulatory Guide 1.116, Dominion commits to the requirements of NQA-1-1994, Subpart 2.8 as identified in Part II, Section 10.

1.2 Standards

ASME NQA-1-1994 Edition - Quality Assurance Requirements for Nuclear Facility Applications

Dominion commits to NQA-1-1994, Parts I, II, and III, as described in Parts II, IV, and V of this document.

Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guides (TGs)

Dominion commits to NIRMA TGs as described in Part II, Section 17.

Part V Additional Quality Assurance and Administrative Controls for the Plant Operational Phase

Dominion includes the requirements of Part V that follow when establishing the necessary measures and governing procedures for the operations phase of the plant.

Section 1 Definitions

Dominion uses the definitions of terms as provided in Section 4 of the Introduction of NQA-1-1994 in interpreting the requirements of NQA-1-1994 and the other standards to which the QAPD commits. In addition, definitions are provided for the following terms not covered in NQA-1-1994:

administrative controls: rules, orders, instructions, procedures, policies, practices and designations of authority and responsibility

experiments: performance of plant operations carried out under controlled conditions in order to establish characteristics or values not previously known

nuclear power plant: any plant using a nuclear reactor to produce electric power, process steam or space heating

independent review: review completed by personnel not having direct responsibility for the work function under review regardless of whether they operate as a part of an organizational unit or as individual staff members (see review)

on-site operating organization: on-site personnel concerned with the operation, maintenance and certain technical services

operating activities: work functions associated with normal operation and maintenance of the plant, and technical services routinely assigned to the on-site operating organization

operational phase: that period of time during which the principal activity is associated with normal operation of the plant. This phase of plant life is considered to begin formally with commencement of initial fuel loading, and ends with plant decommissioning

review: a deliberately critical examination, including observation of plant operation, evaluation of assessment results, procedures, certain contemplated actions, and after-the-fact investigations of abnormal conditions

supervision: direction of personnel activities or monitoring of plant functions by an individual responsible and accountable for the activities they direct or monitor

surveillance testing: periodic testing to verify that safety related structures, systems, and components continue to function or are in a state of readiness to perform their functions

system: an integral part of nuclear power plant comprising components which may be operated or used as a separate entity to perform a specific function

Section 2 Review of Activities Affecting Safe Plant Operation

2.1 Onsite Operating Organization Review

The Dominion onsite organization employs reviews, both periodic and as situations demand, to evaluate plant operations and plan future activities. The important elements of the reviews are documented and subjects of potential concern for the independent review described below are brought to the attention of the Vice President North Anna 3. The reviews are part of the normal duties of plant supervisory personnel in order to provide timely and continuing monitoring of operating activities in order to assist the Vice President North Anna 3 in keeping abreast of general plant conditions and to verify that day-to-day operations are conducted safely in accordance with the established administrative controls. The Vice President North Anna 3 ensures the timely referral of the applicable matters discussed in the reviews to appropriate management and independent reviewers.

2.2 Independent Review

Activities occurring during the operational phase shall be independently reviewed on a periodic basis. The independent review program shall be functional prior to initial core loading.

The Independent Review Committee (IRC) is assigned independent review responsibilities.

- The IRC reports to the CNO.
- The IRC is composed of no less than 5 persons and no more than a minority of members are from the on-site operating organization.

    For example, at least 3 of the 5 members must be from off-site if there are 5 members on the committee. A minimum of the chairman or alternative chairman and 2 members must be present for all meetings.

- During the period of initial operation, meetings are conducted no less frequently than once per calendar quarter. Afterwards meetings are conduced no less than twice a year.
- Results of the meeting are documented and recorded.
- Consultants and contractors are used for the review of complex problems beyond the expertise of the IRC.

- Persons on the IRC are qualified as follows:
  - •• Chairman of the IRC
    - – Education:
      - Baccalaureate in engineering or related science
    - – Minimum experience:
      - Six (6) years combined managerial and technical support
  - •• IRC members
    - – Education:
      - Baccalaureate in engineering or related science for those IRC members who are required to review problems in
        - ∞ nuclear power plant operations,
        - ∞ nuclear engineering,
        - ∞ chemistry and radiochemistry,
        - ∞ metallurgy,
        - ∞ nondestructive testing,
        - ∞ instrumentation and control,
        - ∞ radiological safety,
        - ∞ mechanical engineering, and electrical engineering.
      - High school diploma for those members who are required to review problems in administrative control and quality assurance practices, training, and emergency plans and related procedures and equipment.
    - – Minimum experience:
      - Five (5) years experience in their own area of responsibility (nuclear power plant operations, nuclear engineering, chemistry and radiochemistry, metallurgy, nondestructive testing, instrumentation and control, radiological safety, mechanical engineering, and electrical engineering, administrative control and quality assurance practices, training, and emergency plans and related procedures and equipment).

The independent review function performs the following:

- Reviews proposed changes to the facility as described in the safety analysis report (SAR). The IRC also verifies that changes do not adversely affect safety and if a technical specification change or NRC review is required.
- Reviews proposed tests and experiments not described in the SAR prior to implementation. Verifies the determination of whether changes to proposed tests and experiments not described in the SAR require a technical specification change or license amendment.
- Reviews proposed technical specification changes and license amendments relating to nuclear safety prior to NRC submittal and implementation, except in those cases where the change is identical to a previously approved change.
- Reviews violations, deviations, and events that are required to be reported to the NRC. This review includes the results of investigations and recommendations resulting from such investigations to prevent or reduce the probability of recurrence of the event.
- Reviews any matter related to nuclear safety that is requested by the CNO, the Vice President North Anna 3, or any IRC member.
- Reviews corrective actions for significant conditions adverse to quality.
- Reviews internal audit reports.
- Reviews the adequacy of the audit program every 24 months.

Section 3 Operational Phase Procedures

The following is a description of the various types of procedures used by Dominion to govern the design, operation, and maintenance of its nuclear generating plants. Dominion follows the guidance of Appendix A to Regulatory Guide 1.33 in identifying the types of activities that should have procedures or instructions to control the activity. Each procedure shall be sufficiently detailed for a qualified individual to perform the required function without direct supervision, but need not provide a complete description of the system or plant process.

3.1 Format and Content

Procedure format and content may vary from one location to the other. However, procedures include the following elements as appropriate to the purpose or task to be described.

- **Title/Status**

Each procedure is given a title descriptive of the work or subject it addresses, and includes a revision number and/or date and an approval status.

- Purpose/Statement of Applicability/Scope

  The purpose for which the procedure is intended is clearly stated (if not clear from the title). The systems, structures, components, processes or conditions to which the procedure applies are also clearly described.

- References

  Applicable references, including reference to appropriate Technical Specifications, are required. References are included within the body of the procedure when the sequence of steps requires other tasks to be performed (according to the reference) prior to or concurrent with a particular step.

- **Prerequisites/Initial Conditions**

  Prerequisites/initial conditions identify those independent actions or procedures that must be accomplished and plant conditions which must exist prior to performing the procedure. A prerequisite applicable to only a specific portion of a procedure is so identified.

- **Precautions**

  Precautions alert the user to those important measures to be used to protect equipment and personnel, including the public, or to avoid an abnormal or emergency situation during performance of the procedure. Cautionary notes applicable to specific steps are included in the main body of the procedure and are identified as such.

- **Limitations and Actions**

  Limitations on the parameters being controlled and appropriate corrective measures to return the parameter to the normal control band are specified.

- **Main Body**

  The main body of the procedure contains the step-by-step instructions in the degree of detail necessary for performing the required function or task.

- **Acceptance Criteria**

  The acceptance criteria provide the quantitative or qualitative criteria against which the success or failure (as of a test-type activity) of the step or action would be judged.

- **Checklists**

  Complex procedures utilize checklists which may be included as part of the procedure or appended to it.

3.2 Procedure Types

Administrative Control Procedures

These include administrative procedures, directives, policies, standards, and similar documents that control the programmatic aspects of facility activities. These administrative documents ensure that the requirements of regulatory and license commitments are implemented. Several levels of administrative controls are applied ranging from those affecting the entire Company to those prepared at the implementing group level. These documents establish responsibilities, interfaces, and standard methods (rules of practice) for implementing programs. In addition to the administrative controls described throughout this QAPD, instructions governing the following activities are provided:

- **Operating Orders/Procedures**

  Instructions of general and continuing applicability to the conduct of business to the plant staff are provided. Examples where these are applied include, but are not limited to, job turnover and relief, designation of confines of control room, definition of duties of operators and others, transmittal of operating data to management, filing of charts, limitations on access to certain areas and equipment, shipping and receiving instructions. Provisions are made for periodic review and updating of these documents, where appropriate.

- **Special Orders**

  Management instructions, which have short-term applicability and require dissemination, are issued to encompass special operations, housekeeping, data taking, publications and their distribution, plotting process parameters, personnel actions, or other similar matters.

Provisions are made for periodic review, updating, and cancellation of these documents, where appropriate.

- **Plant Security and Visitor Control**

  Procedures or instructions are developed to supplement features and physical barriers designed to control access to the plant and, as appropriate, to vital areas within the plant. Information concerning specific design features and administrative provisions of the plant security program is confidential and thus accorded limited distribution. The security and visitor control procedures consider, for example, physical provisions, such as: fences and lighting; lock controls for doors, gates and compartments containing sensitive equipment; and provisions for traffic and access control. Administrative provisions, such as: visitor sign-in and sign-out procedures; escorts and badges for visitors; emphasis on inspection, observation and challenging of strangers by operating crews; and a program of pre-employment screening for potential employees are also considered.

- **Temporary Procedures**

  Temporary procedures may be used to direct operations during testing, refueling, maintenance, and modifications to provide guidance in unusual situations not within the scope of the normal procedures. These procedures ensure orderly and uniform operations for short periods when the plant, a system, or a component of a system is performing in a manner not covered by existing detailed procedures or has been modified or extended in such a manner that portions of existing procedures do not apply. Temporary Procedures include designation of the period of time during which they may be used and are subject to the procedure review process as applicable.

Engineering Procedures

These documents provide instructions for the preparation of engineering documents, engineering analysis, and implementation of engineering programs. This includes activities such as designs; calculations; fabrication, equipment, construction, and installation specifications; drawings; analysis and topical reports; and testing plans or procedures. They include appropriate references to industry codes and standards, design inputs, and technical requirements.

Installation Procedures

These documents provide instructions for the installation of components generally related to new construction and certain modification activities. They include appropriate reference to industry standards, installation specifications, design drawings, and supplier and technical manuals for the performance of activities. These documents include provisions, such as hold or witness points, for conducting and recording results of required inspections or tests. These

documents may include applicable inspection and test instructions subject to the requirements for test and inspection procedures below.

System Procedures

These documents contain instructions for energizing, filling, venting, draining, starting up, shutting down, changing modes of operation, and other instructions appropriate for operations of systems related to the safety of the plant. Actions to correct off-normal conditions are invoked following an operator observation or an annunciator alarm indicating a condition which, if not corrected, could degenerate into a condition requiring action under an emergency procedure. Separate procedures may be developed for correcting off-normal conditions for those events where system complexity may lead to operator uncertainty. Appropriate procedures will also be developed for the fire protection program.

Start-up Procedures

These documents contain instructions for starting the reactor from cold or hot conditions and establishing power operation. This includes documented determination that prerequisites have been met, including confirmation that necessary instruments are operable and properly set; valves are properly aligned, necessary system procedures, tests and calibrations have been completed; and required approvals have been obtained.

Shutdown Procedures

These documents contain guidance for operations during controlled shutdown and following reactor trips, including instructions for establishing or maintaining hot shutdown/standby or cold shutdown conditions, as applicable. The major steps involved in shutting down the plant are specified, including instructions for such actions as monitoring and controlling reactivity, load reduction and cooldown rates, sequence for activating or deactivating equipment, requirements for prompt analysis for causes of reactor trips or abnormal conditions requiring unplanned controlled shutdowns, and provisions for decay heat removal.

Power Operation and Load Changing Procedures

These documents contain instructions for steady-state power operation and load changing. These type documents include, as examples, provisions for use of control rods, chemical shim, coolant flow control, or any other system available for short-term or long-term control of reactivity, making deliberate load changes, responding to unanticipated load changes, and adjusting operating parameters.

Process Monitoring Procedures

These documents contain instructions for monitoring performance of plant systems to assure that core thermal margins and coolant quality are maintained in acceptable status at all times, that integrity of fission product barriers is maintained, and that engineered safety features and emergency equipment are in a state of readiness to keep the plant in a safe condition if

needed. Maximum and minimum limits for process parameters are appropriately identified. Operating procedures address the appropriate nature and frequency of this monitoring.

Fuel Handling Procedures

These documents contain instructions for core alterations, accountability of fuel and partial or complete refueling operations that include, for example, continuous monitoring of neutron flux throughout core loading, periodic data recording, audible annunciation of abnormal flux increases, and evaluation of core neutron multiplication to verify safety of loading increments. Procedures are also provided for receipt and inspection of new fuel, and for fuel movements in the spent fuel storage areas. Fuel handling procedures include prerequisites to verify the status of systems required for fuel handling and movement; inspection of replacement fuel and control rods; designation of proper tools, proper conditions for spent fuel movement, proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits and mode switches. These procedures provide requirements for refueling, including proper sequence, orientation and seating of fuel and components, rules for minimum operable instrumentation, actions for response to fuel damage, verification of shutdown margin, communications between the control room and the fuel handling station, independent verification of fuel and component locations, criteria for stopping fuel movements, and documentation of final fuel and component serial numbers (or other unique identifiers) and locations.

Maintenance Procedures

These documents contain instructions in sufficient detail to permit maintenance work to be performed correctly and safely, and include provisions, such as hold or witness points, for conducting and recording results of required inspections or tests. These documents may include applicable inspection or test instructions subject to the requirements for test and inspection procedures below. Appropriate referencing to other procedures, standards, specifications, or supplier manuals is provided. When not provided through other documents, instructions for equipment removal and return to service, and applicable radiation protection measures (such as protective clothing and radiation monitoring) will be included. Additional maintenance procedure requirements are addressed in NQA-1-1994, Subpart 2.18, Section 2.2, Procedures.

Radiation Control Procedures

These documents contain instructions for implementation of the radiation control program requirements necessary to meet regulatory commitments, including acquisition of data and use of equipment to perform necessary radiation surveys, measurements and evaluations for the assessment and control of radiation hazards. These procedures provide requirements for monitoring both external and internal exposures of employees, utilizing accepted techniques; routine radiation surveys of work areas; effluent and environmental monitoring in the vicinity

of the plant; radiation monitoring of maintenance and special work activities, and for maintaining records demonstrating the adequacy of measures taken to control radiation exposures to employees and others.

Calibration and Test Procedures

These documents contain instructions for periodic calibration and testing of instrumentation and control systems, and for periodic calibration of measuring and test equipment used in activities affecting the quality of these systems. These documents provide for meeting surveillance requirements and for assuring measurement accuracy adequate to keep safety-related parameters within operational and safety limits.

Chemical and Radiochemical Control Procedures

These documents contain instructions for chemical and radiochemical control activities and include: the nature and frequency of sampling and analyses; instructions for maintaining coolant quality within prescribed limits; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces, or become sources of radiation hazards due to activation. These documents also provide for the control, treatment and management of radioactive wastes, and control of radioactive calibration sources.

Emergency Operating Procedures

These documents contain instructions for response to potential emergencies so that a trained operator will know in advance the expected course of events that will identify an emergency and the immediate actions that are taken in response. Format and content of emergency procedures are based on NUREG and Owner's Group(s) guidance that identify potential emergency conditions and require such procedures to include, as appropriate, a title, symptoms to aid in identification of the nature of the emergency, automatic actions to be expected from protective systems, immediate operator actions for operation of controls or confirmation of automatic actions, and subsequent operator actions to return the reactor to a normal condition or provide for a safe extended shutdown period under abnormal or emergency conditions.

Emergency Plan Implementing Procedures

These documents contain instructions for activating the Emergency Response Organization and facilities, protective action levels, organizing emergency response actions, establishing necessary communications with local, state and federal agencies, and for periodically testing the procedures, communications and alarm systems to assure they function properly. Format and content of such procedures are such that requirements of each facility's NRC approved Emergency Plan are met.

Test and Inspection Procedures

These documents provide the necessary measures to assure quality is achieved and maintained for the nuclear facilities. The instructions for tests and inspections may be included within other procedures, such as installation and maintenance procedures, but will contain the objectives, acceptance criteria, prerequisites for performing the test or inspection, limiting conditions, and appropriate instructions for performing the test or inspection, as applicable. These procedures also specify any special equipment or calibrations required to conduct the test or inspection and provide for appropriate documentation and evaluation by responsible authority to assure test or inspection requirements have been satisfied. Where necessary, hold or witness points are identified within the procedures and require appropriate approval for the work to continue beyond the designated point. These procedures provide for recording the date, identification of those performing the test or inspection, as-found condition, corrective actions performed (if any), and as-left condition, as appropriate for the subject test or inspection.

Section 4 Control of Systems and Equipment in the Operational Phase

Permission to release systems and equipment for maintenance or modification is controlled by designated operating personnel and documented. Measures, such as installation of tags or locks and releasing stored energy, are used to ensure personnel and equipment safety. When entry into a closed system is required, Dominion has established control measures to prevent entry of extraneous material and to assure that foreign material is removed before the system is reclosed.

Administrative procedures require the designated operating personnel to verify that the system or equipment can be released and determine the length of time it may be out of service. In making this determination, attention is given to the potentially degraded degree of protection where one subsystem of a redundant safety system is not available for service. Conditions to be considered in preparing equipment for maintenance include, for example: shutdown margin; method of emergency core cooling; establishment of a path for decay heat removal; temperature and pressure of the system; valves between work and hazardous material; venting, draining and flushing; entry into closed vessels; hazardous atmospheres; handling hazardous materials; and electrical hazards.

When systems or equipment are ready to be returned to service, designated operating personnel control placing the items in service and document its functional acceptability. Attention is given to restoration of normal conditions, such as removal of jumpers or signals used in maintenance or testing, or actions such as returning valves, breakers or switches to proper start-up or operating positions from "test" or "manual" positions. Where necessary, the equipment placed into service receives additional surveillance during the run-in period.

Independent verifications, where appropriate, are used to ensure that the necessary measures have been implemented correctly. The minimum requirements and standards for using independent verification are established in company documents.

Section 5 Plant Maintenance

Dominion establishes controls for the maintenance or modification of items and equipment subject to the QAPD to ensure quality at least equivalent to that specified in original design bases and requirements, such that safety-related structures, systems and components are maintained in a manner that assures their ability to perform their intended safety function(s). Maintenance activities (both corrective and preventive) are scheduled and planned so as not to unnecessarily compromise the safety of the plant.

In establishing controls for plant maintenance, Dominion commits to compliance with NQA-1-1994, Subpart 2.18, with the following clarifications:

- Where Subpart 2.18 refers to the requirements of ANS-3.2, it shall be interpreted to mean the applicable standards and requirements established within the North Anna 3 QAPD
- Section 2.3 requires cleanliness during maintenance to be in accordance with Subpart 2.1. The commitment to Subpart 2.1 is described in the QAPD, Part II, Section 13.2.

18 Human Factors Engineering

18.0 Human Factors Engineering

18.1 HFE Program Management

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.2 Operating Experience Review

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.3 Functional Requirements Analysis and Function Allocation

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.4 Task Analysis

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.5 Staffing and Qualifications

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.6 Human Reliability Analysis

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.7 Human-System Interface Design

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.8 Procedure Development

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.9 Training Program Development

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.10 Verification and Validation

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.11 Design Implementation

This section of the referenced DCD is incorporated by reference with no departures or supplements.

18.12 Human Performance Monitoring

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19 Probabilistic Risk Assessment and Severe Accident Evaluation

19.0 Probabilistic Risk Assessment and Severe Accident Evaluation

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19.1 Probabilistic Risk Assessment

This section of the referenced DCD is incorporated by reference with no departures or supplements.

19.1.1.2.1 Uses of Probabilistic Risk Assessment in Support of Licensee Programs

NAPS COL 19.3(4) Replace the second paragraph in DCD Subsection 19.1.1.2.1 with the following.

The PRA is updated to assess site-specific information and associated site-specific external events. A systematic process is used to develop the site-specific PRA from the design certification PRA. This process includes the following activities:

- Identify any design changes or departures from the certified design.
- Map the design changes and departures onto specific PRA elements, recognizing that some design changes and departures may be unrelated to any PRA element.
- Develop screening criteria to determine which of the remaining design changes and departures should be included in the plant-specific PRA model. In cases where it can be shown that assumptions in the certified design PRA (1) bound certain site-specific and plant-specific parameters, and (2) do not have a significant impact on the PRA results and insights, no change to the design certification PRA is necessary. Similarly, certain changes or deviations from the certified design or the certified design PRA need not be reflected in the plant-specific PRA as long as it can be shown that (1) they are not important changes or deviations, and (2) do not have a significant impact on the PRA results and insights.

Site-specific information is reviewed to identify information related to the assumptions used in the PRA and having a potential effect on the PRA

insights. Identification of the site-specific design is provided in Section 1.8, which summarizes significant site-specific interfaces and departures from the referenced certified design. These site-specific design issues, except ESWS and ultimate heat sink (UHS), are considered having no potential influence to the results of the PRA. PRA screening assessments are shown in Sections 19.1.4.1.2 through 19.1.6.2.

19.1.1.4.1 Uses of Probabilistic Risk Assessment in Support of Licensee Programs

NAPS SUP 19.1(1)

Add the following text after the first paragraph in DCD Subsection 19.1.1.4.1.

The PRA models and results provide input to programs such as the preventive maintenance basis program and other related maintenance and reliability programs including the MOV and air-operated valve reliability and testing programs.

19.1.4.1.2 Results from the Level 1 PRA for Operations at Power

NAPS COL 19.3(4)

Add the following text after the first sentence in DCD Subsection 19.1.4.1.2.

The only site-specific design that has potential effect on level 1 PRA for operation at power is the site-specific UHS.

Unit 3 uses CTWs as the UHS for the ESWS. Discharged cooling water from the heat exchangers of the ESWS is sprayed into the CTW basin during normal operation. Water is bypassed directly to a basin without passing through spray nozzles to prevent freezing of the ESWS during winter operation. UHS design for the ESWS is treated as conceptual design information in the standard US-APWR design, and the PRA for the standard design assumes that the UHS is an assured source of water, without reference to type of source, cooling, or discharge.

The UHS consists of four 50 percent capacity mechanical draft CTWs, one for each ESWS train, and four 33-1/3 percent capacity basins to supply cooling water more than 30 days. Each CTW consists of two cells with fans and motors, drift eliminators, film fills, risers, and water distribution system all enclosed and supported by a Seismic Category I reinforced concrete structure. Each basin includes an ESWP intake structure that contains one 50 percent capacity ESWP and one

100 percent capacity UHS transfer pump, and associated piping and components. The fan motors are powered from the Class 1E normal ac power system. The UHS transfer pump located in each basin is powered from the Class 1E bus, which is independent from the one to power associated ESWP.

Adoption of CTWs and winter operation mode valves to the UHS for the ESWS raises additional failure modes for the ESWS, which are associated with the failure of CTW fans, UHS CTW isolation valves, and UHS CTW bypass valves. Failure of the CTW fans would cause degradation of heat release from the ESWS to the atmosphere, which would result in an increase of the ESWS temperature in the faulted train. Failure of both fans when providing spray or one valve when providing spray or bypass in a single CTW train is considered a potential failure mode of the ESWS.

Failures of CTW fans, isolation valves, and bypass valves were modeled in ESWS fault tree to address the effect of site-specific UHS. The reliability of ESWS affects both the initiating event frequency of loss of CCW and the reliability of ESWS after the initiating event. Therefore, the initiating event frequency given later in this subsection based on the US-APWR design was re-quantified based on the site-specific ESWS designs along with re-quantification of post-initiating event ESWS reliability.

Assumptions and important design features regarding the UHS and ESWS are as follows:

- A drain line is provided as an overfill protection from overfilling the basin and failing the pump(s).
- There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.
- On failure of the fans during normal plant operation, operating status of each fan is indicated in the MCR.
- Should the plant trip, the basins can be effective in removing decay heat more than 24 hours.
- The transfer line is a high integrity line, regularly tested and inspected for corrosion.
- Failure of the transfer line will not drain any CTW basin.

- The basin water is tested regularly and maintained in a condition to preclude corrosion and organic material from plugging strainers.
- Ventilation of the ESWP room is sufficiently reliable that the availability of ESWP is not degraded.
- The valves in the bypass line and spray line are interlocked. When one valve is opened, the other valve is closed.
- During normal operation, the bypass valve in the cooling tower that is in standby will remain closed regardless of the bypass valve position in the operating tower.
- The valves will be automatically returned to normal position (isolation valve is open, bypass valve is closed) upon detection of accident signal.
- The valve positions are monitored in the MCR.

The internal event core damage frequency (CDF) was found to be numerically the same as reported later in this subsection with an actual increase in the CDF due to the site-specific designs of less than 1 percent. The initiating event frequency for loss of CCW, as reported in DCD Tables 19.1-2 and 19.1-23, increases from 2.4E-05/reactor-year (RY) to 2.6E-05/RY due to the site-specific ESWS designs. The effect of the site-specific ESWS designs on the internal CDF is very small. Therefore, any discrepancy of cutsets, and dominant sequences from that documented for the standard US-APWR design is considered negligible. Changes in importance are the basic events related to the site-specific design shown in Table 19.1-204. The results described below are considered sufficient and applicable.

19.1.4.2.2 Results from the Level 2 PRA for Operations at Power

STD COL 19.3(4)

Add the following text after the first sentence in DCD Subsection 19.1.4.2.2.

The only site-specific design that has potential effect on level 2 PRA is the site-specific UHS.

As is the case of the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), modeling of the site-specific UHS results in small effect on the reliability of the component cooling water system (CCWS) for internal events. There is only small increase of CDF resulting from loss of CCW initiating events, also the contribution of total loss of

CCW initiating event to the large release frequency (LRF) for operations at power is considered insignificant. It has been therefore determined that consideration of the site-specific UHS would have no discernible effect on the Level 2 PRA results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.5 Safety Insights from the External Events PRA for Operations at Power

NAPS COL 19.3(4) Replace the second and third paragraphs in DCD Subsection 19.1.5 with the following.

The last three events listed above receive detailed evaluation in the following subsections. The first four events are subject to the screening criteria consistent with the guidance of ASME/ANS RA-Sa-2009 (Reference 19.1-50), taking into consideration the features of advanced light water reactors.

The assessment of the other external events is provided below:

The screenings for other external events are performed using the following steps taking into consideration the features of advanced light water reactors. At first, qualitative screenings are performed because they are easy to obtain lower risk from advanced reactors design features or site characteristics. The qualitative screenings are performed using the analysis reported in Chapter 2 in accordance with the guidelines of ASME/ANS RA-Sa-2009. Section 6.2 of the standard defined the initial preliminary screening criteria as supporting technical requirement EXT-B1. The five qualitative screening criteria are:

1. Lower damage potential than a design basis event
2. Lower event frequency of occurrence than another event
3. Cannot occur close enough to the plant to have an affect
4. Included in the definition of another event
5. Sufficient time to eliminate the source of threat or to provide an adequate response

Following the qualitative screenings, quantitative screenings are performed. The supporting technical requirement EXT-B2 of ASME/ANS

RA-Sa-2009 states that the criteria provided in the 1975 Standard Review Plan can be used as an acceptable basis for the screening criteria of external events. The criteria are:

i. the contribution to CDF is less than 10^{-6}/year, or

ii. the design-basis event at annual frequencies of occurrence is between 10^{-7} and 10^{-6}.

For Unit 3, a value of 10^{-7} for the annual frequency of occurrence is used as a more conservative quantitative screening criterion. If an event frequency is greater than 10^{-7}/year, perform bounding analysis or PRA to confirm that the risk is sufficiently low for advanced light water reactors such as less than 1% of total CDF. The remaining external events which do not meet the above screening criteria are assessed using a bounding analysis.

The qualitative and quantitative screenings are performed using the analysis reported in Sections 2.2, 2.3, 2.4, and 3.5. The summary of the screenings are described in Table 19.1-205. Only tornado events are not screened because the annual frequency of expected maximum tornado wind speed on the site is close to 10^{-7}/year.

High Winds and Tornadoes

For high winds and tornadoes, tornadoes are evaluated using level 1 PRA as a bounding analysis from the discussion in Section 2.3.1.3.2.

The following sections show the results of the tornado PRA elements: 1) tornado hazards, 2) plant vulnerabilities, 3) accident scenario, and 4) quantification.

- Tornado hazard

  A tornado wind speed hazard curve for Unit 3 was developed following NUREG/CR-4461 which also forms the basis for NRC RG 1.76. The tornado hazard methodology developed in NUREG/CR-4461 fully meets the requirements of ASME/ANS RA-Sa-2009.

  The Unit 3 is near Lake Anna, Virginia, and is located at 38° 03' latitude and 74° 47' longitude. The tornado hazard curve has been developed based on data reported in NUREG/CR-4461 for the 2° box surrounding the site, which recorded 232 tornado occurrences from 1950 through 2003. The hazard curve produced for the Unit 3 is

shown in Figure 19.1-201. Strike and exceedance frequencies for tornadoes categorized in enhanced F-scale intensity are shown in Table 19.1-201.

- Plant vulnerabilities

  Components significant to the internal events PRA were reviewed to identify component vulnerability during tornadoes. Component failures that could cause initiating events were also reviewed.

  All systems and components essential for safe shutdown and for maintaining the integrity of the reactor coolant pressure boundary are located within seismic category I buildings, which are designed to withstand the loading of a design basis tornado. The design basis tornado is described in Section 3.3 and in Table 19.1-202.

  Based on a review of components, the following were identified as potential vulnerabilities during tornadoes with intensities below the design basis tornado.

  - Plant switchyard
  - Piping of the FSS
  - CTW for the non-essential chilled water system and associated pipings
  - Selector circuit and breakers of the alternate ac power supply system
  - Permanent buses of the non-safety power system
  - Main steam supply system downstream of the MSIVs
  - Main feedwater system upstream of the MFIVs

  Structure, system, and components (SSCs) will be designed using the site-specific basic wind speed of 96 mph or higher. Within this analysis, plant vulnerabilities located outdoors that are not Seismic Category I or II structures are assumed to be damaged for tornado strikes of intensity enhanced F-scale 1 and greater. In this analysis, the following systems are assumed to be damaged for tornado strikes of intensity enhanced F-scale 1 and greater:

  - Plant switchyard
  - Non-essential chilled water system - Cooling tower only

  Alternate CCW function, which utilizes the non-ESW system or the FSS, is conservatively assumed to be unavailable for tornado strikes of intensity enhanced F-scale 1 and greater.

Seismic Category II structures are designed to withstand a basic wind speed of 155 mph. The Seismic Category II structure that contains PRA related equipment is the turbine building (T/B). Tornado induced failure of the T/B is conservatively assumed to have an effect on the operability of alternate ac power system. In this analysis, the following systems are assumed to be damaged by tornado strikes resulting in failure of the T/B:

- Plant switchyard
- FSS
- Non-essential chilled water system
- Non-safety electric power system
- Alternate ac power supply system

NAPS ESP VAR 2.3-1

Site-specific structures and components, e.g., UHS, are damaged by tornadoes exceeding the site-specific tornado maximum wind speed (200 mph). Direct damage to the US-APWR standard design Seismic Category I structures and components within the structure can be caused by tornadoes exceeding the design basis tornado (230 mph). Since safety-related systems are cooled by CCWS, through ESWS sharing with UHS, a tornado strike of greater than 200 mph wind speed can result in functional failures of safety-related systems. In this analysis, safety-related systems are assumed to be damaged for tornado strikes exceeding the site-specific tornado maximum wind speed (wind speed >200 mph).

- Accident scenario

When a tornado strikes the plant, there is a probability that a tornado initiated accident scenario may be induced with some mitigation functions inoperable due to damage from a tornado strike. Based on plant vulnerabilities identified in the previous section, the internal events PRA was reviewed to identify initiating events or degradation of mitigation functions that may be caused by a tornado strike. The following internal events accident initiators may be caused by a below design basis tornado strike:

- LOOP
- Main steam line break downstream of MSIVs
- Loss of feedwater flow
- Feedwater line break upstream of the MFIVs

The following mitigation and support systems may be degraded by tornado-induced failures from a below design basis tornado strike:

- •• Alternate CCW utilizing the FSS
- •• Alternate CCW utilizing the non-essential chilled water system
- •• Non-safety electric power system
- •• Alternate ac power supply system (this is a mitigation system for LOOP events, which is an initiating event potentially caused by a tornado strike)

Based on the results of the plant vulnerability analysis and the discussion above, tornado induced accident scenarios were categorized into three scenarios as shown in Table 19.1-203. The frequency of each scenario derived from the hazard fragility analysis of the T/B is also shown.

- Quantification

For the tornado induced accident scenarios, the CDF was calculated based on the internal event PRA results. The dominant core damage scenarios were the following:

- •• Failure of all safety systems by a beyond design basis tornado. This event leads directly to core damage. This CDF for this scenario is 1.2E-07/RY.
- •• Tornado strike induced LOOP caused by EF-scale 1 or EF-scale 2 tornado

  Plant switchyard is damaged by an EF-scale 1 or EF-scale 2 tornado strike and LOOP that cannot be recovered within 24 hours. The FSS and the non-essential chilled water system are also damaged by the tornado strike, resulting in unavailability of the alternate component cooling function. If the gas turbine power generators fail and SBO occurs, RCP seal LOCA will occur and eventually the core is damaged. If the CCW pumps or the ESW pumps fail to restart, RCP seal LOCA will occur and eventually the core is damaged. The CDF for this scenario is 1.6E-08/RY.

The total CDF caused by a tornado strike during at-power operation is on the order of magnitude of 1E-07/RY. Tornado induced CDF is one order of magnitude lower than the total CDF for internal events and internal flood and internal fire events.

The CDF from tornadoes during LPSD does not contribute more than ten percent of the total shutdown CDF and total shutdown LRF compared to the design certification PRA. Tornado events during LPSD do not have a significant contribution to risk.

External Flooding

Section 2.4.2 systematically considers the various factors that can contribute to the incident of external flooding. Based on the discussions in this section, the contribution of such events to the total CDF is considered insignificant. These events meet the preliminary screening criteria of ASME/ANS RA-Sa-2009.

Transportation and Nearby Facility Accidents

These events consist of the following:

- Hazards associated with nearby industrial activities, such as manufacturing, processing, or storage facilities
- Hazards associated with nearby military activities, such as military bases, training areas, or aircraft flights
- Hazards associated with nearby transportation routes (aircraft routes, highways, railways, navigable waters, and pipelines)

In Section 2.2.3, design basis events internal and external to the nuclear power plant are defined as those events that have a probability of occurrence on the order of about 10^{-7}/RY or greater and potential consequences serious enough to affect the safety of the plant to the extent that the guidelines in 10 CFR 100 could be exceeded. The following categories are considered for the determination of design basis events: explosions, flammable vapor clouds with a delayed ignition, toxic chemicals, fires, collisions with the intake structure, and liquid spills.

The effects of these events on the safety-related components of the plant are insignificant as discussed in Section 2.2.3. These events meet the preliminary screening criteria of ASME/ANS RA-Sa-2009.

Aircraft Crash

As described in Section 3.5.1.6, the probability of aircraft-related accidents for Unit 3 is on the order of magnitude of 10^{-7} per year for aircraft, airway, and airport information reflected in Section 2.2. Thus, this event is not addressed further.

19.1.5.1.1 Description of the Seismic Risk Evaluation

NAPS DEP 3.7(1)

Replace the last sentence of the paragraph associated with the first bullet "Selection of review level earthquake" in DCD Subsection 19.1.5.1.1 with the following.

The RLE of Unit 3 is 1.67 times the safe-shutdown earthquake (SSE).

Add the following sentence at the end of the paragraph associated with the bullet "Fragility Analysis" in DCD Subsection 19.1.5.1.1.

It is assumed that the relative seismic margins to SSE for SSCs in DCD Subsection 19.1.5.1 are applicable for Unit 3 because the PRA related SSCs are designed to have adequate margin to both the DCD condition and Unit 3 site-specific condition.

Replace the last sentence in the third paragraph following the bullet "Demonstration of seismic margin in the design" in DCD Subsection 19.1.5.1 with the following.

An earthquake of 1.67 times SSE is defined as the RLE for Unit 3.

Replace the last sentence in the paragraph following "a) Components" in DCD Subsection 19.1.5.1.1 with the following.

The ratios of the HCLPF values to the SSE used in the DCD are assumed to be the same for Unit 3, which has a higher SSE.

Replace the last sentence in the third paragraph following "b) Structures" of DCD Subsection 19.1.5.1.1 with the following.

The ratios of the HCLPF values to the SSE used in the DCD are assumed to be the same for Unit 3, which has a higher SSE.

Replace the first sentence in the fourth paragraph following "b) Structures" of DCD Subsection 19.1.5.1.1 with the following.

For SSCs for which generic fragility data is not available or is not appropriate, a HCLPF value of 1.67 times SSE (PGA) is assumed.

Replace the fifth paragraph after "b) Structures" of DCD Subsection 19.1.5.1.1 with the following.

SSCs of Seismic Category I are designed for the SSE with such conservatisms that they have adequate seismic design margin. Therefore, HCLPF of 1.67 times SSE would be reasonably achievable for Seismic Category I SSCs. The site-specific seismic margin analysis using the plant-specific, in-structure response and the results of stress analysis for Unit 3 will confirm that the as-built HCLPF values for Unit 3 SSCs are not less than 1.67*SSE.

19.1.5.1.2 Results from the Seismic Risk Evaluation

NAPS DEP 3.7(1)

Replace DCD Subsection 19.1.5.1.2 with the following

It is assumed that the relative seismic margins to SSE for SSCs in DCD Subsection 19.1.5.1 are applicable for Unit 3 because the PRA related SSCs are designed to have adequate margin to both the DCD condition and Unit 3 site-specific condition. The site-specific seismic margin analysis using the plant specific in-structure response and the results of Unit 3 stress analyses will confirm that the as-built HCLPF values of Unit 3 SSCs are not less than 1.67*SSE. Deviations from the HCLPF values or other assumptions in DCD Subsection 19.1.5.1 will be analyzed to determine if new vulnerabilities have been introduced. This analysis will be completed prior to fuel load.

The result of the PRA based SMA is the plant HCLPF for core damage. The steps to perform the PRA based SMA include the following.

1. HCLPFs for seismic basic events - The HCLPFs for various US-APWR SSCs including site-specific SSCs, such as ESWPTs, Ultimate Heat Sink Related Structures, ESWS Bypass and Isolation Valves, and PSFSVs, were calculated. See Table 19.1-54R for HCLPF values of structures and categories of components, and Table 19.1-55R for HCLPF values for basic events.

2. Calculation of seismic initiating event HCLPFs - Initiating event HCLPFs are calculated using the min-max method.

3. Calculation of cutsets for the core damage - Cutsets of the core damage sequences are quantified using fault tree linking process. The seismic cutsets contain only seismic failure events. Then, the probability of random failures is set to 0.0, and cutsets are calculated.

4. Calculation of sequence HCLPFs and the plant HCLPF - Sequence HCLPFs are calculated using the min-max method. The plant HCLPF is calculated as the minimum sequence HCLPF, as shown in Table19.1-56.

5. Calculation of core damage mixed-cutsets - The mixed-cutsets contain both seismic failures and random failures. Random failure probabilities are derived from the internal PRA model. The mixed-cutsets are quantified using fault tree linking process.

The dominant sequence HCLPFs are shown below.

Initiating event	Fault tree		Sequence
1. SE_ELOCA (1.67*SSE)		=	SE_ELOCA-0001 (1.67*SSE)
2. SE_CCW (1.67*SSE)		=	SE_CCW-0001 (1.67*SSE)
3. SE_LOOP (0.08 g)	[AND] SE-OPS (1.67*SSE)	=	SE_LOOP-0027 (1.67*SSE)
4. SE_GSTC (1.77*SSE)		=	SE_GSTC-0001 (1.77*SSE)

Accident scenario and important contributors to each sequence are described below.

1. SE_ELOCA-0001

   SE_ELOCA-0001 sequence, with HCLPF value 1.67*SSE, is a loss of the RCS inventory that exceeds the ECCS capacity to provide makeup event. This event leads to core damage. The most important contributors to this event are:

(1) Structural failure of the fuel assembly: (reactor internals and core assembly)	1.67*SSE
(2) Structural failure of the RV:	2.07*SSE
(3) Structural failure of the RCPs:	2.23*SSE

2. SE_CCW-0001

   SE_CCW-0001 sequence, with HCLPF value 1.67*SSE, is a seismically induced loss of CCW event. This event causes RCP seal LOCA and results in failure of all systems cooled by the CCWS such as the safety injection pumps and the Containment Spray/Residual Heat Removal System (CS/RHRS) pumps. This event leads to core damage. The most important contributors to this event are:

   (1) Structural failure of the essential chiller units: 1.67*SSE

   (2) Structural failure of ESW intake structure: 1.67*SSE

   (3) Structural failure of ESW pipe tunnel: 1.67*SSE

   (4) Structural failure of CCW heat exchangers: 1.93*SSE

   (5) Structural failure of the CCW surge tanks: 1.93*SSE

   (6) Structural failure of the CS/RHR heat exchangers: 1.93*SSE

3. SE_LOOP-0027

   SE_LOOP-0027 sequence, with HCLPF value 1.67*SSE, is a seismically-induced LOOP event and failure of class 1E GTGs. This event sequence causes RCP seal LOCA and results in failure of all systems cooled by CCWS. The most important cutsets associated with this sequence involve failure of the ceramic insulators (0.08 g) combined with failure of the class 1E GTGs (1.67*SSE).

4. SE_GSTC-0001

   [SE_GSTC-0001 sequence, with HCLPF value 1.77*SSE, is a gross structural collapse event which leads to core damage. The most important contributors to this event are:

   (1) Structural failure of the cable trays: 1.77*SSE

   (2) Structural failure of the containment: 2.10*SSE

   (3) Structural failure of the RWSP: 2.10*SSE

The plant HCLPF is calculated by finding the lowest HCLPF sequence shown in Table 19.1-56R. The plant HCLPF value is 1.67*SSE. Therefore, an acceptable standard design is realized since the plant HCLPF (1.67*SSE) is greater than or equal to the RLE PGA (1.67*SSE).

It is not desirable that conservative SSC HCLPFs control the plant HCLPF. Conservative HCLPFs of 1.67*SSE are assigned to essential chiller units (1.67*SSE), ESW intake structure (1.67*SSE), ESWPT (1.67*SSE), fuel assembly (1.67*SSE) and class 1E GTGs (1.67*SSE). When the design activity progresses and specific design data becomes available, the SSC HCLPF values will be reviewed to confirm that they are greater than or equal to the RLE PGA.

Thus, a sensitivity study is performed by setting the HCLPF capacities for these SSCs to 3.33*SSE. The result of the sensitivity analysis showed that the plant HCLPF increased to 1.77*SSE.

From the results of the plant HCLPF calculation and sensitivity studies, SSCs that make the largest contribution to seismic risk are as follows:

1. SE-HVACHSF001BC (1.67*SSE): Essential chiller units (structural failure)
2. SE-SWSSRSFESWBAS (1.67*SSE): ESW intake structure (structural failure)
3. SE-SWSSRSFESWTUN (1.67*SSE): ESWPT (structural failure)
4. SE-ELOSRSFFUEL (1.67*SSE): Fuel assembly (structural failure)
5. SE-ELSDLFFGTABCD (1.67*SSE): Class 1E GTGs (functional failure)
6. SE-GTSCASFCABLE (1.77*SSE): Cable tray (structural failure)
7. SE-CWSTNSF001AB (1.93*SSE): CCW surge tank (structural failure)
8. SE-CWSRISF001ABCD (1.93*SSE): CCWS heat exchangers (structural failure)
9. SE-RSSRISF001ABCD (1.93*SSE): CS/RHRS heat exchangers (structural failure)

The potential impact of random failures on the vulnerability of the plant is assessed by examining “mixed cutsets” in the results. Dominant mixed-cutsets are defined as the mix-cutsets containing the random failure probability higher than 1.0E-03 in this study. The dominant mixed-cutsets (i.e., the combination of seismic failure and no seismic failures) are organized as follows:

- Combination 1:

Seismically induced small LOCA initiating event

[AND] Seismically induced failure of M/D EFW pumps

Multiple failures of SSCs are required to cause core damage. The probability of such a scenario would be low. From these results, random failures are concluded not to have significant impact on seismic safety.

One of the objectives of a seismic PRA study is to identify vulnerabilities of containment functions, including containment integrity, containment isolation and prevention of bypass functions. Seismic capacities for these functions are as follows.

- Containment integrity
  - Containment
  - Containment spray and containment cooling system (involved in CS/RHRS)
- Containment isolation
  - Containment isolation valves and associated piping
  - Penetrations
  - Equipment hatches
- Prevention of bypass function
  - MSIVs
- Containment integrity

  HCLPF of containment is 2.10*SSE. The seismic capacity for CS/RHRS is identified higher than RLE PGA. Therefore there is a seismic margin for containment integrity.
- Containment isolation function

  HCLPF of containment isolation valves are 2.67*SSE. The seismic capacity for safety-related I&C system and power distribution system to actuate containment isolation valves are also higher than RLE PGA. HCLPFs for penetrations and equipment hatches are greater than 1.67*SSE.
- Prevention of containment bypass function

  Causes of containment bypass are interfacing system LOCA (ISLOCA), and steam generator tube rupture. US-APWR has enhanced the plant design against an ISLOCA by increasing the

design pressure. Therefore the frequency of ISLOCA is very low. Also HCLPF of steam generators is 2.23*SSE and higher than RLE PGA. Therefore there is a seismic margin for containment bypass event.

The SMA results identified some risk insights as follows:

1. There are some important safety-related SSCs for which seismically induced failure would lead directly to core damage. In this SMA study, these SSCs have HCLPF values in excess of 1.67*SSE. If any of these SSCs were built with a HCLPF lower than 1.67*SSE, the plant HCLPF would also be lower than 1.67*SSE.

2. The plant HCLPF is dominated by essential chiller units (1.67*SSE), ESW intake structure (1.67*SSE), ESWPT (1.67*SSE), fuel assembly (1.67*SSE) and class 1E gas turbine generators (1.67*SSE). If those SSCs HCLPF value were to be increased to any value above 1.77*SSE, the plant HCLPF would increase to 1.77*SSE and would be dominated by the cable tray (1.77*SSE).

3. The analysis did not identify any important sequence containing mixed cutsets. The only sequences containing mixed cutsets which would lower the plant HCLPF to below 1.67*SSE when random failures occur are LOOP sequences which are initiated by failure of the ceramic insulators (0.08 g). However, the probability of such random failures occurring is low (i.e., less than 1.0E-03). This means that random failures are unlikely to occur in a seismically-initiated accident sequence.

4. No credit is taken for operator actions in this study. The plant HCLPF is dominated by failures of SSCs result in core damage directly, such as the failure of structures.

5. Depending on whether offsite power is available, different scenarios to trip the reactor are considered. In the case where offsite power failed (i.e., a LOOP initiating event), the control rod motor generator sets would be de-energized thereby releasing control rods into the core even if the reactor trip signal function failed. Only when the control rods mechanically bind or fail would the reactor trip be failed. This scenario is considered in this study and the HCLPF value for this event is 2.23*SSE (dominated by the control rod HCLPF). In the case where offsite power is available, the failure of the reactor trip

signal function should be considered. However, the HCLPF determined for the reactor trip system would be higher than 2.23*SSE when offsite power is lost. This is because HCLPFs for electrical equipment and sensors/transmitters to trip the reactor are above 2.23*SSE. Thus, whether offsite power is available or not, the HCLPF value (i.e., seismic capacity) to trip the reactor is higher than the plant HCLPF of 1.67*SSE.

6. There are no vulnerabilities for containment performance (i.e., containment integrity, containment isolation and prevention of bypass functions) due to a seismic event.

Insights regarding the Essential Service Water Intake Structure, ESWPT and class 1E gas turbine generators are applicable to the site specific SSCs such as Ultimate Heat Sink Related Structures and PSFSVs. Site-specific seismic margin analysis using the plant specific in-structure response and the results of stress analysis of Unit 3 will confirm that the HCLPF values of Unit 3 SSCs are not less than 1.67*SSE.

The following subsections describe the internal fires risk evaluation and its results.

19.1.5.2.2 Results from the Internal Fires Risk Evaluation

STD COL 19.3(4)

Add the following text at the beginning of DCD Subsection 19.1.5.2.2.

The only site-specific design that has potential effect on internal fires risk is the site-specific UHS.

Four-train separation is maintained in the site-specific UHS design. Modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal fire events. As was the case with the results of the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), it has been determined that consideration of the site-specific UHS would have no discernible effect on the fire PRA results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.5.3.2 Results from the Internal Flooding Risk Evaluation

STD COL 19.3(4)

Add the following text at the beginning of DCD Subsection 19.1.5.3.2.

The only site-specific design that has potential effect on internal flooding risk is the site-specific UHS.

Four-train separation is maintained in the site-specific UHS design. Modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal flooding events. As was the case with the results of the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), it has been determined that consideration of the site-specific UHS would have no discernible effect on the internal flooding PRA results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.6.2 Results from the Low-Power and Shutdown Operations PRA

STD COL 19.3(4) Add the following text at the beginning of DCD Subsection 19.1.6.2.

The only site-specific design that has potential effect on low-power and shutdown risk is the site-specific UHS.

As was the case with the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal events. Considering the small increase of loss of CCW initiating event frequency, it has been determined, that consideration of the site-specific UHS would have no discernible effect on the low-power and shutdown (LPSD) results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.7.1 PRA Input to Design Programs and Processes

STD COL 19.3(4) Add the following text after the last sentence of DCD Subsection 19.1.7.1.

Site-specific key assumptions are summarized in Table 19.1-206.

19.1.7.6 PRA Input to the Technical Specification

NAPS COL 19.3(1) Replace the last paragraph in DCD Subsection 19.1.7.6 with the following.

Unit 3 will not implement RMTS, SFCP, and peer review.

19.1.8 Conclusions and Findings

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Replace the first sentence of the second paragraph in DCD Subsection 19.1.8 with the following.

The results of the site-specific Unit 3 core damage quantification are consistent with the results of the US-APWR plant core damage quantification, which indicate the following CDFs:

Replace the third paragraph in DCD Subsection 19.1.8 with the following.

Based on SMA, the plant HCLPF is 1.67*SSE.

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 1 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Building / Structure				
Reactor Building	Structural Failure	0.69	2.30 *SSE	3
Safety Power Source Buildings	Structural Failure	1.36	4.53 *SSE	3
Containment	Structural Failure	0.63	2.10 *SSE	3
Emergency Feedwater Pits	Structural Failure	0.69	2.30 *SSE	3
Refueling Water Storage Pit	Structural Failure	0.63	2.10 *SSE	3
Interior Containment Structure	Structural Failure	0.66	2.20 *SSE	3
Essential Service Water Intake Structure	Structural Failure	0.50	1.67 *SSE	2
Essential Service Water Pipe Tunnel	Structural Failure	0.50	1.67 *SSE	2
Primary Components				
Fuel Assembly (Reactor Internals and Core Assembly)	Structural Failure	0.50	1.67 *SSE	2
Control Rod Drive	Structural Failure	0.67	2.23 *SSE	1
Reactor Vessel	Structural Failure	0.62	2.07 *SSE	1
Reactor Coolant Pumps	Structural Failure	0.67	2.23 *SSE	1
Pressurizer	Structural Failure	0.67	2.23 *SSE	1
Steam Generator (including Steam Generator Tubes)	Structural Failure	0.67	2.23 *SSE	1
Mechanical Equipment				
Cable Trays	Structural Failure	0.53	1.77 *SSE	1
Accumulators	Structural Failure	0.75	2.50 *SSE	1
CS/RHR Heat Exchangers	Structural Failure	0.58	1.93*SSE	1
CCW Heat Exchangers	Structural Failure	0.58	1.93 *SSE	1
Component Cooling Water Surge Tanks	Structural Failure	0.58	1.93 *SSE	1
Essential Chilled Water Compression Tanks	Structural Failure	0.58	1.93 *SSE	1
Air Conditioner Ducts	Structural Failure	0.53	1.77 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 1 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
High Head Injection System Piping	Structural Failure	0.80	2.67 *SSE	1
Accumulator System Piping	Structural Failure	0.80	2.67 * SSE	1
CS/RHR System Piping	Structural Failure	0.80	2.67 *SSE	1
Emergency Feedwater System Piping	Structural Failure	0.80	2.67 *SSE	1
Essential Chilled Water System Piping	Structural Failure	0.80	2.67 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 2 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Mechanical Equipment (continued)				
Component Cooling Water System Piping	Structural Failure	0.80	2.67 *SSE	1
Essential Service Water System Piping	Structural Failure	0.80	2.67 *SSE	1
RCS Piping	Structural Failure	0.80	2.67 *SSE	1
DVI Piping	Structural Failure	0.80	2.67 *SSE	1
CS/RHR Hotleg Injection Piping	Structural Failure	0.80	2.67 *SSE	1
Main Steam Lines (The upstream side from Main Steam Isolation Valves)	Structural Failure	0.80	2.67 *SSE	1
In-Core Instrumentation Tube	Structural Failure	0.80	2.67 *SSE	1
Pressurizer Safety Valve Piping	Structural Failure	0.80	2.67 *SSE	1
Safety Depressurization Valve Piping	Structural Failure	0.80	2.67 *SSE	1
Pressurizer Spray Piping	Structural Failure	0.80	2.67 *SSE	1
Emergency Letdown Piping	Structural Failure	0.80	2.67 *SSE	1
RCS Instrumentation Letdown Piping	Structural Failure	0.80	2.67 *SSE	1
Accumulator Cold leg Injection Piping	Structural Failure	0.80	2.67 *SSE	1
High Head Injection System Hotleg Piping	Structural Failure	0.80	2.67 *SSE	1
Containment Spray Nozzles	Structural Failure	0.80	2.67 *SSE	1
Pumps and Electric motor				
Safety Injection Pumps	Functional Failure	0.62	2.07 *SSE	1
Safety Injection Pumps	Structural Failure	0.62	2.07 *SSE	1
CS/RHR Pumps	Functional Failure	0.62	2.07 *SSE	1
CS/RHR Pumps	Structural Failure	0.62	2.07 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 2 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Motor-Driven Emergency Feedwater Pumps	Functional Failure	0.62	2.07 *SSE	1
Component Cooling Water Pumps	Structural/ Functional Failure	0.62	2.07 *SSE	1
ESW Pumps	Structural /Functional Failure	0.62	2.07 *SSE	1
Essential Chilled Water Pumps	Functional Failure	0.62	2.07 *SSE	1
Turbine-Driven Emergency Feedwater Pumps	Functional Failure	0.75	2.50 *SSE	1
Emergency Feedwater Pump Area Air Handling Units	Functional Failure	0.67	2.23 *SSE	1
Essential Chiller Units	Functional Failure	0.50	1.67 *SSE	2
Essential Chiller Units	Structural Failure	0.50	1.67 *SSE	2

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 3 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Motor-Operated Valve				
CS/RHR Heat Exchanger Outlet Valves	Functional Failure	0.80	2.67 *SSE	1
Containment Spray Header Containment Isolation Valves	Functional Failure	0.80	2.67 *SSE	1
EFW Isolation Motor-Operated Flow Control Valves	Functional Failure	0.80	2.67 *SSE	1
T/D EFWP steam supply line Motor-Operated Valves	Functional Failure	0.80	2.67 *SSE	1
CCW Supply/Return Header Isolation Valves (NCS-MOV-007A,B,C,D)	Functional Failure	0.80	2.67 *SSE	1
CCW Supply/Return Header Isolation Valves (NCS-MOV-020A,B,C,D)	Functional Failure	0.80	2.67 *SSE	1
Main Feedwater Isolation Valves	Functional Failure	0.80	2.67 *SSE	1
RWSP Outlet Line Motor-Operated Valve 1	Functional Failure	0.80	2.67 *SSE	1
RWSP Outlet Line Motor-Operated Valve 2	Functional Failure	0.80	2.67 *SSE	1
ESWS Pump Outlet Motor-Operated Valves	Functional Failure	0.80	2.67 *SSE	1
Air-Operated Valve				
Main Steam Isolation Valves	Functional Failure	0.80	2.67 *SSE	1
RWSP Return Line Air-Operated valve	Functional Failure	0.80	2.67 *SSE	1
Electrical Equipment				
Offsite Power System (Ceramic Insulators)	Functional Failure	0.08	0.27*SSE	1
Class 1E Gas Turbine Generators	Functional Failure	0.50	1.67 *SSE	2

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 3 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Batteries and Racks	Functional Failure	1.13	3.77 *SSE	1
Class 1E 6.9kV-480V Station Service Transformers	Functional Failure	0.72	2.40 *SSE	1
Class 1E I&C Power Transformers	Functional Failure	0.72	2.40 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 4 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Electrical Equipment (continue)				
Class 1E 6.9 kV Switchgears	Functional Failure	0.96	3.20 *SSE	1
Class 1E 480V Load Centers (A,B,C,D)	Functional Failure	0.96	3.20 *SSE	1
Class 1E 480V Load Centers (A1,D1)	Functional Failure	0.96	3.20 *SSE	1
Class 1E Motor Control Centers (A,B,C,D)	Functional Failure	0.96	3.20 *SSE	1
Class 1E Motor Control Centers (A1,D1)	Functional Failure	0.96	3.20 *SSE	1
Class 1E Gas Turbine Generator Controlboards	Functional Failure	1.13	3.77 *SSE	1
Gas Turbine Control Cabinets	Functional Failure	1.13	3.77 *SSE	1
Class 1E DC Switchboards (A,B,C,D)	Functional Failure	1.13	3.77 *SSE	1
Class 1E DC Switchboards (A1,D1)	Functional Failure	1.13	3.77 *SSE	1
Solenoid Distribution Panels	Functional Failure	1.13	3.77 *SSE	1
Safety Logic System Cabinets	Functional Failure	1.13	3.77 *SSE	1
Reactor Protection System Cabinets	Functional Failure	1.13	3.77 *SSE	1
ESF Actuation System Cabinets	Functional Failure	1.13	3.77 *SSE	1
Safety Remote I/O Cabinets	Functional Failure	1.13	3.77 *SSE	1
Emergency Feedwater Pump Outlet Flow Control Valves Panels	Functional Failure	1.13	3.77 *SSE	1
Ventilation Chiller Control Cabinets	Functional Failure	1.13	3.77 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 4 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Class 1E Battery Chargers	Functional Failure	0.75	2.50 *SSE	1
Class 1E UPS Units	Functional Failure	0.75	2.50 *SSE	1
Class 1E AC 120V Panelboards	Functional Failure	0.75	2.50 *SSE	1
Turbine-driven Emergency Feedwater Pump Actuation Cabinets	Functional Failure	1.13	3.77 *SSE	1
Class 1E MOV Inverters	Functional Failure	0.75	2.50 *SSE	1
MOV Inverter Switches	Functional Failure	0.75	2.50 *SSE	1
Class 1E MOV Motor Control Centers	Functional Failure	0.96	3.20 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 5 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Safety and Check Valves				
Pressurizer Safety Valves	Functional Failure	0.80	2.67 *SSE	1
Safety Injection pump Discharge Check Valves	Functional Failure	0.80	2.67 *SSE	1
RV/HL Injection Line Check Valves	Functional Failure	0.80	2.67 *SSE	1
RV Injection Line Check Valves 1	Functional Failure	0.80	2.67 *SSE	1
RV Injection Line Check Valves 2	Functional Failure	0.80	2.67 *SSE	1
Accumulator Injection Line Check Valves 1	Functional Failure	0.80	2.67 *SSE	1
Accumulator Injection Line Check Valves 2	Functional Failure	0.80	2.67 *SSE	1
CS/RHR Pump Suction Check Valves	Functional Failure	0.80	2.67 *SSE	1
Containment Spray Header Line Check Valves	Functional Failure	0.80	2.67 *SSE	1
EFW Isolation Check Valves	Functional Failure	0.80	2.67 *SSE	1
EFW Pit outlet Check Valves	Functional Failure	0.80	2.67 *SSE	1
EFWP discharge Check Valves	Functional Failure	0.80	2.67 *SSE	1
SG Outlet Check Valves	Functional Failure	0.80	2.67 *SSE	1
CCW Pump outlet Check Valves	Functional Failure	0.80	2.67 *SSE	1
ESWS Pump Outlet Check Valves	Functional Failure	0.80	2.67 *SSE	1
ESWS Supply Line Check Valves	Functional Failure	0.80	2.67 *SSE	1
Main Feedwater Isolation Check Valves	Functional Failure	0.80	2.67 *SSE	1
RWSP Return Line Check Valve	Functional Failure	0.80	2.67 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 5 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (Unit 3) (g:PGA)	basis
Safety and Check Valves *(continued)*				
Essential Chilled Water Pump Discharge Check Valves	Functional Failure	0.80	2.67 *SSE	1
Containment Isolation Equipments				
RCP Seal Water Return Line: C/V Isolation Valves	Functional Failure	0.80	2.67 *SSE	1
RCP Seal Water Return Line C/V Isolation System Piping	Structural Failure	0.80	2.67 *SSE	1
C/V Sump Pump Outlet Pipe Line C/V Isolation System Piping	Structural Failure	0.80	2.67 *SSE	1
Control air Supply Line: C/V Isolation Valve 1	Functional Failure	0.80	2.67 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 6 of 6)

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (NAPS3) (g:PGA)	basis
Containment Isolation Equipments *(continued)*				
Control air Supply Line C/V Isolation Valve 2	Functional Failure	0.80	2.67 *SSE	1
Instrument Air Pipe C/V Isolation System Piping	Structural Failure	0.80	2.67 *SSE	1
CV Clean up Pipe Line C/V Isolation System Piping	Structural Failure	0.80	2.67 *SSE	1
Containment low volume purge supply Containment Isolation Valve (VCS-AOV-356)	Structural Failure	0.80	2.67 *SSE	1
Containment low volume purge supply Containment Isolation Valve (VCS-AOV-357)	Structural Failure	0.80	2.67 *SSE	1
Penetrations	Structural Failure	0.50	1.67 *SSE	2
Equipment hatches	Structural Failure	0.50	1.67 *SSE	2
Other Equipments				
Spent Fuel Pit Heat Exchangers	Structural Failure	0.58	1.93 *SSE	1
Spent Fuel Pit	Structural Failure	0.69	2.30 *SSE	3
Spent Fuel Pit Pumps	Functional Failure	0.62	2.07 *SSE	1
Spent Fuel Pit Pumps	Structural Failure	0.62	2.07 *SSE	1
Spent Fuel Pit Water Cooling System Piping	Structural Failure	0.80	2.67 *SSE	1
Important Site-Specific SSCs				
Essential Service Water Pipe Tunnel (Site-Specific)	Structural Failure	—	1.67 *SSE	2
Ultimate Heat Sink Related Structures	Structural Failure	—	1.67 *SSE	2
ESWS Bypass and isolation valves	Functional Failure	—	2.67 *SSE	1

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Table 19.1-54R HCLPF Values of Structures and Categories of Components (Sheet 6 of 6) *(continued)*

Equipment Name	Failure Mode	HCLPF (DC) (g:PGA)	HCLPF (NAPS3) (g:PGA)	basis
Power Source Fuel Storage Vaults	Structural Failure	—	1.67 *SSE	2

Notes:

1. HCLPF based on EPRI Utility Requirements Document (DCD Reference 19.1-35)
2. HCLPF is assumed as ~~0.5g~~1.67*SSE.
3. HCLPF based on EPRI TR-103959 methodology (DCD Reference 19.1-36)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 1 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Building/Structure						
Reactor building	Structural Failure	SE-GTSBDSFBLDGE	~~1.78~~ 5.9 *SSE	0.42	~~0.69~~ 2.30 *SSE	SE_GSTC
Safety power source buildings	Structural Failure	SE-GTSBDSFBLDGP	~~3.35~~ 11.2 *SSE	0.40	~~1.36~~ 4.53*SSE	SE_GSTC
Containment	Structural Failure	SE-GTSSRSFCVESS	~~1.22~~ 4.1 *SSE	0.30	~~0.63~~ 2.10*SSE	SE_GSTC
Emergency Feedwater Pits	Structural Failure	SE-EFWTNSF001AB	~~1.78~~ 5.9*SSE	0.42	~~0.69~~ 2.30 *SSE	SE_GSTC
Refueling water storage pit	Structural Failure	SE-RWSTNSFRWSP	~~1.22~~ 4.1 *SSE	0.30	~~0.63~~ 2.10 *SSE	SE_GSTC
Interior containment structure	Structural Failure	SE-GTSSRSFCVINT	~~1.52~~ 5.1*SSE	0.36	~~0.66~~ 2.20*SSE	SE_GSTC
Essential service water intake Structure	Structural Failure	SE-SWSSRSFESWBAS	—	—	~~0.50~~ 1.67 *SSE	SE_CCW
Essential service water pipe tunnel (Site-Specific)	Structural Failure	SE-SWSSRSFESWTUN	—	—	~~0.50~~ 1.67 *SSE	SE_CCW
Ultimate Heat Sink Related Structures	Structural Failure	(Surrogated with SE-SWSSRSFESWTUN)	—	—	1.67 *SSE	SE_CCW

Table 19.1-55R HCLPFs for Basic Events (Sheet 1 of 13) *(continued)*

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Primary Components						
Fuel assembly (Reactor internals and core assembly)	Structural Failure	SE-ELOSRSFFUEL	—	—	~~0.50~~ 1.67 *SSE	SE_ELOCA
Control rod drive	Structural Failure	SE-RTPSRSFCRD	~~2.2~~ 7.3 *SSE	0.51	~~0.67~~ 2.23 *SSE	SE-RTA
Reactor vessel	Structural Failure	SE-ELOSRSFRXVES	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE_ELOCA

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Table 19.1-55R HCLPFs for Basic Events (Sheet 2 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Primary Components (Continued)						
Reactor coolant pumps	Structural Failure	SE-ELOPMSF001ABCD	~~2.2~~ 7.3 *SSE	0.51	~~0.67~~ 2.23*SSE	SE_ELOCA
Pressurizer	Structural Failure	SE-LLOPZSFPZR	~~2.2~~ 7.3 *SSE	0.51	~~0.67~~ 2.23*SSE	SE_LLOCA
Steam generator (including steam generator tubes)	Structural Failure	SE-GTSSGSFSG	~~2.2~~ 7.3 *SSE	0.51	~~0.67~~ 2.23*SSE	SE_GSTC
Mechanical Equipment						
Cable trays	Structural Failure	SE-GTSCASFCABLE	~~2.2~~ 7.3 *SSE	0.61	~~0.53~~ 1.77 *SSE	SE_GSTC
Accumulators	Structural Failure	SE-ACCTKSF001ABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	SE-ACA-LLOCA SC-ACA-SLOCA
CS/RHR Heat Exchangers	Structural Failure	SE-RSSRISF001ABCD	~~1.7~~ 5.7 *SSE	0.46	~~0.58~~ 1.93 *SSE	SE_CCW
CCW Heat Exchangers	Structural Failure	SE-CWSRISF001BCD	~~1.7~~ 5.7 *SSE	0.46	~~0.58~~ 1.93 *SSE	SE_CCW
Component Cooling Water Surge Tanks	Structural Failure	SE-CWSTNSF001AB	~~1.7~~ 5.7 *SSE	0.46	~~0.58~~ 1.93 *SSE	SE_CCW
Essential Chilled Water Compression Tanks	Structural Failure	SE-HVATNSF001BC	~~1.7~~ 5.7 *SSE	0.46	~~0.58~~ 1.93 *SSE	HVA-EFW-A(B)
Air conditioner ducts	Structural Failure	SE-HVAVDSFDUCT	~~2.2~~ 7.3 *SSE	0.61	~~0.53~~ 1.77 *SSE	HVA-EFW-A(B)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 2 of 13) *(continued)*

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
High head injection system piping	Structural Failure	SE-HPIPNSFINJA	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL SE-RWS

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Table 19.1-55R HCLPFs for Basic Events (Sheet 3 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Mechanical Equipment (Continued)						
Accumulator System Piping	Structural Failure	SE-ACCPNSFINJA	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-ACA-LLOCA SE-ACA-SLOCA
CS/RHR system piping	Structural Failure	SE-RSSPNSFPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RSS-CSS SE-RSS-CSS-HRSE-RWS
Emergency Feedwater System Piping	Structural Failure	SE-EFWPNSFCSTA	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
HVAC chiller system piping	Structural Failure	SE-HVAPNSFCHPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	HVA-EFW-A(B)
Component cooling water system piping	Structural Failure	SE-CWSPNSFCCWA	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
Essential service water system piping	Structural Failure	SE-SWSPNSFSWPA1	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
RCS piping	Structural Failure	SE-ELOPNSFNPIP	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
DVI piping	Structural Failure	SE-ELOPNSFDV	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
CS/RHR Hot Leg injection piping	Structural Failure	SE=ELOPNSFCSHL	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
Main Steam Lines (The upstream side from Main Steam Isolation Valves)	Structural Failure	SE-ELOPNSFMSIV	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
In-core instrumentation tube	Structural Failure	SE-ELOPNSFINSTR	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA

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Table 19.1-55R HCLPFs for Basic Events (Sheet 3 of 13) *(continued)*

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Pressurizer safety valve piping	Structural Failure	SE-LLOPNSFPZRSV	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_LLOCA

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Table 19.1-55R HCLPFs for Basic Events (Sheet 4 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Mechanical Equipment (Continued)						
Safety Depressurization Valve Piping	Structural Failure	SE-LLOOPNSFPZRRV	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_LLOCA
Pressurizer Spray Piping	Structural Failure	SE-LLOPNSFPZRSP	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_LLOCA
Emergency Letdown Piping	Structural Failure	SE-LLOPNSFELD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_LLOCA
RCS Instrumentation Letdown Piping	Structural Failure	SE-SLOPNSFINST	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_SLOCA
Accumulator Coldleg Injection Piping	Structural Failure	SE-ELOPNSFACCINJ	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
High Head Injection System Hotleg Piping	Structural Failure	SE-ELOPNSFHPIINJ	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
Containment Spray Nozzles	Structural Failure	SE-RSSSZSFNOZABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RSS-CSS SE-RSS-CSS-HR
Pumps and Electric motor						
Safety Injection Pumps	Functional Failure	SE-HPIPMFF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL
Safety Injection Pumps	Structural Failure	SE-HPIPMSF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE_CCW
CS/RHR Pumps	Functional Failure	SE-RSSPMFF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE-RSS-CSS SE-RSS-CSS-HR

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Table 19.1-55R HCLPFs for Basic Events (Sheet 4 of 13) *(continued)*

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
CS/RHR Pumps	Structural Failure	SE-RSSPMSF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE_CCW

Table 19.1-55R HCLPFs for Basic Events (Sheet 5 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Pumps and Electric motor (Continued)						
Motor Driven Emergency Feedwater Pumps	Functional Failure	SE-EFWPMFF001BC	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE-EFW-SL SE-EFW-LO1
Component Cooling Water Pumps	Structural/ Functional Failure	SE-CWSPMFF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE_CCW
ESW Pumps	Structural/ Functional Failure	SE-SWSPMFF001ABCD	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	SE_CCW
Essential Chilled Water Pumps	Functional Failure	SE-HVAPMFF001BC	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	HVA-EFW-A(B)
Turbine Driven Emergency Feedwater Pumps	Functional Failure	SE-EFWPTFF001AD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	SE-EFW-SL SE-EFW-LO1
Emergency Feedwater Pump Area Air Handling Units	Functional Failure	SE-HVAAHFF401BC	~~2.2~~ 7.3 *SSE	0.51	~~0.67~~ 2.23 *SSE	HVA-EFW-A(B)
Essential Chiller Units	Functional Failure	SE-HVACHFF001BC	—	—	~~0.50~~ 1.67 *SSE	HVA-EFW-A(B)
Essential Chiller Units	Structural Failure	SE-HVACHSF001BC	—	—	~~0.50~~ 1.67 *SSE	SE_CCW
Motor-Operated Valve						
CS/RHR Heat Exchanger Outlet Valves	Functional Failure	SE-RSSMVFF145ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RSS-CSS-HR

Table 19.1-55R HCLPFs for Basic Events (Sheet 6 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Motor-Operated Valve (Continued)						
Containment Spray Header Containment Isolation Valves	Functional Failure	SE-RSSMVFF004ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RSS-CSS SE-RSS-CSS-HR
EFW Isolation Motor-Operated Flow Control Valves	Functional Failure	SE-EFWMVFF017ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
T/D EFWP steam supply line Motor- Operated Valves	Functional Failure	SE-EFWMVFF103AD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
CCW Supply/Return Header Isolation Valves (NCS-MOV-007A,B,C,D)	Functional Failure	SE-CWSMVFF007ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
CCW Supply/Return Header Isolation Valves (NCS-MOV-020A,B,C,D)	Functional Failure	SE-CWSMVFF020ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
ESWS Bypass and Valves	Functional Failure	(Surrogated with SE-CWSMVFF020ABCD)	11.0 *SSE	0.61	2.67 *SSE	SE_CCW
Main Feedwater Isolation Valves	Functional Failure	SE-MFWMVFF512ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-ELOCA
RWSP Outlet Line Motor-Operated Valve 1	Functional Failure	SE-RWSMVFF002	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RWS
RWSP Outlet Line Motor-Operated Valve 2	Functional Failure	SE-RWSMVFF004	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RWS

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Table 19.1-55R HCLPFs for Basic Events (Sheet 7 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
ESWS Pump Outlet Motor-Operated Valves	Functional Failure	SE-SWSPMFF503ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-CCW
Air-Operated Valve						
Main Steam Isolation Valves	Functional Failure	SE-MSRAVFF515ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-ELOCA
RWSP Return Line Air-Operated Valve	Functional Failure	SE-RWSAVFF022	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RWS
Electrical Equipment						
Offsite Power System (Ceramic Insulators)	Functional Failure	SE-OPSTRFFRESERVE	0.30	0.55	0.08	SE_LOOP
Class 1E Gas Turbine Generators	Functional Failure	SE-EPSDLFFGTABCD	—	—	~~0.50~~ 1.67 *SSE	SE-OPS EPS-69KA(B)(C)(D)
Power Source Fuel Storage Vaults	Functional Failure	(Surrogated with SE-EPSDLFFGTABCD)	—	—	1.67 *SSE	SE-OPS EPS-69KA(B)(C)(D)
Batteries and Racks	Functional Failure	SE-EPSBYFFBYABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-OPS EPS-69KA(B)(C)(D) EPS-SBA(B)(C)(D)
Class 1E 6.9kV-480V Station Service Transformers	Functional Failure	SE-EPSTRFF001ABCD	~~2.1~~ 7.0 *SSE	0.46	~~0.72~~ 2.40 *SSE	EPS-480A(B)(C)(D)
Class 1E I&C Power Transformers	Functional Failure	SE-EPSEPFF002ABCD	~~2.1~~ 7.0 *SSE	0.46	~~0.72~~ 2.40 *SSE	EPS-VITALA(B)(C)(D)
Class 1E 6.9kV Switchgears	Functional Failure	SE-EPSEPFFMCABCD	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	SE-OPS EPS-69KA(B)(C)(D)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 7 of 13) *(continued)*

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Class 1E 480V Load Centers (A,B,C,D)	Functional Failure	SE-EPSEPFFPCABCD	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	EPS-480A(B)(C)(D)
Class 1E 480V Load Centers (A1,D1)	Functional Failure	SE-EPSEPFFPCA1D1	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	EPS-48A1(D1)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 8 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Electrical Equipment (Continued)						
Class 1E Motor Control Centers (A,B,C,D)	Functional Failure	SE-EPSEPFFMCCABCD	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	EPS-MCA(B)(C)(D)
Class 1E Motor Control Centers (A1,D1)	Functional Failure	SE-EPSEPFFMCCA1D1	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	EPS-MCA1(D1)
Class 1E Gas Turbine Generator Controlboards	Functional Failure	SE-EPSEPFFGBABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-OPS EPS-69KA(B)(C)(D)
Gas Turbine Control Cabinets	Functional Failure	SE-EPSEPFFEPBABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-OPS EPS-69KA(B)(C)(D)
Class 1E DC Switchboards (A,B,C,D)	Functional Failure	SE-EPSEPFFDCCABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-OPS EPS-69KA(B)(C)(D) EPS-SBA(B)(C)(D)
Class 1E DC Switchboards (A1,D1)	Functional Failure	SE-EPSEPFFDCCA1D1	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	EPS-SBA1(D1)
Solenoid Distribution Panels	Functional Failure	SE-EPSEPFFSDCABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE_GSTC
Safety Logic System Cabinets	Functional Failure	SE-SGNEPFFSLCABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE_GSTC
Reactor Protection System Cabinets	Functional Failure	SE-SGNEPFFRPSABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE_GSTC
ESF Actuation System Cabinets	Functional Failure	SE-SGNEPFFEFCABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE_GSTC
Safety Remote I/O Cabinets	Functional Failure	SE-SGNEPFFRIOABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE_GSTC

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Table 19.1-55R HCLPFs for Basic Events (Sheet 9 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Electrical Equipment (Continued)						
Ventilation Chiller Control Cabinets	Functional Failure	SE-SGNEPFFVCPABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.1~~ 3.67 *SSE	HVA-EFW-A(B)
Class 1E Battery Chargers	Functional Failure	SE-EPSEPFFBCPABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	SE-OPS EPS-69KA(B)(C)(D) EPS-SBA(B)(C)(D)
Class 1E UPS Units	Functional Failure	SE-EPSIVFFIBCABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	SE-OPS EPS-69KA(B)(C)(D) EPS-VITALA(B)(C)(D)
Class 1E AC 120V Panelboards	Functional Failure	SE-EPSEPFFIBDABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	SE-OPS EPS-69KA(B)(C)(D) EPS-VITALA(B)(C)(D)
Turbine-driven Emergency Feedwater Pump Actuation Cabinets	Functional Failure	SE-SGNEPFFTDFAD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-EFW-SL SE-EFW-LO1
Emergency Feedwater Pump Outlet Flow Control Valves Panels	Functional Failure	SE-SGNEPFFAFWABCD	~~3.3~~ 11.0 *SSE	0.46	~~1.13~~ 3.67 *SSE	SE-EFW-SL SE-EFW-LO1
Class 1E MOV Inverters	Functional Failure	SE-EPSIVFFMVIABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	EPS-MVMC1A(B)(C)(1D)
MOV Inverter Switches	Functional Failure	SE-EPSATFFSABCD	~~2.2~~ 7.3 *SSE	0.46	~~0.75~~ 2.50 *SSE	EPS-MVMC1A(B)(C)(1D)
Class 1E MOV Motor Control Centers	Functional Failure	SE-EPSEPFFMOVMCC ABCD	~~2.8~~ 9.3 *SSE	0.46	~~0.96~~ 3.20 *SSE	EPS-MVMC1A(B)(C)(1D)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 10 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Safety and Check Valve						
Pressurizer Safety Valves	Functional Failure	SE-PZRSVFF120-123	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE_LLOCA
Safety Injection pump Discharge Check Valves	Functional Failure	SE-HPICVFF004ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL
RV/HL Injection Line Check Valves	Functional Failure	SE-HPICVFF010ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL
RV Injection Line Check Valves 1	Functional Failure	SE-HPICVFF012ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL
RV Injection Line Check Valves 2	Functional Failure	SE-HPICVFF013ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-HPI-LL SE-HPI-ML SE-HPI-SL
Accumulator Injection Line Check Valves 1	Functional Failure	SE-ACCCVFF102ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-ACA-LLOCA SE-ACA-SLOCA
Accumulator Injection Line Check Valves 2	Functional Failure	SE-ACCCVFF103ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-ACA-LLOCA SE-ACA-SLOCA
CS/RHR Pump Suction Check Valves	Functional Failure	SE-RSSCVFF004ABCD	3.3 11.0 *SSE	0.61	0.80 2.67 *SSE	SE-RSS-CSS SE-RSS-CSS-HR

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Table 19.1-55R HCLPFs for Basic Events (Sheet 11 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Safety and Check Valve *(continued)*						
Containment Spray Header Line Check Valves	Functional Failure	SE-RSSCVFF005ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RSS-CSS SE-RSS-CSS-HR
EFW Isolation Check Valves	Functional Failure	SE-EFWCVFF018ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
EFW Pit Outlet Check Valves	Functional Failure	SE-EFWCVFF008AB	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
ESW discharge Check Valves	Functional Failure	SE-EFWCVFF012ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
SG Outlet Check Valves	Functional Failure	SE-EFWCVFF102ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-EFW-SL SE-EFW-LO1
CCW Pump Outlet Check Valves	Functional Failure	SE-CWSCVFF016ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
ESWS Pump Outlet Check Valves	Functional Failure	SE-SWSCVFF502ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
ESWS Supply Line Check Valves	Functional Failure	SE-SWSCVFF602ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_CCW
Main Feedwater Isolation Check Valves	Functional Failure	SE-MFWCVFF511ABCD	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE_ELOCA
RWSP Return Line Check Valve	Functional Failure	SE-RWSCVFF023	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	SE-RWS
Essential Chilled Water Pump Discharge Check Valves	Functional Failure	SE-HVACVFF005BC	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	HVA-EFW-A(B)

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Table 19.1-55R HCLPFs for Basic Events (Sheet 12 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Containment isolation Equipments						
RCP Seal Water Return Line: C/V Isolation Valves	Functional Failure	SE-CVIMVFF203	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
RCP Seal Water Return Line C/V Isolation System Piping	Structural Failure	SE-CVIPNSFSEALPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
C/V Sump Pump Outlet Pipe Line C/V Isolation System Piping	Structural Failure	SE-CVIPNSFSUMPPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Control air Supply Line: C/V Isolation Valve 1	Functional Failure	SE-CVIMVFF002	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Control air Supply Line: C/V Isolation Valve 2	Functional Failure	SE-CVICVFF003	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Instrument Air Pipe C/V Isolation System Piping	Structural Failure	SE-CVIPNSFIAPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
C/V Clean up Pipe Line C/V Isolation System Piping	Structural Failure	SE-CVIPNSFCVCLPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Containment low volume purge supply Containment Isolation Valve	Functional Failure	SE-CVIAVFF356	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Containment low volume purge supply Containment Isolation Valve	Functional Failure	SE-CVIAVFF357	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	C/V ISOLATION
Penetrations	Structural Failure	SE-CVIPESFPENE	—	—	~~0.50~~ 1.67 *SSE	C/V ISOLATION
Equipment hatches	Structural Failure	SE-CVIHCSFHATCH	—	—	~~0.50~~ 1.67 *SSE	C/V ISOLATION

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Table 19.1-55R HCLPFs for Basic Events (Sheet 13 of 13)

Equipment Name	Failure Mode	Seismic Basic Event ID	Median PGA(g)	ßc	HCLPF (g)	Impacts
Other Equipments						
Spent Fuel Pit Heat Exchangers	Structural Failure	SE-SFPRISFSFPHXAB	~~1.7~~ 5.7 *SSE	0.46	~~0.58~~ 1.93 *SSE	LPSD
Spent Fuel Pit	Structural Failure	SE-SFPTNSFSFPIT	—	—	~~1.5~~ 5.00 *SSE	LPSD
Spent Fuel Pit Pumps	Structural Failure	SE-SFPPMSFSFP1AB	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	LPSD
Spent Fuel Pit Pumps	Functional Failure	SE-SFPPMFFSFP1AB	~~1.8~~ 6.0 *SSE	0.46	~~0.62~~ 2.07 *SSE	LPSD
Spent Fuel Pit Water Cooling System Piping	Structural Failure	SE-SFPPNSFSFPPIPE	~~3.3~~ 11.0 *SSE	0.61	~~0.80~~ 2.67 *SSE	LPSD

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Table 19.1-56R HCLPFs for Sequences and the Plant HCLPF

Sequence ID	Sequence Code	Initiating Event HCLPF (g)	Sequence HCLPF (Initiative Event Is Not Included) (g)	Sequence HCLPF (g)[(1)]
SE_GTC-0001		~~0.53~~ 1.77 *SSE	N/A	~~0.53~~ 1.77 *SSE
SE_ELOCA-0001		~~0.50~~ 1.67 *SSE	N/A	~~0.50~~ 1.67 *SSE
SE_CCWS-0001		~~0.50~~ 1.67 *SSE	N/A	~~0.50~~ 1.67 *SSE
SE_LLOCA-0002	SE_CXC	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0003	SE_CSA	~~0.67~~ 2.23 *SSE	~~0.62~~ 2.07 *SSE	~~0.67~~ 2.23 *SSE
SE_LLOCA-0004	SC_ACA	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0005	SE_ACA-SE_CXC	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0006	SE_ACA-SE_CSA	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0007	SE_HIA	~~0.67~~ 2.23 *SSE	~~0.62~~ 2.07 *SSE	~~0.67~~ 2.23 *SSE
SE_LLOCA-0008	SE_HIA-SE_CXC	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0009	SE_HIA-SE_CSA	~~0.67~~ 2.23 *SSE	~~0.50~~ 1.67 *SSE	~~0.67~~ 2.23 *SSE

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Table 19.1-56R HCLPFs for Sequences and the Plant HCLPF

Sequence ID	Sequence Code	Initiating Event HCLPF (g)	Sequence HCLPF (Initiative Event Is Not Included) (g)	Sequence HCLPF (g)[(1)]
SE_LLOCA-0010	SE_HIA-SE_ACA	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0011	SE_HIA-SE_ACA-SE_CXC	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LLOCA-0012	SE_HIA-SE_ACA-SE_CSA	~~0.67~~ 2.23 *SSE	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_SLOCA-0002	SE_CXB	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0003	SE_CSA	~~0.80~~ 2.67 *SSE	~~0.62~~ 2.07 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0004	SE_HIB	~~0.80~~ 2.67 *SSE	~~0.62~~ 2.07 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0005	SE_HIB-SE_CXB	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0006	SE_HIB-SE_CSA	~~0.80~~ 2.67 *SSE	~~0.50~~ 1.67 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0007	SE_HIB-SE_ACC	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0008	SE_HIB-SE_ACC-SE_CXB	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0009	SE_HIB-SE_ACC-SE_CSA	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE

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Table 19.1-56R HCLPFs for Sequences and the Plant HCLPF

Sequence ID	Sequence Code	Initiating Event HCLPF (g)	Sequence HCLPF (Initiative Event Is Not Included) (g)	Sequence HCLPF (g)[(1)]
SC_SLOCA-0010	SE_EFA	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0011	SE_EFA-SE_CXB	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0012	SE_EFA-SE_CSA	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0013	SE_EFA-SE_HIB	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0014	SE_EFA-SE_HIB-SE_CXB	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0015	SE_EFA-SE_HIB-SE_CSA	~~0.80~~ 2.67 *SSE	~~0.75~~ 2.50 *SSE	~~0.80~~ 2.67 *SSE
SE_SLOCA-0016	SE_RTA	~~0.80~~ 2.67 *SSE	~~0.67~~ 2.23 *SSE	~~0.80~~ 2.67 *SSE
SE_LOOP-0014	SE_EFO	0.08	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LOOP-0015	SE_EFO-SE_CXB3	0.08	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LOOP-0016	SE_EFO-SE_CSA	0.08	~~0.75~~ 2.50 *SSE	~~0.75~~ 2.50 *SSE
SE_LOOP-0027	SE_OPS-SEL	0.08	~~0.50~~ 1.67 *SSE	~~0.50~~ 1.67 *SSE

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Table 19.1-56R HCLPFs for Sequences and the Plant HCLPF

Sequence ID	Sequence Code	Initiating Event HCLPF (g)	Sequence HCLPF (Initiative Event Is Not Included) (g)	Sequence HCLPF (g)[(1)]
SE_LOOP-0029	SE_RTA	0.08	~~0.67~~ 2.23 *SSE	~~0.67~~ 2.23 *SSE
			Plant HCLPF =	~~0.50g~~ (1.67 *SSE)g

Notes:
(1) DCD values in this entire column have been replaced with site-specific values.

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Table 19.1-119R Key Insights and Assumptions (Sheet 1 of 46)

Key Insights and Assumptions	Dispositions
Design features and insights	
1. High Head Safety Injection System	
- The high head safety injection system consists of four independent and dedicated SI pump trains.	6.3.2.1.1
- The SI pump trains are automatically initiated by ECCS actuation signal, and supply borated water from the RWSP to the reactor vessel via direct vessel injection line.	6.3.2.1.1
- Each SI pump is connected to a dedicated direct vessel injection nozzle for injection into the reactor downcomer region.	6.3.2.1.1
- SI pump suction isolation valves (SIS-MOV-001A/B/C/D) remain open during normal and emergency operations. These valves are remotely closed by operator action from MCR or RSC to isolate RWSP to terminate leak or if pump/valve maintenance requires it.	6.3.2.2.6.1
- This system provides the safety injection function during LOCA events and feed and bleed operation.	6.3.3 19.2.5 13.5.2 ~~COL13.5(6)~~ ~~COL19.3(6)~~
- During plant shutdown, safety injection provides RCS makeup function in loss of RHRS. In the case of failure of operable SI pump, the pumps that are locked out for LTOP compliance can be used if available.	5.2.2.1.2 5.2.2.2.2.2 13.5.2 19.2.5 ~~COL13.5(6)~~ ~~COL19.3(6)~~
- SI pump can be manually actuated by DAS from MCR.	7.8.1.1.1 Table 7.8-5

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Table 19.1-119R Key Insights and Assumptions (Sheet 3 of 46)

Key Insights and Assumptions	Dispositions
3. Chemical and Volume Control System	
- The CVCS provides a means to maintain a programmed inventory of reactor coolant during all phases of plant operation.	9.3.4.1.2.1
- The CVCS continuously supplies seal water to the reactor coolant pump seals, as required by the reactor coolant pump design.	9.3.4.1.2.4 9.3.4.2.7.2
- The charging pumps are arranged in parallel with common suction and discharge headers. Each pump provides full capability for normal makeup.	9.3.4.2.6.1
- Charging injection is provided by the CVCS. One CVCS charging pump is capable of maintaining normal RCS inventory with small system leak if the leakage rate is less than that from a break of a pipe 3/8 inch in inside diameter.	9.3.4.2.7.4
- Normally, one charging pump is operating and takes suction from the VCT, supplies charging flow to the RCS and seal water to the reactor coolant pumps. The flow rate of the charging pump is controlled by the flow control valve located in the charging line and the flow control valve located in the reactor coolant pump seal injection line.	9.3.4.2.1 9.3.4.2.6.1 9.3.4.2.7.2
- The pump can take suction from the VCT, the reactor makeup control system, the refueling water storage auxiliary tank and the spent fuel pit.	9.3.4.2.6
- During normal operation, the VCT water level is controlled by automatic makeup. In case the automatic makeup fails to actuate and the water level in the VCT decreases, low VCT water level is detected and actuates a low-low level signal that opens the stop valves in the refueling water storage auxiliary tank supply line, and closes No. 1 and No. 2 stop valves in the VCT outlet to provide emergency makeup.	9.3.4.2.1 9.3.4.5.4.1
- Two centrifugal boric acid transfer pumps are utilized for the transfer and circulation of the boric acid solution in the two boric acid tank.	9.3.4.2.3.1 9.3.4.2.6.2 9.3.4.2.6.9
- During plant shutdown, when the RHR system is in operation, the RHR system provides reactor coolant to the CVCS, upstream of the letdown heat exchanger in the letdown line.	9.3.4.2.7.3

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Table 19.1-119R Key Insights and Assumptions (Sheet 3 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
- During plant shutdown, charging injection provides RCS makeup function in loss of RHRS. In the case of failure of operable charging pump, the pumps that are locked out for LTOP compliance can be used if available.	5.2.2.1.2 5.2.2.2.2.2 13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 4 of 46)

Key Insights and Assumptions	Dispositions
4. Containment Spray System / Residual Heat Removal System	
- The containment spray system (CSS) and the residual heat removal system (RHRS) share major components which are containment spray/residual heat removal (CS/RHR) pumps and heat exchangers.	5.4.7.1 5.4.7.2.1 6.2.2 6.2.2.1 6.2.2.2
- The CSS/RHRS consists of four independent subsystems, each of which receives electrical power from one of four safety buses. Each subsystem includes one CS/RHR pump and one CS/RHR heat exchanger, which have functions in both the CS system and the RHRS.	6.2.2 5.4.7.2.1
- All four CS/RHR pumps automatically start to supply water in RWSP and containment spray header isolation valves are open automatically on the receipt of a containment spray signal.	6.2.2.2.1 6.2.2.2.7.2
- CSS/RHRS provides multiple functions such as, (1) containment spray to decrease pressure and temperature in the containment, (2) alternate core cooling in case all safety injection systems fails during LOCA in conjunction with a fast depressurization of the RCS by using the EFW pumps to remove heat through the SGs and by manually opening the MSDVs especially in high RCS pressure sequences, (3) RHR operation for long term core cooling, (4) heat removal function for long term containment cooling, (5) providing water to flood the reactor cavity and (6) fission product removal. (7) During plant shutdown, RHRS provides function to remove decay heat from the RCS.	3.2.2 6.2.2 6.2.2.1 6.2.5 5.4.7.1 5.4.7.2.1 5.4.7.2.3.3 13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
- The RHRS is designed and equipped with pressure relief valves to prevent RHRS over-pressurization and low temperature overpressurization.	5.4.7.1
- Two motor operated valves in series on the RHR suction line with power lockout capability during normal power operation minimize the probability of RCS pressure entering the RHR system. Even if both these valves are opened during normal power operation, the RHR system is designed to discharge the RCS inventory to the in-containment RWSP. The RHRS is designed to prevent an interfacing system LOCA by having a design rating of 900 lb. The RHR 900 lb. design rated system can withstand the full RCS pressure. The current values are in accordance with Section III of the ASME Code for Service Level A.	6.3.1.4 5.4.7.1 5.4.7.2.1 5.4.7.2.2 Table 5.4.7-2

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Table 19.1-119R Key Insights and Assumptions (Sheet 12 of 46)

Key Insights and Assumptions	Dispositions
10. Reactor Coolant System High Point Vents	
- Safety depressurization valves (SDVs) and depressurization valves (DVs) are provided at top head of the pressurizer in order to cool the reactor core by feed and bleed operation when loss of heat removal from steam generator occurs.	5.4.12.2 13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
- RCS depressurization system dedicated for severe accident is provided to prevent high pressure melt ejection. The location of release point from the valve is in containment dome area.	5.4.12.2
- Safety depressurization valves can be manually actuated by DAS.	7.8.1.1.1 Table 7.8-5
11. Main Steam Supply System	
- The system consists of MSRV, MSDV, MSSVs, and MSIV in each main steam line and TBVs.	10.3 10.3.1.1
- Six MSSVs are provided per each main steam line and are located in the main steam piping upstream of the MSIVs. The MSSVs have the three kind of set pressure.	10.3.2.3.2 Table 10.3.2-2
- One air-operated MSRV and one motor-operated MSDV are installed on each main steam line piping.	10.3.2.3.3
- MSIVs are installed in each of the main steam lines to (1) limit uncontrolled steam release from one steam generator in the event of a steam line break, and to (2) isolate the faulted SG in the event of SGTR.The valve is designed to fully close by receipt the signal such as low main steam line pressure.	10.3.2.1 10.3.2.3.4
- In LOCA event with failure of all HHISs, operators open MSDVs to depressurize the RCS for alternate core injection.	13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
- During shutdown operation, when the RCS is mid-loop state with the closed state, operators open MSDVs for heat removal via SGs.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 13 of 46)

Key Insights and Assumptions	Dispositions
12. Component Cooling Water System	
- The CCWS consists of two independent subsystems. One subsystem consists of trains A & B, and the other subsystem consists of trains C & D, for a total of four trains. Each train has one CCW pump and CCW heat exchanger. Each subsystem is served by one CCW surge tank.	9.2.2.1.1 9.2.2.2
- The CCWS is designed to withstand leakage in one train without loss of the system's safety function.	9.2.2.1.1
- Two motor operated valves are located at the CCW outlet of the RCP thermal barrier Hx and close automatically upon a high flow rate signal at the outlet of this line in the event of in-leakage from the RCS through the thermal barrier Hx, and prevents this in-leakage from further contaminating the CCWS.	9.2.2.2.1.5
- During normal operation, heat loads of the CCWS are RCP, charging pump, letdown heat exchanger, instrument air, spent fuel pool cooling heat exchanger, etc.	9.2.2.1.2.1
- Normally open header tie line isolation valves, which are motor-operated valves, is automatically closed upon detection of ECCS actuation signal and under voltage signal or containment spray signal to separate each subsystem into two independent trains.	9.2.2.2.1.5
- CS/RHR heat exchanger outlet valves, which are motor-operated valves, are normally closed and automatically are opened by ECCS actuation signal.	9.2.2.2.1.5
- During normal operation, at least one train in each subsystem is operable. Total of two CCWP and two CCW heat exchangers are in operation. During accident, all CCWPs are automatically actuated by ECCS actuation signals.	9.2.2.2.2.1 9.2.2.2.2.4
- During a severe accident event, it is assumed that the containment fan cooler unit fans are non-operable and that the non-essential chilled water system is unavailable. Valves are provided to manually align the CCW to the containment fan cooler unit cooling coils. This supplies CCW to the cooling coils in the containment fan cooler unit for long term containment cooling.	9.4.6.2.1 13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
- In the case of loss of CCW, a non-essential chilled water system or a fire system is able to connect to the CCWS in order to cool the charging pump and maintain RCP seal water injection.	13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 14 of 46)

Key Insights and Assumptions	Dispositions
13. Essential Service water system	
- The ESWS is arranged into four independent trains (A, B, C, and D). Each train consists of one ESWP, two 100% strainers in the pump discharge line, one 100% strainer upstream of the CCW HX, one CCW HX, one essential chiller unit, and associated piping, valves, instrumentation and controls.	9.2.1 9.2.1.2.1 9.2.1.2.3.1 9.2.5.2 ~~COL 9.2(3)~~ ~~COL 9.2(4)~~
- In the case where ESW pump motors are air-cooled, backup actions can avoid excessive room heat up in the event of loss of ESW pump room ventilation. Operational procedures to avoid excessive room heat up will be prepared.	9.2.1.2.2.1 13.5.2 ~~COL 9.2(6)~~ ~~COL 13.5(5)~~
- During normal operation, two trains are operating and at least one other train is on standby.	9.2.1.2.3.1
- The motor-operated valve provided at the discharge of each ESW pump actuates in conjunction with the pump operation. The discharge valves are opened after the ESW pump start.	9.2.1.2.2.6
- During normal operation, two ESW trains are operating and at least one train is on standby.	9.2.1.2.3.1
- The motor-operated valve is provided at the ESWP discharge of each pump. While the ESW pump is running, the valve remains open. The valve position is monitored in the control room.	9.2.1.2.2.6 9.2.1.2.3.1
- All valves except the pump discharge valves in the flow path are locked open.	9.2.1.2.3.1
- When one ESW train is unavailable due to failure of the discharge line valve to open, operators start the standby ESWP, monitoring pump discharge pressure.	9.2.1.2.3.1 13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 15 of 46)

Key Insights and Assumptions	Dispositions
14. Onsite Electric Power System	
- The onsite Class 1E electric power systems comprise four independent and redundant trains, each with its own power supply, buses, transformers, and associated controls.	8.3.1.1 8.3.1.1.2.1 8.3.1.1.3
- One independent Class 1E GTG is provided for each Class 1E train.	8.3.1.1.2.1
- Non-Class 1E 6.9kV permanent buses P1 and P2 are also connected to the non-Class 1E A-AAC GTG and B-AAC GTG, respectively. The loads which are not safety-related but require operation during LOOP are connected to these buses.	8.3.1.1.1
- In the event of SBO, power to one Class 1E 6.9kV bus can be restored manually from the AAC GTG.	8.3.1.1.1 8.3.1.1.2.2 8.3.1.1.2.3 13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
- Common cause failure between class 1E GTG and non-class 1E GTG supply is minimized by design characteristics. Different rating GTGs with diverse starting system, independent and separate auxiliary and support systems are provided to minimize common cause failure.	8.3.1.1.1 8.4.1.3
- The non-safety GTG can be started manually when connecting to the class 1E bus in the event of SBO.	8.4.1.3
- Power to the shutdown buses can be restored from the AAC sources within 60 minutes.	8.4.1.3
- Power to the shutdown buses can be restored from the AAC sources within 60 minutes.	8.4.1.3
- The GTG does not need cooling water system. Cooling of GTG is achieved by air ventilation system.	8.3.1.1.3 8.3.1.1.3.10 9.5.5
- GTG combustion air intake and exhaust system for each of the four GTGs supply combustion air of reliable quality to the gas turbine and exhausts combustion products from the gas turbine to the atmosphere. The air intake also provides ventilation/cooling air to the GTG assembly.	9.5.8

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Table 19.1-119R Key Insights and Assumptions (Sheet 17 of 46)

Key Insights and Assumptions	Dispositions
16. Containment System	
- The containment prevents or limits the release of fission products to the environment.	3.1.2.7 3.8.1
- Hydrogen control system that consists of igniters is provided to limit the combustible gas concentration. The igniters start with the ECCS actuation signal and are powered by two non-class 1E buses with non-class 1E GTGs.	6.2.5.2
- Alternate containment cooling system using the containment fan cooler units is provided to prevent containment over pressure even in case of containment spray system failure.	9.4.6.2.1 13.5.2 19.2.5 COL 13.5(6) COL 19.3(6)
- Reactor cavity flooding system by firewater injection is provided to enhance heat removal from molten core ejected into the reactor cavity. This system is available as a countermeasure against severe accidents even in case of fire.	9.5.1.2.2 13.5.2 19.2.5 COL 13.5(6) COL 19.3(6)
- The FSS is also utilized to promote condensation of steam. The FSS is lined up to the containment spray header when the CSS is not functional, and provides water droplet from top of containment. This will temporarily depressurize containment.	9.5.1.2.2 13.5.2 19.2.5 COL 13.5(6) COL 19.3(6)
- A set of drain lines from SG compartment to the reactor cavity is provided in order to achieve reactor cavity flooding. Spray water which flows into the SG compartment drains to the cavity and cools down the molten core after reactor vessel breach.	3.4.1.5.1
- Reactor cavity has a core debris trap area to prevent entrainment of the molten core to the upper part of the containment.	3.8.1 19.2.3.3.4
- Reactor cavity is designed to ensure thinly spreading debris by providing sufficient floor area and appropriate depth.	3.8.1 19.2.3.3.3
- Reactor cavity floor concrete is provided to protect against challenge to liner plate melt through.	3.8.1 19.2.3.3.3
- Main penetrations through containment vessel are isolated automatically with the containment penetration signal even in case of SBO.	6.2.4

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Table 19.1-119R Key Insights and Assumptions (Sheet 19 of 46)

Key Insights and Assumptions	Dispositions
18. Main equipments and instrumentations used for severe accident mitigation are designed to perform their function in the environmental conditions such as containment overpressure and temperature rise following hydrogen combustion.	19.2.3.3.7
19. Instrumentations for detecting core damage with high reliability are provided.	5.3.3.1
20. Risk significant SSCs are identified for the RAP.	17.4
21. Instrumentation piping are installed at upside of the RV. No penetrations through the RV are located below the top of the reactor core. This minimizes the potential for a loss of coolant accident by leakage from the reactor vessel, allowing the reactor core to be uncovered.	5.3.3.1
22. Check valves in accumulator, high head injection system, and other systems are in diverse configuration because: - The accumulator does not have any pumps to drive upon a failed closed check valve but other systems have pumps so the forces acting on the valves to open them (even if the valves are similar) are different. - The duty cycles in the systems are different. They are cycled at different times when the systems are tested. - Maintenance practices including testing may also be different. Common cause failure between the check valves in accumulator and HHIS is therefore not model in the PRA.	19.1.4.1 Table 19.1-38
23. Surveillance test interval and refueling outages are consistent with Technical Specifications.	Chapter 16
24. The availability and reliability of all trains of safety related systems will be controlled by the maintenance and configuration risk management programs. Availability goals will be set for each train of all safety related systems and their availability will be tracked and compared to these goals.	17.6 ~~COL 17.6(1)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 20 of 46)

Key Insights and Assumptions	Dispositions
Operator actions (At Power)	
1. Operator actions modeled in the PRA are based on symptom oriented procedures. Risk significant operator actions identified in the PRA will be addressed in plant operating procedures including abnormal operating procedure (AOP), emergency operating procedure (EOP), etc.	13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
2. In the operational VDU of US-APWR, the layout of controllers & monitoring alignment in each window are different and this feature would make the operator perceive them as different locations.	18.4 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~ ~~COL 13.5(6)~~
3. In the case of loss of CCW, operators connect a non-essential chilled water system or a fire protection water supply system to the CCWS in order to cool the charging pump and maintain RCP seal water injection. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.1.4 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.6(6)~~
4. When station blackout occurs, operators connect the alternate ac power to class 1E bus in order to recovery emergency ac power. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
5. If emergency feed water pumps cannot feed water to two intact SGs, operators will attempt to open the cross tie-line of EFW pump discharge line in order to feed water to two more than SGs by one pump.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 21 of 46)

Key Insights and Assumptions	Dispositions
6. The CS/RHR System has the function to inject the water from RWSP into the cold leg piping by switching over the CS/RHR pump lines to the cold leg piping if all safety injection systems failed (Alternate core cooling operation). In high RCS pressure sequences, a fast depressurization of the RCS by using the EFW pumps to remove heat through the SGs and by manually opening the MSRVs allows alternate core cooling injection using the CS/RHR pumps. Alternate core cooling operation may be required under conditions where containment protection signal is valid. In such cases, alternate core cooling operation is prioritized over containment spray, because prevention of core damage would have higher priority than prevention of containment vessel rupture.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
7. When any two EFW pumps that commonly utilize at EFW pit have failed, operators supply water to operating EFW pumps from alternate EFW pit or demineralized water storage pit in order to ensure the water source.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
8. In the case of failure to isolate failed SG, but success to sufficiently depressurize RCS by secondary side cooling and Safety depressurization valve in SGTR event, operators do RCS pressure control in order to prepare to early RHR cooling in order to ensure long term heat removal. (RCS pressure control means stopping SI safety injection and starting charging pump. RCS pressure under SI injection remains higher for connecting RHR system. Charging pump is back up for failure of RHR cooling after stopping SI injection.)	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
9. In the case of above, if operators fail to move RHR cooling after SI injection control, operators start to bleed and feed operation. Operators open safety depressurization valve and start the safety injection pump (if standby) in order to ensure long term heat removal.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
10. When the main steam isolation valve fail to close in SGTR event, with status signal of this valve, operators try to close this valve in order to stop leakage of RCS coolant from the failed SG.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
11. In the case of loss of failed SG isolation function in SGTR event, with SG pressure indication after above operation, operators open main steam depressurization valve of intact SG loop in order to promote SG heat removal and to depressurize RCS and move to cool down and recirculation operation.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~

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Table 19.1-119R Key Insights and Assumptions (Sheet 22 of 46)

Key Insights and Assumptions	Dispositions
12. In the case of loss of secondary side cooling function by emergency feedwater system in transient events including turbine trip, load loss event etc., with emergency feedwater pump flow rate, operators start to recover main feedwater system in order to maintain secondary side cooling.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
13. In the case of loss of SI injection function entirely in LOCA event, with SI flow rate and RCS temperature indication, operators provide secondary side cooling to reduce RCS pressure and temperature by opening the main steam depressurization valves manually and supplying water from the emergency feedwater system in order to enable low pressure injection with containment spray system / residual heat removal system.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
14. In the case of loss of containment spray system function, alternate containment cooling operation is implemented utilizing CV natural recirculation in order to remove heat from CV. This preparation contains CCW pressurization with N2 gas, disconnection heat load of non-safety chiller and CRDM etc. and connection to containment fan cooler units. This operation is implemented when the containment pressure reaches the design pressure.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
15. In the case of leakage of the RWSP water from HHIS piping, CSS/RHRS piping or refueling water storage system piping, with drain sump water level – abnormally high, operators close the RWSP suction isolation valves respectively in order to prevent leakage of RWSP water from failed piping.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
16. When the containment isolation signal fail to automatically actuate, with CV pressure abnormally high signal, operators manually actuate the containment isolation signal in order to remove heat from the containment vessel.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
17. When the CCW header tie-line isolation valves fail to automatically close with specific signals which contain ECCS actuation signal plus under-voltage signal, containment spray signal, and surge tank level low signal, operators manually close these valves in order to separate CCW header.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~
18. RCS is depressurized through operating the depressurization valve after onset of core damage and before reactor vessel breach. This operation prevents events due to high pressure melt ejection.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~
19. Operation of firewater injection to reactor cavity is implemented to flood reactor cavity in case of containment spray system failure, after onset of core damage and before reactor vessel breach.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 23 of 46)

Key Insights and Assumptions	Dispositions
20. When the running charging pump is unavailable, operators start the standby charging pump.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
21. Operators manually start SI pumps by DAS by detection of DAS alarm in the software CCF for recovery of the automatic injection using SI pump.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
22. Operators manually open SDVs by DAS by detection of DAS alarm in the software CCF for RCS depressurization.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
23. When reactor trip fails (i.e., ATWS event), operators initiate boric acid transfer to maintain the adequate boron concentration in the RCS using CVCS. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	18.6 13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
24. When containment pressure is abnormally high due to failure of automatic containment spray actuation, operators manually actuate containment spray by opening containment spray isolation valve and CS/RHR heat exchanger cooling line valves and starting CS/RHR pumps.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
25. When incoming breakers fail to automatically open in the loss of offsite power case, operators manually open the breakers to isolate Class 1E 6.9kV ac switchgears from the faulted offsite power.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
26. After onset of core damage prior to reactor vessel breach, operators open the depressurization valves for RCS depressurization in order to prevent the breach caused by high pressure meld ejection.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
27. Operation of fire injection to reactor cavity is implemented to flood reactor cavity in case of containment spray system failure, after onset of core damage and before reactor vessel breach.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
28. Operators calibrate the EFW pit water level sensor, which is applied to changeover water source of EFW pump or to supply demineralized water to the EFW pit.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 23 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
29. Operators calibrate CCW surge tank pressure sensor which is used to pressurize CCWS for alternate containment cooling.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 24 of 46)

Key Insights and Assumptions	Dispositions
30. Operators calibrate containment pressure sensors used for ESF actuation signals (safety) and for alternate containment cooling (non-safety).	13.5.2 19.2.5 ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
31. Action to open Unlocked motor-operated valve is performed in series through the communication between operators in electrical room and in main control room.	18.6
32. MCR crew members consists of the following team members at all times during the evolution of an accident scenario: - Reactor operator (RO) - Senior reactor operator (SR) - Shift technical advisor (STA) The RO operates the plant during normal and abnormal situations, and SRO and STA check the action of the RO. If the RO commits an error during the operation, SRO or STA would correct the circumstances. However, when there is not enough available time to take corrective action, recovery credit is not considered.	13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
33. For operator actions at local area (action that takes place outside control room) auxiliary operators (licnsed and non-licensed) are available: - Auxiliary operator 1 - Auxiliary operator 2 Normally the auxiliary operators are stational in the MCR. If the local manipulation of equipment is required to mitigate accidents or to prevent core damage, the auxiliary operator moves to the appropriate area in the reactor building or auxiliary building, to access equipment such as manual valves. It is assumed that auxiliary operator 1 operates equipments and auxiliary operator 2 checks the actions of auxiliary operator 1. If auxiliary operator 1 commits an error during the operation, auxiliary operator 2 corrects it.	13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
34. Misalignment of remote-operated valves (e.g. motor-operated valves, air-operated valves), pumps and gas turbine generators after test and maintenance will be fixed before initiating events occur. Remote-operated valve open/close positions and control switch positions are monitored in the main control room, so they will be detected in a short time	13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~ ~~COL 19.3(6)~~
35. The controls and displays available in the US-APWR control room are superior to conventional control room HSIs and, therefore, human error probabilities in the US-APWR operation would be less than those in conventional plants.	13.5.2 19.2.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~ ~~COL 19.3(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 25 of 46)

Key Insights and Assumptions	Dispositions
36. Misalignment of remote-operated valves (e.g. motor-operated valves, air-operated valves), pumps and gas turbine generators after test and maintenance will be fixed before initiating events occur. Remote-operated valve open/close positions and control switch positions are monitored in the main control room, so they will be detected in a short time.	13.5.2 19.1.4 19.1.5 ~~COL 13.5(5)~~ ~~COL 13.5(6)~~
37. The controls and displays available in the US-APWR control room are superior to conventional control room HSIs and, therefore, human error probabilities in the US-APWR operation would be less than those in conventional plants.	Chapter 18 19.1

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 26 of 46)

Key Insights and Assumptions	Dispositions
Operator actions (LPSD)	
1. Operator actions modeled in the PRA are based on symptom oriented procedures. Risk significant operator actions identified in the PRA will be addressed in plant operating procedures including AOP, EOP, etc.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
2. Maintenance procedures indicate to check valve positions from the main control room after outages or testing. Valves that have been aligned in the wrong position will be detected and fixed to the correct position within a short period of time.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
3. In the operational visual display unit (VDU) of US-APWR, the layout of controllers & monitoring alignment in each window are different and this feature would make the operator perceive them as different locations.	13.5.2 18.4 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
4. When the RCS is at atmospheric pressure, gravity injection from SFP is effective. Operator will perform the gravity injection by opening the injection flow path from SFP to RCS cold legs, and supplying water from RWSP to SFP.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~ 5.4.7.2.3.6
5. When station blackout occurs, operators connect the alternative ac power with alternate gas turbines to class 1E bus in order to recover emergency ac power. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
6. In the case of loss of CCW/ESW, operators connect the fire suppression system to the CCWS and start the fire suppression pump in order to cool the charging pump and maintain injection to RCS. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 26 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
7. In the case of loss of decay heat removal functions by RHRS and SGs operators start the charging pump in order to recover water level in the RCS. If water level in the RWSAT, which is the water source of charging pumps, indicates low level the operator will supply RWSP water to the RWSAT by the refueling water recirculation pump. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 27 of 46)

Key Insights and Assumptions	Dispositions
8. In case LOCA occurs in RHR line, operator will perform isolation of the RHR hot legs suction isolation valves and stop leakage of RCS coolant from RHRS where LOCA occurs.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
9. In case the RCS water level decreases during mid-loop operation and the failure of automatic isolation valve occurs, operator will perform the manual isolation of low-pressure letdown line.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
10. When over-draining occurs and the automatic isolation valve fails, with RCS water level – low, operators close the valve on the letdown line in order to stop draining.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
11. In the case of loss of decay heat removal functions by RHRS and SGs, operators start the safety injection pump in order to maintain RCS water level. This operator action is risk important. Activities to minimizes the likelihood of human error in the human factors engineering is important in developing procedures, training and other human reliability related programs.	13.5.2 18.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
12. In the case of failure of running RHRS, with RHR flow rate – low, operators open the valves on the standby RHR suction line and discharge line and start the standby RHR pump in order to maintain RHR operating.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
13. In the case of leakage of the RWSP water from HHIS piping, CSS/RHR piping or refueling water storage system piping, with drain sump water level – abnormally high, operators close the RWSP suction isolation valves respectively in order to prevent leakage of RWSP water from failed piping.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
14. In the case of failure of running CCWS, with CCW flow rate – low, operators start the standby CCW pump in order to maintain CCWS operating.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~ ~~COL 13.5(7)~~
15. In the case of failure of running ESWS, with CCW flow rate – low, operators start the standby ESW pump in order to maintain ESWS operating.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~
16. When ESW strainer plugs up, with ESW pump pressure – normal, ESW flow rate – low and differential pressure – significant, operators switch from plugged strainer to standby strainer in order to maintain ESWS operating.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(5)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 27 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
17. In the case of loss of decay heat removal functions from RHR, with RCS temperature – high or RCS water level – low, operators feed water to SGs by motor-driven EFW pump, open MSDVs and close pressurizer spray vent valve (if open) in order to remove decay heat from RCS.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 28 of 46)

Key Insights and Assumptions	Dispositions
18. In the case of failure of feed or steam line associated with available motor-driven EFW pump during secondary side cooling, operators open the EFW tie-line valves in order to feed water to multiple SGs.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
19. When incoming breakers fail to automatically open in the loss of offsite power case, operators manually open the breakers to isolate Class 1E 6.9kV ac switchgears from the faulted offsite power.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
20. When running CS/RHR pumps are tripped due to loss of offsite power, operators restart the CS/RHR pumps to maintain the RHR operation.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
21. Operators manually start charging pump and safety injection pump as a local action when the software CCF occurs.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
22. Action to open Unlocked motor-operated valve is performed in series through the communication between operators in electrical room and in main control room.	18.6
23. In the event of decreasing RCS water level, operator actions to trip the CS/RHR pumps before cavitation and to restart the pumps after water level is restored will improve the reliability of RHR recovery. This operator action is important to reduce risk during shutdown.	13.5.2 5.4.7.2.3.6 ~~COL 13.5(7)~~
24. In the event of decreasing RCS water level, operators trip CS/RHR pumps before pump cavitation occurrence. After recover the water level, operators restart the pump. The action to restart the pump has high reliability, which reduces the risk during shutdown operation.	13.5.2 5.4.7.2.3.6 ~~COL 13.5(7)~~
25. MCR crew members consists of the following team members at all times during the evolution of an accident scenario: - Reactor operator (RO) - Senior reactor operator (SR) - Shift technical advisor (STA) The RO operates the plant during normal and abnormal situations, and SRO and STA check the action of the RO. If the RO commits an error during the operation, SRO or STA would correct the circumstances. However, when there is not enough available time to take corrective action, recovery credit is not considered.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 29 of 46)

Key Insights and Assumptions	Dispositions
26. For operator actions at local area (action that takes place outside control room) auxiliary operators (licnsed and non-licensed) are available: - Auxiliary operator 1 - Auxiliary operator 2 Normally the auxiliary operators are stational in the MCR. If the local manipulation of equipment is required to mitigate accidents or to prevent core damage, the auxiliary operator moves to the appropriate area in the reactor building or auxiliary building, to access equipment such as manual valves. It is assumed that auxiliary operator 1 operates equipments and auxiliary operator 2 checks the actions of auxiliary operator 1. If auxiliary operator 1 commits an error during the operation, auxiliary operator 2 corrects it.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
27. Misalignment of remote-operated valves (e.g. motor-operated valves, air-operated valves), pumps and gas turbine generators after test and maintenance will be fixed before initiating events occur. Remote-operated valve open/close positions and control switch positions are monitored in the main control room, so they will be detected in a short time.	13.5.2 19.1.6 ~~COL 13.5(5)~~ ~~COL 13.5(7)~~
28. The controls and displays available in the US-APWR control room are superior to conventional control room HSIs and, therefore, human error probabilities in the US-APWR operation would be less than those in conventional plants.	Chapter 18 19.1

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 30 of 46)

Key Insights and Assumptions	Dispositions
Operator actions (Severe Accidents)	
1. Operators manually initiate severe accident mitigation systems in accordance with the instructions from the technical support centre staff.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~
2. In the loss of support system sequences, operators will attempt to recover CCW/ESW or ac power while suppressing containment overpressure with firewater injection into spray header.	13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 31 of 46)

Key Insights and Assumptions	Dispositions
LPSD assumptions	
1. Freeze plug may not be used for US-APWR because the isolation valves are installed considering maintenance and CCWS has been separated individual trains. Therefore, the freeze plug failure is excluded from the potential initiator.	13.5.2 ~~COL 13.5(7)~~
2. Hydrogen peroxide addition is adopted instead of aeration because it decreases the duration of the mid-loop operation: hydrogen peroxide addition operation does not require mid-loop duration. As a result of adopting hydrogen peroxide addition which is done at a higher SG nozzle level, the mid-loop operation is needed only to drain the SG primary side water while, thus reducing overall duration mid-loop operation.	5.4.7.2.3.6
3. Redundant narrow range water level instrument and a mid-range water level instrument are provided to measure mid-loop water level. Installation of a redundant water narrow level instrument enhances reliability of the mid-loop operation. A temporary mid-loop water level sensor that measures the RCS water level with reference to pressure at the reactor vessel head vent line and cross over leg is installed in addition to these permanent water level sensors to cope with surge line flooding events.	5.4.7.2.3.6 Figure 5.1-2
4. When the RCS is mid-loop operation with the closed state, the reflux cooling with the SGs is effective.	13.5.2 19.1.6 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(6)~~
5. Various equipments will be possible temporary in the containment during LPSD operation for maintenance. However, there are few possibilities that these materials fall into the sump because the debris interceptor is installed on the sump of US-APWR. Therefore, potential plugging of the suction strainers due to debris is excluded from the PRA modeling.	6.2.2

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 32 of 46)

Key Insights and Assumptions	Dispositions
6. Low-pressure letdown line isolation valves are installed. One normally closed air-operated valve is installed in each of two low pressure letdown lines that are connected to two of four RHR trains. During normal plant cooldown operation, these valves are opened to divert part of the normal RCS flow to the CVCS for purification and the RCS inventory control. These valves are automatically closed and the CVCS is isolated from the RHRS by the RCS loop low-level signal to prevent loss of RCS inventory at mid-loop operation during plant shutdown. There are no features that automate the response to loss of RHR.	5.4.7.2.2.3 5.4.7.2.3.6 7.6.1.7 13.5.2 19.2.5 ~~COL 13.5(7)~~ ~~COL 19.3(6)~~ TS 3.4.8 TS 3.9.6
7. The time when loss of RHR occur were set to be 12 hours after plant trip, which is the time POS 4 (mid-loop operation) is entered after plant trip, since this condition gives the most severe condition for mid-loop operation from a decay heat perspective. The pressurizer spray-line vent line with 3/4 inch diameter is assumed to be open at the initial condition. One hour after loss of RHR function, the operator is assumed to perform the following actions: - Close pressurizer spray line vent, - Start emergency feed water (EFW) pump, and - Open main steam depressurization valve.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
8. Nitrogen will not be injected in the SG tubes to speed draining in the US-APWR design. The SG tubes will be filled with air during midloop operation.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
9. Operator actions assumed in the PRA will be considered in the shutdown response guideline, which will be developed satisfying NUMRAC 91-06 and following other recent guidelines such as INPO 06-008.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
10. Cleanliness, housekeeping and foreign material exclusion areas are administrative controls and programs to be developed by any applicant referencing the certified US-APWR design for construction and operation.	6.2 Table 6.2.2-2 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 32 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
11. The reactivity insertion event due to boron dilution has been judged to be insignificant to risk because of the following factors: - Strict administrative controls are in place to prevent boron dilution - Boron dilution events are highly recoverable - The CVCS design inherently limits te maximum boron duration rate. - The consequences of re-criticality are minor unless they continue for very long.	15.4.6.2 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 33 of 46)

Key Insights and Assumptions	Dispositions
12. Administrative controls ensure the RCS water level, temperature and pressure indication are available during shutdown.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
13. Maintenance rule process is implemented to evaluate the risk of configurations being entered during shutdown. These practices assure that removing a number of related systems from service at the same time is carefully considered and virtually never done when the conditional risk impacts are high.	17.6 ~~COL 17.6(1)~~
14. The SG nozzle dam installation level for the US-APWR is higher than in most conventional operating plants. The installation and removal of SG nozzle dams are done when the RCS water level is above the top of the main coolant piping (MCP).	5.4.7.2.3.6
15. The de-tensioning and tensioning of RV head stud bolts are performed at an RCS water level between the flange and the top of the MCP.	5.4.7.2.3.6
16. The installation and removal of the in-core instrumentation system (ICIS) is not done at mid-loop operation but is done when the RCS water level is above the top of the MCP.	5.4.7.2.3.6
17. Loss of SFP cooling is also progress the phenomena and has sufficient time to recovery because of large coolant inventory in the pool.	

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 34 of 46)

Key Insights and Assumptions	Dispositions
18. Surge line flooding may occur if decay heat removal function is lost during plant operating states where the pressurizer manway is the only vapor release pass from the RCS. Water held up in the pressurizer can erroneous readings of water level indicators measured with reference to the pressurizer. This phenomenon can also prevent gravity injection from the SFP. Measures to prevent accident evolution caused by surge line flooding are important. Adoption of both measures listed below can reduce risk from surge line flooding event. - Installation of an temporary RCP water level sensor that measure the MCP water level with reference to pressure at the reactor vessel head vent line and cross over leg when the RCS is vented at a high elevation. - Operational procedures to perform continuous RCS injections when loss of RHR occurs under conditions where the pressurizer manway is the only vapor release pass from the RCS. The temporary water level will satisfy the following specifications. - Water level can be read outside the containment vessel (CV) in order to be effective during events which involve harsh environment in the CV - Tygon tubing monometer will not be used - Instrumentation piping diameter will be sufficient enough to prevent delay in response	5.4.7.2.3.6 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
19. Two types of instruments are provided in US-APWR design to measure the temperature representative of the core exit whenever the reactor vessel head is located on top of the reactor vessel. The first one is core exit thermocouples located inside the RV. The second is resistance temperature detectors in the reactor coolant hot leg. These two independent instruments will be available whenever the RCS is in a mid-loop condition and the reactor vessel head is located on top of the reactor vessel.	5.4.7.2.3.6

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 35 of 46)

Key Insights and Assumptions	Dispositions
Expeditious actions outlined in GL 88-17 The following actions described as expeditious actions in Generic Letter 88-17 (Reference 19.1-54) are important to plant safety and should be implemented prior to operating in a reduced inventory condition. The expeditious actions applicable to the US-APWR design are the followings:	
1. Discuss the Diablo Canyon event, related events, lessons learned, and implications with appropriate plant personnel. Provide training shortly before entering a reduced inventory condition.	13.5.2 ~~COL 13.5(7)~~
2. Implement procedures and administration controls that reasonably assure that containment closure will be achieved prior to the time at which a core uncover could result from a loss of decay heat removal coupled with an inability to initiate alternate cooling or addition of water to the RCS inventory. These procedures and administrative controls should be active and in use prior to entering a reduced RCS inventory condition.	13.5.2 ~~COL 13.5(7)~~
3. Provide at least two independent, continuous temperature indications that are representative of the core exit conditions whenever the RCS is in a mid-loop condition and the reactor vessel head is located on top of the reactor vessel. Two types of instruments provided in the US-APWR design to measure RV temperature are core exit thermocouples located inside the RV and the resistance temperature detectors in the reactor coolant hot leg.	13.5.2 ~~COL 13.5(7)~~ 7.5.1.1.3.1 7.5.1.1.3.3
4. Provide at least two independent, continuous RCS water level indications whenever the RCS is in a reduced inventory condition. Two types of instruments are provided in US-APWR design to measure RCS water level are the middle range RCS water level sensor and the narrow level middle range water level sensor.	13.5.2 ~~COL 13.5(7)~~ 5.4.7.2.3.6
5. Implement procedures and administrative controls that generally avoid operations that deliberately or knowingly lead to perturbations to the RCS and/or to systems that are necessary to maintain the RCS in a stable and controlled condition while the RCS is in a reduced inventory condition.	13.5.2 ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 35 of 46) *(continued)*

Key Insights and Assumptions	Dispositions
6. Provide at least two available or operable means of adding inventory to the RCS that are in addition to pumps that are a part of the normal DHR systems.	13.5.2 ~~COL 13.5(7)~~
Means of adding inventory to the RCS in the US-APWR design can be safety injection pumps, charging pump and gravity injection from the SFP.	6.3.2.1.1 5.4.7.2.3.6 9.3.4.2.6.1

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 36 of 46)

Key Insights and Assumptions	Dispositions
7. Implement procedures and administrative controls that reasonably assure that all hot legs are not blocked simultaneously by nozzle dams unless a vent path is provided that is large enough to prevent pressurization of the upper plenum of the RV. Pressurizer safety valves are removed to prevent the damage of SG nozzle dams caused by loss of RHR function while SG nozzle dams and reactor vessel head are placed. Removal of the pressurizer safety valves is done during the period between removal of the SG manyays and installation of the SG nozzle dams. Installation of the pressurizer safety valves is performed during a period between removal of the SG nozzle dams and installation of SG manways.	13.5.2 5.4.7.2.3.6 COL 13.5(7)

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 37 of 46)

Key Insights and Assumptions	Dispositions
Seismic insights	
1. Table 19.1-54 provides the list of HCLPFs for US-APWR SSCs. This table demonstrates that the SSC HCLPF values are greater than 1.67 times the design basis SSE although the assessment performed by conservative generic data from EPRI URD. This insight will be certified by the following assessment.	19.1.5.1 ~~Table 19.1-54~~ Table 19.1-54R
- Perform seismic margin assessment using US-APWR plant specific in-structure response and stress analyses. - Conduct plant walkdown to certify the SSCs retain seismic margin under as-built conditions prior to fuel loading.	3.7

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Table 19.1-119R Key Insights and Assumptions (Sheet 38 of 46)

Key Insights and Assumptions	Dispositions
Seismic assumptions	
1. Failure of the RHRS isolation valves is not included in the analysis, because the pipe sections are assumed to fail before the valves fail and these valves are normally closed. Also, the US-APWR design has provided further protection against interfacing system LOCA by upgrading design pressure. Therefore, interfacing system LOCA is not modeled.	5.4.7.1
2. Failure of buildings that are not seismic Category I (i.e., turbine building, auxiliary building and access building) does not impact SSCs designed to be seismic Category I. Seismic spatial interactions between SSCs design to be seismic Category I and any other buildings will be avoided by proper equipment layout and design. The following seismic Category I buildings and structures are identified as buildings and structures that involve safety-related SSCs to prevent core damage. - Reactor building - Safety power source buildings - Essential service water intake structure - Essential service water pipe tunnel	3.2.1
3. Relay chatter does not occur or does not affect safety functions during and after seismic event.	3.10 ~~Table 19.1-54~~ Table 19.1-54R

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Table 19.1-119R Key Insights and Assumptions (Sheet 40 of 46)

Key Insights and Assumptions	Dispositions
Internal fire assumption	
1. All fire doors serving as fire barriers between redundant safety train fire compartments are normally closed.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
2. For transient combustibles, “three Airline trash bags” has been assumed in each fire compartment.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
3. Transient combustibles with total heat release capacity of 93,000 Btu (obtained from NUREG/CR-6850, “AppendixG-table-7LBL-Von Volkinburg, Rubbish Bag” Test results) is assumed for Fire ignition source within Containment Vessel.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
4. The Heat Release Rate of various items as specified in Chapter-11 of NUREG/CR-6850 is used.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
5. Damage temperature of thermoplastic cables as shown in Appendix-H of NUREG/CR-6850 is used as the target damage temperature.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
6. Operators are well trained in responding to fire event.	9.5.1 9.5.1.2.1 ~~COL 9.5(1)~~
7. One of RCS letdown isolation valves and one of RCS vent line isolation valves are locked close by administrative controls.	13.5 13.5.1 13.5.2 ~~COL 13.5(1)~~ ~~COL 13.5(7)~~
8. Each yard transformer is separated by a fire barrier.	19.1.5.2.1

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Table 19.1-119R Key Insights and Assumptions (Sheet 44 of 46)

Key Insights and Assumptions	Dispositions
Internal flood assumption	
1. Drain systems are designed to compensate with flood having flow rate below 100 gpm. Flood with flow rate below 100 gpm will not propagate to other areas due to the drain systems.	3.4.1.3
2. R/B is separated in two divisions (i.e. east area and west area). This design is prevents loss of all safety systems though postulated major floods that leak water over the capacities of flood mitigation systems. East side and west side of reactor building (R/B) are physically separated by flood propagation preventive equipment such as water tight doors. Therefore, flood propagation between east side and west side in the reactor building is not considered.	3.4.1.3 13.5 13.5.1 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(1)~~ ~~COL 13.5(7)~~
3. Watertight doors are provided for the boundaries between R/B and A/B in the bottom floor and between R/B and T/B in flood area 1F. This measure prevents flood propagation from non-safety building to R/B.	3.4.1.3
4. Flooding of ESW system can to be isolated within 15 minutes.	
5. Four trains of ESW system have physical separation and flooding in one train does not propagate to other trains.	9.2.1.2.1 9.2.5.2 ~~COL 9.2(3)~~ ~~COL 9.2(4)~~
6. The components that are environmentally qualified are considered impregnable to spraying or submerge effects. Also component failure by flooding will not result in the loss of an electrical bus.	
7. Penetrations within the boundaries between the restricted area and non-restricted area are sealed and doors or dikes are provided for openings. Therefore, flood propagation, except for major flood events is not considered.	3.4.1.3
8. The administrative controlled flood barriers that separated the reactor building between the east side and the west side are effective. The other water tight doors may be opened during maintenance.	13.5 13.5.1 13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~(RAI 19-50)~~ ~~COL 13.5(1)~~ ~~COL 13.5(7)~~

NAPS COL 19.3(6)

Table 19.1-119R Key Insights and Assumptions (Sheet 44 of 46)

Key Insights and Assumptions	Dispositions
9. The outage states of mitigation systems are important for LPSD risk. From the insight of flooding risk, one train of mitigation system on each side in R/B should be available. So that assumed the available safety injection pumps trains A and C are available during POS 8-1. B and D pumps are assumed out of service.	13.5.2 19.2.5 ~~COL 19.3(6)~~ ~~COL 13.5(7)~~
10. A water leak in the break room that adjoins the MCR would be isolated immediately by the operators in the MCR.	19.5.3.1

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Table 19.1-201 Tornado Strike and Exceedance Frequency for Unit 3

Enhanced F-Scale Tornado Intensity	Wind Speed (mph)	Description	Strike Frequency (/yr)	Strike Exceedance Frequency (/yr)
EF0	65-85	Light Damage	7.9E-05	1.6E-04
EF1	86-110	Moderate Damage	5.5E-05	8.1E-05
EF2	111-135	Considerable Damage	1.9E-05	2.6E-05
EF3	136-165	Severe Damage	5.7E-06	6.8E-06
EF4	166-200	Devastating Damage	1.0E-06	1.1E-06
EF5	>200	Incredible Damage Beyond Design Basis	1.2E-07	1.2E-07

NAPS COL 19.3(4)
NAPS ESP VAR 2.3-1

Table 19.1-202 Parameters of Design Basis Tornadoes

	Parameter	
Parameter Description	**Standard Plant SSCs**	**Site-Specific SSCs**
Tornado maximum wind speed	230 mph	200 mph
Tornado maximum pressure drop	1.2 psi	0.9 psi
Tornado-generated missile spectrum and associated velocities	6.625 in. dia. x 15 ft. long Schedule 40 steel pipe moving horizontally at 135 ft/s	6.625 in. dia. x 15 ft. long Schedule 40 steel pipe moving horizontally at 112 ft/s
	4,000 lb automobile moving horizontally at 135 ft/s	4,000 lb automobile moving horizontally at 112 ft/s
	1 in. diameter steel sphere moving horizontally at 26 ft/s	1 in. diameter steel sphere moving horizontally at 23 ft/s

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Table 19.1-203 Tornado Accident Scenarios

Wind Speed	Assumed Impact on Plant	Frequency (/yr)	CCDP	CDF (/Ry)
86–135 (EF1 and EF2 scale)	Loss of Offsite Power with - loss of alternate CCW	7.4E-05	2.1E-04	1.6E-08
136–200 (EF3 and EF4 scale)	Loss of Offsite Power with - loss of alternate CCW, and -loss of alternate ac power supply	6.7E-06	1.7E-03	1.1E-08
>200 mph (EF5 scale)	Failure of safety-related systems Assumed guaranteed core damage	1.2E-07	1	1.2E-07

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Table 19.1-204 Important Basic Event Related to the Site-Specific Design

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
1	UHSCF8CTBDBD-ALL	COOLING TOWER FANS FAIL TO START (CCF)	1.3E-06	7.1E-03	5.7E+03
2	UHSCF8CTYRBD-ALL	COOLING TOWER FANS FAIL TO RUN (CCF)	1.8E-07	1.0E-03	5.7E+03
3	UHSCF8CTBDBD-138	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
4	UHSCF8CTBDBD-147	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
5	UHSCF8CTBDBD-238	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
6	UHSCF8CTBDBD-237	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
7	UHSCF8CTBDBD-148	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
8	UHSCF8CTBDBD-248	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
9	UHSCF8CTBDBD-247	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
10	UHSCF8CTBDBD-137	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	3.6E-05	6.0E+02
11	UHSCF8CTYRBD-137	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
12	UHSCF8CTYRBD-147	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
13	UHSCF8CTYRBD-138	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
14	UHSCF8CTYRBD-247	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
15	UHSCF8CTYRBD-238	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
16	UHSCF8CTYRBD-237	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
17	UHSCF8CTYRBD-148	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
18	UHSCF8CTYRBD-248	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	5.2E-06	6.0E+02
19	UHSCF8CTBDBD-467	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
20	UHSCF8CTBDBD-468	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
21	UHSCF8CTBDBD-458	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02

Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
22	UHSCF8CTBDBD-368	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
23	UHSCF8CTBDBD-457	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
24	UHSCF8CTBDBD-357	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
25	UHSCF8CTBDBD-358	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
26	UHSCF8CTBDBD-367	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.4E-05	2.4E+02
27	UHSCF8CTYRBD-367	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
28	UHSCF8CTYRBD-358	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
29	UHSCF8CTYRBD-458	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
30	UHSCF8CTYRBD-457	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
31	UHSCF8CTYRBD-468	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
32	UHSCF8CTYRBD-467	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
33	UHSCF8CTYRBD-368	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
34	UHSCF8CTYRBD-357	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.1E-06	2.4E+02
35	UHSCF8CTBDBD-168	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
36	UHSCF8CTBDBD-268	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
37	UHSCF8CTBDBD-157	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
38	UHSCF8CTBDBD-158	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
39	UHSCF8CTBDBD-167	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
40	UHSCF8CTBDBD-258	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
41	UHSCF8CTBDBD-257	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02
42	UHSCF8CTBDBD-267	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.0E-05	1.7E+02

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Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
43	UHSCF8CTYRBD-157	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
44	UHSCF8CTYRBD-268	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
45	UHSCF8CTYRBD-267	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
46	UHSCF8CTYRBD-258	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
47	UHSCF8CTYRBD-167	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
48	UHSCF8CTYRBD-158	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
49	UHSCF8CTYRBD-257	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
50	UHSCF8CTYRBD-168	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.5E-06	1.7E+02
51	UHSCF8CTBDBD-38	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.3E-05	3.6E+01
52	UHSCF8CTBDBD-37	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.3E-05	3.6E+01
53	UHSCF8CTBDBD-48	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.3E-05	3.6E+01
54	UHSCF8CTBDBD-47	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.3E-05	3.6E+01
55	UHSCF8CTBDBD-347	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	2.1E-06	3.6E+01
56	UHSCF8CTBDBD-378	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	2.1E-06	3.6E+01
57	UHSCF8CTBDBD-478	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	2.1E-06	3.6E+01
58	UHSCF8CTBDBD-348	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	2.1E-06	3.6E+01
59	UHSCF8CTYRBD-37	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.8E-06	3.6E+01
60	UHSCF8CTYRBD-48	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.8E-06	3.6E+01
61	UHSCF8CTYRBD-47	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.8E-06	3.6E+01
62	UHSCF8CTYRBD-38	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.8E-06	3.6E+01
63	UHSCF8CTYRBD-347	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	3.0E-07	3.6E+01

Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
64	UHSCF8CTYRBD-348	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	3.0E-07	3.6E+01
65	UHSCF8CTYRBD-478	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	3.0E-07	3.6E+01
66	UHSCF8CTYRBD-378	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	3.0E-07	3.6E+01
67	UHSCF8CTBDBD-145	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
68	UHSCF8CTBDBD-135	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
69	UHSCF8CTBDBD-136	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
70	UHSCF8CTBDBD-146	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
71	UHSCF8CTBDBD-236	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
72	UHSCF8CTBDBD-245	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
73	UHSCF8CTBDBD-246	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
74	UHSCF8CTBDBD-235	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-06	2.8E+01
75	UHSCF8CTYRBD-245	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
76	UHSCF8CTYRBD-136	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
77	UHSCF8CTYRBD-145	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
78	UHSCF8CTYRBD-236	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
79	UHSCF8CTYRBD-146	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
80	UHSCF8CTYRBD-135	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
81	UHSCF8CTYRBD-246	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
82	UHSCF8CTYRBD-235	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-07	2.8E+01
83	UHSCF8CTBDBD-27	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	7.1E-06	2.1E+01
84	UHSCF8CTBDBD-28	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	7.1E-06	2.1E+01

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Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
85	UHSCF8CTBDBD-18	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	7.1E-06	2.1E+01
86	UHSCF8CTBDBD-17	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	7.1E-06	2.1E+01
87	UHSCF8CTBDBD-127	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.2E-06	2.1E+01
88	UHSCF8CTBDBD-278	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.2E-06	2.1E+01
89	UHSCF8CTBDBD-128	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.2E-06	2.1E+01
90	UHSCF8CTBDBD-178	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.2E-06	2.1E+01
91	UHSCF8CTYRBD-17	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.0E-06	2.1E+01
92	UHSCF8CTYRBD-27	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.0E-06	2.1E+01
93	UHSCF8CTYRBD-28	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.0E-06	2.1E+01
94	UHSCF8CTYRBD-18	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.0E-06	2.1E+01
95	UHSCF8CTYRBD-278	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.7E-07	2.1E+01
96	UHSCF8CTYRBD-128	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.7E-07	2.1E+01
97	UHSCF8CTYRBD-178	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.7E-07	2.1E+01
98	UHSCF8CTYRBD-127	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.7E-07	2.1E+01
99	UHSCF2MVOD509AC-ALL	UHS-MOV-509A,C FAIL TO OPEN	4.7E-05	3.3E-04	8.0E+00
100	UHSCF2MVCD510AC-ALL	UHS-MOV-510A,C FAIL TO CLOSE	4.7E-05	3.3E-04	8.0E+00
101	UHSCF8CTBDBD-67	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.0E-06	3.9E+00
102	UHSCF8CTBDBD-68	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.0E-06	3.9E+00
103	UHSCF8CTBDBD-57	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.0E-06	3.9E+00
104	UHSCF8CTBDBD-58	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	1.0E-06	3.9E+00
105	UHSCF8CTBDBD-567	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.7E-07	3.9E+00

Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
106	UHSCF8CTBDBD-568	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.7E-07	3.9E+00
107	UHSCF8CTBDBD-678	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.7E-07	3.9E+00
108	UHSCF8CTBDBD-578	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.7E-07	3.9E+00
109	UHSCF8CTYRBD-58	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.5E-07	3.9E+00
110	UHSCF8CTYRBD-57	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.5E-07	3.9E+00
111	UHSCF8CTYRBD-68	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.5E-07	3.9E+00
112	UHSCF8CTYRBD-67	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.5E-07	3.9E+00
113	UHSCF8CTYRBD-567	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.5E-08	3.9E+00
114	UHSCF8CTYRBD-578	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.5E-08	3.9E+00
115	UHSCF8CTYRBD-678	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.5E-08	3.9E+00
116	UHSCF8CTYRBD-568	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.5E-08	3.9E+00
117	UHSCF8CTBDBD-14	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	9.7E-07	3.7E+00
118	UHSCF8CTBDBD-13	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	9.7E-07	3.7E+00
119	UHSCF8CTBDBD-24	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	9.7E-07	3.7E+00
120	UHSCF8CTBDBD-23	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	9.7E-07	3.7E+00
121	UHSCF8CTBDBD-124	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-07	3.7E+00
122	UHSCF8CTBDBD-134	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-07	3.7E+00
123	UHSCF8CTBDBD-123	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-07	3.7E+00
124	UHSCF8CTBDBD-234	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	1.6E-07	3.7E+00
125	UHSCF8CTYRBD-23	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.4E-07	3.7E+00
126	UHSCF8CTYRBD-13	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.4E-07	3.7E+00

Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
127	UHSCF8CTYRBD-14	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.4E-07	3.7E+00
128	UHSCF8CTYRBD-24	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	1.4E-07	3.7E+00
129	UHSCF8CTYRBD-123	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-08	3.7E+00
130	UHSCF8CTYRBD-134	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-08	3.7E+00
131	UHSCF8CTYRBD-124	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-08	3.7E+00
132	UHSCF8CTYRBD-234	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	2.3E-08	3.7E+00
133	UHSMVOD509C	UHS-MOV-509C FAIL TO OPEN	9.5E-04	2.0E-03	3.1E+00
134	UHSMVCD510C	UHS-MOV-510C FAIL TO CLOSE	9.5E-04	2.0E-03	3.1E+00
135	UHSMVPR509C	UHS-MOV-509C PLUG	9.6E-07	2.0E-06	3.1E+00
136	UHSMVCM509C	UHS-MOV-509C SPURIOUS CLOSE	9.6E-07	2.0E-06	3.1E+00
137	UHSMVOM510C	UHS-MOV-510C SPURIOUS OPEN	9.6E-07	2.0E-06	3.1E+00
138	UHSMVEL510C	UHS-MOV-510C EXTERNAL LEAK LARGE	2.4E-08	5.1E-08	3.1E+00
139	UHSMVEL509C	UHS-MOV-509C EXTERNAL LEAK LARGE	2.4E-08	5.1E-08	3.1E+00
140	UHSCTBDCA	COOLING TOWER FAN C1 UHS-MFN-001C FAIL TO START (RUNNING)	9.5E-05	1.8E-04	2.9E+00
141	UHSCTBDCB	COOLING TOWER FAN C2 UHS-MFN-002C FAIL TO START (RUNNING)	9.5E-05	1.8E-04	2.9E+00
142	UHSCTYRCA	COOLING TOWER FAN C1 UHS-MFN-001C FAIL TO RUN (RUNNING)	1.4E-05	2.6E-05	2.9E+00
143	UHSCTYRCB	COOLING TOWER FAN C2 UHS-MFN-002C FAIL TO RUN (RUNNING)	1.4E-05	2.6E-05	2.9E+00
144	UHSCF8CTBDBD-78	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	6.9E-07	2.9E+00

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Table 19.1-204 Important Basic Event Related to the Site-Specific Design *(continued)*

Rank	Basic Event ID	Basic Event Description	Nominal Value	FV Importance	RAW
145	UHSCF8CTYRBD-78	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	9.9E-08	2.9E+00
146	UHSCF8CTBDBD-36	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	5.4E-07	2.5E+00
147	UHSCF8CTBDBD-35	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	5.4E-07	2.5E+00
148	UHSCF8CTBDBD-46	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	5.4E-07	2.5E+00
149	UHSCF8CTBDBD-45	COOLING TOWER FANS FAIL TO START (CCF)	3.6E-07	5.4E-07	2.5E+00
150	UHSCF8CTBDBD-456	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	9.1E-08	2.5E+00
151	UHSCF8CTBDBD-356	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	9.1E-08	2.5E+00
152	UHSCF8CTBDBD-346	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	9.1E-08	2.5E+00
153	UHSCF8CTBDBD-345	COOLING TOWER FANS FAIL TO START (CCF)	6.0E-08	9.1E-08	2.5E+00
154	UHSCF8CTYRBD-46	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	7.8E-08	2.5E+00
155	UHSCF8CTYRBD-35	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	7.8E-08	2.5E+00
156	UHSCF8CTYRBD-36	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	7.8E-08	2.5E+00
157	UHSCF8CTYRBD-45	COOLING TOWER FANS FAIL TO RUN (CCF)	5.1E-08	7.8E-08	2.5E+00
158	UHSCF8CTYRBD-356	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.3E-08	2.5E+00
159	UHSCF8CTYRBD-346	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.3E-08	2.5E+00
160	UHSCF8CTYRBD-345	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.3E-08	2.5E+00
161	UHSCF8CTYRBD-456	COOLING TOWER FANS FAIL TO RUN (CCF)	8.6E-09	1.3E-08	2.5E+00

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities	Explosions and Flammable Vapor Clouds	SSAR 2.2.3.1.1	• Truck Traffic The largest explosive load routinely transported by truck on Virginia highways contains 8500 gallons of gasoline. The explosive force of this quantity of gasoline is estimated to be equivalent to 50,700 pounds of TNT, using a simple TNT-equivalent yield formula. According to NRC RG 1.91, if this amount of gasoline were to explode, a peak overpressure of 1 pound per square inch (psi) would be experienced as far as 1900 feet away from the point of explosion. The closest point of Virginia Route 652 to the Unit 3 site is 1.5 miles (6420 feet). RG 1.91 cites 1 psi as a conservative value of peak positive incident overpressure, below which no significant damage would be expected. Thus, no significant damage would occur in the event of an explosion resulting from a gasoline truck traffic accident.	1,3	None	No
		FSAR 2.2.3.1.1	Considering the portions of on-site delivery truck routes within 1900 ft of Unit 3 safety-related structures, the exposure distance, s, would be 3.48 mi. However, using 1900 ft is conservative in comparison with the methodology described in Section 2.2.3.1.3 for determining the safe separation distance. Therefore, the exposure distance of 3.48 mi is also conservative. Based on the convservative assumptions in Section 2.2.3.1.1, an annual exposure rate of 1.67×10^{-6} was obtained, which is on the order of magnitude of 10^{-6} per year, so their is a sufficiently low risk from explosion during on-site gasoline tanker truck deliveries. However, based on the conservatisms described in Section 2.2.3.1.1, the realistic probability is lower.			

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Explosions and Flammable Vapor Clouds *(continued)*	SSAR 2.2.3.1.2	• Pipelines No natural gas pipeline or mining facilities are located within 10 miles of the Unit 3 site. There are no pipelines carrying potentially hazardous materials within 5 miles of the Unit 3 site. Therefore, the potential for hazards from these sources that could adversely affect safe operation of the plant is minimal.			
		SSAR 2.2.2.1	• Industrial Facilities (SSAR 2.2.2.1) Louisa County is a rural and residential area. There are no substantial industrial activities within 5 miles of the Unit 3 site. Any major industrial expansion in the area is subject to the approval from the local county planning commission. The Louisa County Board of Supervisors has approved a zoning ordinance allowing industrial development of approximately 620 acres near the site EAB. Within 10 miles of the site, there are several other areas zoned for industrial development, the largest one being 150 acres near Pendleton, Virginia. However, there are no plans for development in this area.			
		FSAR 2.2.2.1	Since the SSAR was completed, no hazardous industrial facilities have been added at the 620 acres industrial development near the Unit 3 EAB. The industrial site poses no hazard to Unit 3.			

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Explosions and Flammable Vapor Clouds *(continued)*	SSAR 2.2.2.2	• Mining Activities There are no mining activities within 5 miles of the Unit 3 site.			
		SSAR 2.2.2.4	• Railroads The closest railroad line to the Unit 3 site is the main line of the Chesapeake and Ohio Railway, which runs from Newport News to Chicago. It passes through the towns of Louisa, Mineral, Fredericks Hall, and Bumpass; its closest approach to the site is about 5.5 miles southwest. A spur line connects the Unit 3 site with this line.			
		SSAR 2.2.2.5	• Marine Transportation There are six marinas in the vicinity of the Unit 3 site. These marinas, including wet slips and other boat ramps, provide access for up to 1600 pleasure craft on Lake Anna on a peak day. The closest marina is 1.4 miles north-northeast of the site. The remaining marinas are from 2 to 2.3 miles distant. The nearest marina stores gasoline in amounts up to about 4000 gallons. There are no large boats or barges on Lake Anna.			
		SSAR 2.2.2.8	• Military Facilities There are no military facilities within 5 miles of the Unit 3 site.			

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Toxic Chemicals	SSAR 2.2.3.3	RG 1.78 requires evaluation of control room habitability for a postulated release of chemicals stored within 5 miles of the control room. As described in SSAR Section 2.2.2, there are no manufacturing plants, chemical plants, storage facilities, major water transportation routes, and oil or gas pipelines within 5 miles of the Unit 3 site. Therefore, as described in RG 1.78, only two scenarios were evaluated: 1. Chemical transported on routes within a 5-mile radius of the site, at a frequency of 10 or more per year, and with weights outlined in the RG. Four roads pass within 5 miles of the Unit 3 site. U.S. Route 522 passes about 5 miles to the true west-northwest; the other three routes pass the site at closer distances. The NAPS UFSAR (Section 6.4.1.3.3) states that due to lack of chemicals and industrial facilities along these state routes, and considering the longer distance between Route 522 and the site, no chemicals are transported along these routes at a frequency and weight sufficient to require evaluation in accordance with the RG. Therefore, the UFSAR concludes that no significant control room habitability impact on the existing units is expected due to chemicals being shipped along these routes. Because of the close proximity of Unit 3 to the existing units, no significant impact would be expected on those persons inhabiting the Unit 3 MCR due to chemical accidents on these routes.	1	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Toxic Chemicals *(continued)*	FSAR 2.2.3.1.3 FSAR 6.4.4.2	2. Chemicals stored on site. The on-site toxic chemical materials stored on-site at Units 1, 2, and 3 are listed in Table 2.2-202. These chemicals have been evaluated for an accidental release of each. The results of the evaluation indicate that the Unit 3 MCR concentration for each chemical does not exceet the applicable toxicity limit.			
	Fires	FSAR 2.2.3.4	The potential for off-site wildfires exists due to the rural nature of the NAPS site and presence of off-site vegetation to the west and south of the site. The maximum incident heat flux from a wildfire on a Unit 3 safety-related structure is 0.76 kW/m^2 for the UHSRS. For comparison, this level of thermal radiation is about that of the sun's thermal radiation at the ground surface, or 0.7 to 1.0 kW/m^2. Given the conservatism in the assumptions and the large separation distances to safety-related structures, a wildfire originating offsite would not affect the safe operation or shutdown of Unit 3. In addition to a potential fire in the vicinity of Unit 3, a fire involving chemicals stored on the NAPS site was considered. Table 2.2-203 lists the chemicals and shows those which are potentially flammable or explosive. The stored chemicals identified in Table 2.2-203 as potential flammability hazards were evaluated using ALOHA. The ALOHA analyses show that these materials are sufficiently separated from safety-related SSCs that further analysis is not required. Table 2.2-203 and the ALOHA results in Table 2.2-204 demonstrate that significant effects are not expected due to a fire involving onsite chemicals and fuels.	1,3	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Collision with the Unit 3 Intake Structure	FSAR 2.2.3.5	The area around the Unit 3 intake structure is managed by Dominion as a part of the exclusion area. Due to the presence of the cofferdam, there is no potential for a collision between a boat on Lake Anna and the Unit 3 intake structure. Also, because the Unit 3 intake structure is not a safety-related structure, such a collision could not affect the safe operation or shutdown of Unit 3.	3	None	No
	Liquid spills near the Intake Structure	FSAR 2.2.3.6	An accidental spill of an oil or liquid in Lake Anna near the Unit 3 intake structure that may be corrosive, cryogenic, or a coagulant was considered and determined to not be credible or have a low probability of occurrence and have no consequences for the safety of Unit 3. The oil or gasoline from a spill would float on the Lake Anna surface while the openings in the Unit 3 intake channel culverts through the cofferdam are underwater. Therefore, such spills could not affect the safe operation or shutdown of Unit 3.	1, 3	None	No
	Aircraft Crashes	SSAR 2.2.3.2.1 FSAR 2.2.3.2.1	None of the airports within 10 miles of the Unit 3 site, as described in SSAR Section 2.2.2.6.1 and Section 2.2.2.6.1, support operations in excess of the threshold criteria specified in NUREG-0800, Section 3.5.1.6.	2	$<10^{-7}$	No
		FSAR 3.5.1.6	The probabilities (P_{FA}) per year of an aircraft flying on the nearby airways crashing into Unit 3 were estimated using the following relationship, as specified in NUREG-0800, Section 3.5.1.6. P_{FA} = C x N x A/W The total of two accident probabilities (civil airway and military routes) meet the NUREG-0800 (Section 3.5.1.6) guideline and is of an order of magnitude of 10^{-7} per year.			

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Nearby Industrial, Transportation and Military facilities *(continued)*	Site Proximity Missiles	FSAR 3.5.1.5	No potential site-proximity missile hazards are identified except aircraft, which are evaluated in Section 3.5.1.6.	3	None	No
	Turbine Missile	FSAR 3.5.1.3.2	Technical Reports MUAP-10005-NP, "Probability of Missile Generation From Low Pressure Turbines for Model L54" (Reference 3.5-17R), and MUAP-07029-NP, "Probabilistic Evaluation of Turbine Valve Test Frequency," (Reference 3.5-18R) are used to establish the procedures and criteria for PSI, ISI intervals, and turbine valve test frequencies. Additionally, procedures implement the applicable operating criteria specified in SRP 3.5.1.3. These actions maintain the probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing such that the acceptable risk rate is maintained at less than 10^{-7} per year.	2,3	$<10^{-7}$	No
Meteorology	Extreme Winds	SSAR 2.3.1.3.1	According to American National Standard, ANSI 58.1-1982, the operating basis wind velocity at 33 feet (10 meters) above ground level in the Unit 3 site area associated with a 100-year return period is 64 miles per hour (mph). The fastest-mile-wind speed is defined as the passage of one mile of wind with the highest speed for the day. The actual observed fastest-mile-wind speed at Richmond (68 mph) was recorded at that station in October 1954. The 3-second gust wind speed that represents a 100-year return period is 96 mph at 10 meters above ground. This wind speed was determined in accordance with the guidance in SEI/ASCE 7-02, Revision of ASCE 7-98, and is selected as a conservative basic wind speed site characteristic.	1,4	None	No

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Table 19.1-205 External Events Screening and Site Applicability

	Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
NAPS ESP VAR 2.3-1	Meteorology *(continued)*	Tornadoes	FSAR 2.3.1.3.2	Table 2.3-219 describes the tornado with a total annual strike probability equal to 10^{-7} of striking the Unit 3 site.	Not screening	Close to 10^{-7}	Yes (Section 19.1.5)
			FSAR 3.5.1.4	The Unit 3 site characteristic for tornado missile spectrum is the spectrum in Table 2 of RG 1.76, Rev. 1, for Region II applied to full building height. This spectrum fully addresses variations in grade levels at the Unit 3 site.			

Table 2.3-219 Unit 3 Site Tornado Parameters

Criteria	Unit of Measure	Site Tornado (10^{-7} per year occurrence)
Max. Wind Speed	mph	200
Max. Rotational Velocity	mph	160
Max. Translation Velocity	mph	40
Radius of Max. Rotational Velocity	ft	150
Pressure Drop	psi	0.9
Rate of Pressure Drop	psi/sec	0.4

Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Meteorology *(continued)*	Tropical Cyclone	SSAR 2.3.1.3.3	A comprehensive database of historical tropical cyclone tracks extending from 1851 through 2003, available through the NOAA's Coastal Services Center and based on information compiled by the National Hurricane Center, indicates that a total of 55 tropical cyclone centers or storm tracks have passed within a 100-nautical mile radius of the Unit 3 site. Storm classifications and respective frequencies of occurrence over this period of record are as follows: • Hurricanes - Category 3 (1), Category 2 (1), and Category 1 (5) • Tropical Storms - 27 • Tropical Depressions - 13 • Subtropical Depressions - 1 • Extra-Tropical Storms - 7	1	Not deter-mined	No
Meteorology *(continued)*	Precipitation Extremes	SSAR 2.3.1.3.4 FSAR 2.3.1.3.4	Historical precipitation extremes (rainfall and snowfall) are listed in SSAR Table 2.3-5 along with climatological extremes of temperature for the available periods of record at selected National Weather Service and cooperative observing stations in the Unit 3 site area. The 48-hour PMWP event is 20.75 inches of rain. This precipitation amount was determined by linear interpolation of the 24-hour and 72-hour, 10-square-mile area, values shown in Figures 35 and 45, respectively, for December (NUREG/CR-1486). Table 2.3-216 summarizes maximum snowfall event depths, maximum snowpack depths, and estimated 100-year return values for snowfall event depths for selected stations in the Unit 3 site area. The estimated 100-year return value for the maximum snowfall event amount is 26.5 inches in the Unit 3 site area.	1	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Meteorology *(continued)*	Hails, Snowstorms, and Ice Storms	SSAR 2.3.1.3.5	Hail can occur at any time of the year and is associated with well-developed thunderstorms, but has been observed primarily during the spring and summer months. The data indicate that Louisa and Spotsylvania Counties can expect, on average, hail with diameters greater than or equal to 0.75 inch about one day per year. The occurrence of hailstorms with hail greater than or equal to 1.0 inch in diameter averages less than one day per year. The Climate Atlas indicates that the occurrence of snowfalls greater than or equal to 1 inch in the Unit 3 site area ranges from about three to five days per year. However, the frequency of such snow events increases to the west and northwest of the Unit 3 site in far western Louisa County, north-central Fluvanna County, and much of Albemarle and Orange Counties, ranging between 6 and 10 days per year. In general, these differences can be attributed to topographic effects.	1,4	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Meteorology *(continued)*	Thunder-storms	SSAR 2.3.1.3.6	Based on a 67-year period of record, Richmond averages 36 thunderstorm-days per year. July has the highest frequency of occurrence—about 8 days, on average. The mean frequency of lightning strikes to earth can be estimated using a method reported by EPRI. The EPRI formula assumes a relationship between the average number of thunderstorm-days per year (T) and the number of lightning strikes to earth per square mile per year (N). $N = 0.31T$ As indicated previously, there are 36 thunderstorm-days per year, on average, at Richmond. Consequently, the number of lightning strikes to earth per square mile is about 11.2 per year. The Unit 3 site plant envelope area is approximately 0.068 mi^2. Using this as the Unit 3 area, the annual average number of lightning strikes in the Unit 3 area can be calculated as follows: $11.2/mi^2/year \times 0.068\ mi^2 = 0.76$ lightning strikes per year at the Unit 3 area.	1,4	Not determin ed	No
	Restrictive Dilution Conditions	SSAR 2.3.1.3.7	In the Unit 3 site region, the annual frequency of low-level inversions or isothermal layers based at or below a 500-foot elevation is approximately 30 percent. Seasonally, the greatest frequencies of inversions occur during the fall and winter (34 and 33 percent, respectively). Spring and summer have the lowest inversion frequencies (about 28 percent of the time for each season). Most of these inversions are nocturnal in nature, generated through nighttime cooling.	1,4	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability		
				Criteria	Freq. (/yr)	Site Appl.
Meteorology *(continued)*	Ultimate Heat Sink	SSAR 2.3.1.3.8	The performance of the ultimate heat sink is described inSection 9.2.5.2.3. The meteorological conditions resulting in the maximum evaporation and drift loss of water from the UHS are the worst 30-day average combination of the controlling atmospheric parameters. Calculating "running, 30-day," daily averages and selecting the 30-day period with the highest daily average wet-bulb temperature, determined the worst 30-day period. The worst 30-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures is 76.3°F and 79.5°F, respectively, based on the referenced data encompassing a 25-year period of record from 1978 to 2003. The meteorological conditions resulting in minimum water cooling are the worst combination of controlling atmospheric parameters, including diurnal variations where appropriate, for the critical time periods unique to the UHS design. The worst 1-day and the worst 5-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures are considered to conservatively represent these conditions.	1	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability Criteria	Freq. (/yr)	Site Appl.
Hydrologic Engineering	Flood from Probable Maximum Precipitation	FSAR 2.4.2.3	The Unit 3 site drainage facilities and grading in the power block area provide evacuation of the runoff from the PMP storm event. The design plant grade elevations for safety-related buildings are located above the estimated PMP water levels and grading is such that sheet flows and roof drainage flow away from safety-related buildings. The maximum water level from a PMP event in the power block area, located plant north of the UHS, is Elevation 288.9 ft NAVD88 (289.8 ft NGVD29), which is 1.1 ft below the design plant grade elevation for safety-related structures. Additionally, the Unit 3 PMP flows do not impact the Units 1 and 2 site. No flood protection measures are necessary for the Unit 3 site.	1,3	None	No
	Probable Maximum Flood	FSAR 2.4.3	The Lake Anna PMF analysis presented in the SSAR utilized a normal pool elevation of 249.14 ft NAVD88 (250.00 ft NGVD29). For the addition of the Unit 3 power reactor, the normal pool elevation has been raised by 3 inches to an elevation of 249.39 ft NAVD88 (250.25 ft NGVD29). Because the normal pool elevation has been increased, the Lake Anna PMF analysis was performed to reflect the new normal pool elevation. The PMF elevation at the Unit 3 site is 266.53 ft NAVD88 (267.39 ft NGVD29). This elevation is 23.47 ft below the Unit 3 design plant grade elevation of 290.0 ft NAVD88 (290.86 ft NGVD29) for safety-related facilities, including the safety-related UHS SSCs.	1,3	None	No

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Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Hydrologic Engineering *(continued)*	Dam Failures	SSAR 2.4.4	The Unit 3 site is located adjacent to Lake Anna and approximately 5 miles upstream of the North Anna Dam. The ultimate heat sink (UHS) consists of mechanical draft cooling towers over partially buried water storage basins. The UHS facilities provide the source of water for the ESWS in the event that the primary source becomes unavailable. Therefore, adequate ESWS water would be immediately available to maintain Unit 3 in a safe condition, even if Lake Anna were to be drained due to a dam failure. No safety-related structures or systems of Unit 3 would be adversely affected by the loss of water in Lake Anna due to dam failure. No other dams exist on the North Anna River, either upstream or downstream of the Unit 3 site.	1,3	None	No
	Surge and Seiche Flooding	SSAR 2.4.5	Since the Unit 3 site is not located on an estuary or open coast, surge or seiche flooding would not produce maximum water levels at the site. Based on the approximate flood hazard area identified for Lake Anna corresponding to the 100-year maximum water level in the lake, an approximate flood elevation of 254.14 ft NAVD88 (255 ft NGVD29) was estimated. This elevation is 9.07 ft below the maximum PMF still-water elevation of 263.21 ft NAVD88 (264.07 ft NGVD29).	3	None	No
	Tsunami	SSAR 2.4.6	Since the site is at an inland location and not located on an estuary or open coast, tsunami flooding is not a design consideration.	3	None	No

NAPS COL 19.3(4)

Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Hydrologic Engineering *(continued)*	Ice Effects	SSAR 2.4.7	Ice at a nuclear power plant site can occur in any one of the following forms: • Surface ice and its associated forces • Anchor ice formation on components • Frazil ice that could clog intake flow passages • Ice jams that can affect flow path to the intake • Ice accumulation on roofs of safety related structures and components. Historical data quantifying ice and snow conditions at the Unit 3 site have been collected and evaluated. No safety-related facilities would be affected by ice layer formation.	3	None	No
	Cooling Water Canals and Reservoirs	SSAR 2.4.8	There are no safety-related cooling water canals or reservoirs required for Unit 3. The ultimate heat sink (UHS) is part of the ESWS. The UHS does not rely on cooling water canals or reservoirs and is not dependent on a stream, river, estuary, lake, or ocean. The UHS facilities have their own water for safety-related cooling in the event that the normal water source is not available. Therefore, the North Anna Reservoir and the WHTF are not safety-related sources of water to the UHS.	3	None	No

NAPS COL 19.3(4)

Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability: Criteria	Freq. (/yr)	Site Appl.
Hydrologic Engineering *(continued)*	Channel Diversions	SSAR 2.4.9	The possibility of an upstream diversion of the North Anna River is considered extremely remote. Historical information indicates that the river has not had a major change of course in recent history. Inspection of US Geological Survey 7.5-minute topographic maps and pre-Lake Anna aerial photography shows that the North Anna River lies in a valley that is at least 250 feet lower than the surrounding drainage divide. There is no apparent man-made or natural event (e.g., earthquake, subsidence, landslide, or ice blockage) that could divert the North Anna River from its current drainage basin. Thus, the flow of water into Lake Anna from the North Anna River and tributaries is secure from unexpected upstream diversions.	3	None	No
	Low Water	FSAR 2.4.11.5	Lake Anna is not relied on as a safety-related water supply for emergency cooling and does not serve as the UHS. Since the cooling tower basins for the UHS contain a 30-day water supply, water levels in Lake Anna do not affect the ability of the UHS to provide emergency cooling for safe shutdown.	3	None	No
	Groundwater	FSAR 2.4.12.4	The post-construction piezometric head contour map indicates that maximum groundwater level elevations in the power block area range from about 270.0 to 284.4 ft NAVD88 (270.86 to 285.26 ft NGVD29). The maximum groundwater level elevation in the R/B complex area of Unit 3 is 7.7 ft below the design plant grade elevation of 290 ft NAVD88 (290.86 ft NGVD29). The maximum groundwater level elevation near the UHSRS is 5.6 ft below the design plant grade elevation.	3	None	No

NAPS COL 19.3(4)

Table 19.1-205 External Events Screening and Site Applicability

Category	Event	SSAR/ FSAR Section Disposition	Description	Screening and Applicability		
				Criteria	Freq. (/yr)	Site Appl.

Notes:

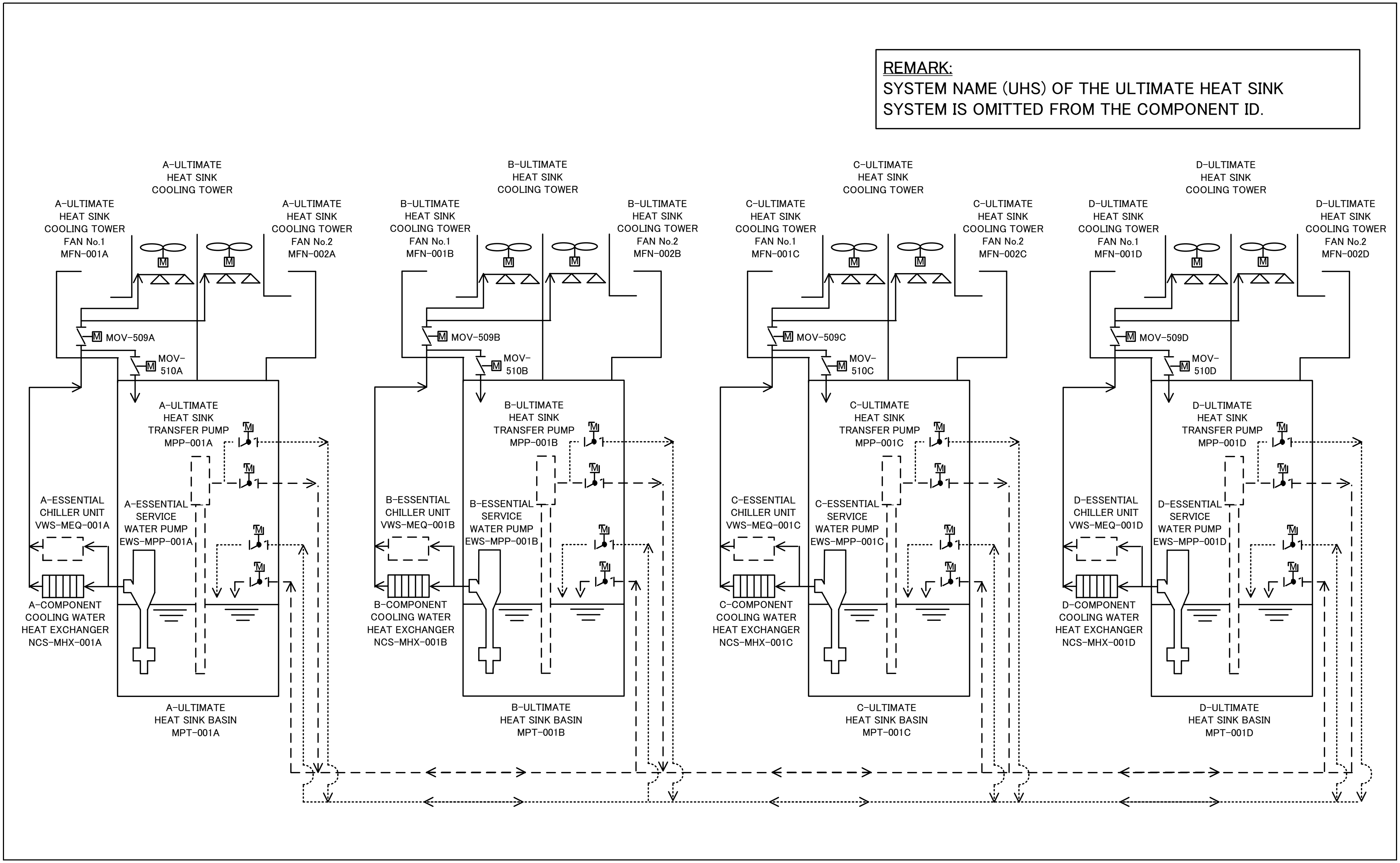
1. Screening criteria categories
   "1" Lower damage potential than a design basis event
   "2" Lower event frequency of occurrence than another event
   "3" Cannot occur close enough to the plant to have an affect
   "4" Included in the definition of another event
   "5" Sufficient time to eliminate the source of threat or to provide an adequate response

NAPS COL 19.3(4)

Table 19.1-206 Site-specific Key Assumptions

Key Insights and Assumptions	Disposition
Site-Specific Design Features and Assumptions	
Design features and assumptions that contribute to high reliability of continuous operation after the 24-hour mission time are the following:	
• The normal makeup water to the UHS inventory is from Lake Anna via the cooling tower makeup water and blowdown.	Sections 9.2.5.2.1 & 9.2.5.2.2
• UHS transfer pumps and the ESW pumps in each basin are powered by the different Class 1E buses. UHS transfer pump operates to permit the use of three of the four basin water volumes.	Sections 9.2.5.2.2 & 9.2.5.3
• The transfer line is a high-integrity line, regularly tested and inspected for corrosion.	Sections 9.2.1.2.1 & 9.2.5.4
• There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.	Section 9.2.5.5
• Two basins contain enough water to supply water to remove decay heat for at least 24 hours after plant trip.	Section 9.2.5.3
• In operating trains, the water is bypassed directly to a basin without passing through spray nozzles, when the water temperature reaches a pre-determined value of basin water temperature.	Section 9.2.5.3
Overfill protection will be provided to prevent overfilling the basin and failing the pump(s). This feature is important to prevent degradation of the ESWS when the basin is overfilled due to failure in the transfer pump or circulation system.	Section 13.5
Plant-specific SSCs that potentially impact plant safety are seismically designed and thus will not impact the plant HCLPF. HCLPF values for the plant-specific SSCs, such as cooling towers, will be confirmed by calculation using EPRI TR-103959 methodology after completion of seismic design and stress analysis of the SSCs.	Section 19.1
Administrative controls are in place to ensure that the truck bay entrance of the reactor building is closed when a tornado is nearby or source of high wind is forecast for the immediate area.	Section 13.5

Figure 19.1-2R Simplified System Diagram (Sheet 20 of 42) (Essential Service Water System [2 of 3])



NAPS COL 19.3(4)

Figure 19.1-201 Point Estimate Probability of Tornado Exceeding Maximum Wind Speed at the Unit 3 Site

19.2 Severe Accident Evaluation

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19.2.5 Accident Management

STD COL 19.3(6) Add the following text after the last paragraph in DCD Subsection 19.2.5.

An accident management program will be developed, in which severe accident management procedures that capture important operator actions described in the severe accident management framework are included. The accident management program will incorporate the instructions provided in NEI 91-04 Revision 1 (Reference 19.2-201). Development of emergency operating procedures is addressed in Subsection 13.5.2.1. Training requirements will also be developed as part of the accident management program addressed in DCD Section 18.9, and training for operators will be completed prior to first fuel load.

19.2.6.1 Introduction

STD COL 19.3(4) Replace the content of DCD Subsection 19.2.6.1 with the following.

This section is prepared using site-specific PRA information to consider potential design improvements as required under 10 CFR 50.34(f) and follows content guidance provided in NRC Regulatory Guide 1.206. Information for this section is from Subsections 7.2 and 7.3 of the Environmental Report, Part 3 of the Combined License (COL) Application.

19.2.6.1.1 Background

STD COL 19.3(4) Add the following text after the last paragraphs in DCD Subsection 19.2.6.1.1.

Design or procedural modifications that could mitigate the consequences of severe accidents are known as severe accident mitigation alternatives (SAMAs). For design certification, SAMAs are known as severe accident mitigation design alternatives (SAMDAs), which focus on design changes and do not consider procedural modifications for SAMAs. For an existing plant with a well-defined design and established procedural controls, the

normal evaluation process for identifying potential SAMAs includes four steps:

1. Define the base case - The base case is the dose-risk and cost-risk of severe accidents before implementation of any SAMAs. A plant's PRA is the primary source of data in calculating the base case. The base case risks are converted to a monetary value to use for screening SAMAs.

2. Identify and screen potential SAMAs - Potential SAMAs can be identified from the plant's individual plant examination (IPE), the plant's PRA, and the results of other plants' SAMA analyses. This list of potential SAMAs is assigned a conservatively low implementation cost based on historical costs, similar design changes, and/or engineering judgment, then compared to the base case screening value. SAMAs with higher implementation cost than the base case are not evaluated further.

3. Determine the cost and net value of each SAMA - A detailed engineering cost evaluation is developed using current plant engineering processes for each SAMA remaining after step 2. If the SAMA continues to pass the screening value, step 4 is performed.

4. Determine the benefit associated with each screened SAMA - Each SAMA that passes the screening in step 3 is evaluated using the PRA model to determine the reduction in risk associated with implementation of the proposed SAMA. The reduction in risk benefit is then monetized and compared to the detailed cost estimate. Those SAMAs with reasonable cost-benefit ratios are considered for implementation.

In the absence of a completed plant with established procedural controls, the current analysis is limited to demonstrating that a US-APWR located at the site is bounded by the DCD analysis, and determining what magnitude of plant-specific design or procedural modifications would be cost-effective. Determining the magnitude of cost effective design or procedural modifications is the same as step 1, "Define base case," for operating nuclear plants. The base case benefit value is calculated by assuming that the current dose risk of the unit could be reduced to zero, then assigning a defined dollar value for this change in risk. Any design

or procedural change cost that exceeds the benefit value would not be considered cost-effective.

The dose-risk and cost-risk results (Section 7.2 of the Environmental Report) are monetized in accordance with methods established in NUREG/BR-0184. NUREG/BR-0184 presents methods for determination of the value of decreases in risk by using four types of attributes: public health, occupational health, off-site property, and on-site property. Any SAMAs in which the conservatively low implementation cost exceeds the base case monetization would not be expected to pass the screening in step 2. If the baseline analysis produces a value that is below that expected for implementation of any reasonable SAMA, no matter how inexpensive, then the remaining steps of the SAMA analysis are not necessary.

(Note: Hereafter where the word “SAMDA” appears in the DCD, it is replaced with “SAMA” in the Final Safety Analysis Report (FSAR) without any further notification.)

19.2.6.2 Estimate of Risk for Design

STD COL 19.3(4)

Replace the last sentence of the first paragraph in DCD Subsection 19.2.6.2 with the following.

The second analysis is a Level 3 PRA analysis that integrates the Level 2 source term to quantify the consequences based on the site-specific parameters.

NAPS COL 19.3(4)

Replace after the second sentence of the third paragraph in DCD Subsection 19.2.6.2 with the following.

In the offsite dose risk quantification, three years of site-specific meteorological data are used. The 50-mile population distribution data are based on the projected population for calendar year 2030.

The total population dose risk for internal events is 5.4E-01 person-rem/RY, and the largest contributor is from RC3 - containment failure before core damage - overpressure failure before core damage due to loss of heat removal (42%).

19.2.6.4 Risk Reduction Potential of Design Improvements

NAPS COL 19.3(4)

Replace the last sentence in DCD Subsection 19.2.6.4 with the following.

The maximum averted cost for internal events, internal fires, internal floods and LPSD is $490k.

19.2.6.5 Cost Impacts of Candidate Design Improvements

STD COL 19.3(4)

Replace the first sentence in the last paragraph in DCD Subsection 19.2.6.5 with the following.

SAMA cost evaluation results are described in Table 19.2-9R.

19.2.6.6 Cost-Benefit Comparison

NAPS COL 19.3(4)

Replace the content of DCD Subsection 19.2.6.6 with the following.

The maximum averted cost-risk with a 7% discount rate is less than $490k for a single US-APWR unit at Unit 3. This is so low that there are no design changes over those already incorporated into the US-APWR design that could be determined to be cost-effective. Even with a conservative 3 percent discount rate, the valuation of the averted risk is approximately $751k.

Accordingly, further evaluation of design-related SAMAs is not warranted. Evaluation of administrative SAMAs would not be appropriate until the plant design is finalized, and plant administrative processes and procedures are developed. At that time, appropriate administrative controls on plant operations would be incorporated into the plant's management systems as part of its baseline.

19.2.7 References

Add the following reference document after the last document in DCD Subsection 19.2.7.

19.2.201 Severe Accident Issue Closure Guidelines, NEI 91-04 Rev. 1, Nuclear Energy Institute, December 1994

NAPS COL 19.3(4)

Table 19.2-9R SAMA Cost Evaluation Results

	Design Alternative	Cost Impact	Maximum Averted Cost	Sensitivity of Each SAMA Benefit	
				7% Discount Rate (baseline)	3% Discount Rate
1	Provide additional dc battery capacity.	$2,000k	$490k	$196k	$300k
2	Provide an additional gas turbine generator.	$10,000k	$490k	$196k	$300k
3	Install an additional, buried off-site power source.	$10,000k	$490k	$201k	$308k
4	Provide an additional high-pressure injection pump with independent diesel.	$1,000k	$490k	$255k	$391k
5	Add a service water pump.	$5,900k	$490k	$123k	$188k
6	Install an independent reactor coolant pump seal injection system with dedicated diesel.	$3,800k	$490k	$230k	$353k
7	Install an additional component cooling water pump.	$1,500	$490k	$123k	$188k
8	Add a motor-driven feed-water pump.	$2,000k	$490k	$172k	$263k
9	Install a filtered containment vent to remove decay heat.	$3,000k	$490k	$294k	$450k
10	Install a redundant containment spray system.	$870k	$490k	$23k	$35k

19.3 Open, Confirmatory, and COL Action Items Identified as Unresolved

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19.3.3 Resolution of COL Action Items

Replace the content of DCD Subsection 19.3.3 with the following.

NAPS COL 19.3(1)

19.3(1) ***Update of PRA and SA evaluation for input to RMTS and peer review***

This COL item is addressed in Subsection 19.1.7.6.

19.3(2) ***Deleted from the DCD.***

19.3(3) ***Deleted from the DCD.***

STD COL 19.3(4)
NAPS COL 19.3(4)

19.3(4) ***Update of PRA and SA evaluation based on site-specific information***

This COL item is addressed in Subsections 19.1.1.2.1, 19.1.4.1.2, 19.1.4.2.2, 19.1.5, 19.1.5.1.2, 19.1.5.3.2, 19.1.6.2, 19.1.7.1, 19.2.6.1, 19.2.6.1.1, 19.2.6.2, 19.2.6.4, 19.2.6.5 and 19.2.6.6, Tables 19.1-201, 19.1-202, 19.1-203, 19.1-204, 19.1-205, 19.1-206, 19.2-9R, 19A.2, 19A.4.2, 19A.4.3, and Figures 19.1-201 & 19.1-2R.

19.3(5) ***Deleted from the DCD.***

NAPS COL 19.3(6)

19.3(6) ***Accident management program***

This COL item is addressed in Subsection 19.2.5 and Table 19.1-119R.

Appendix 19A US-APWR Beyond Design Basis Aircraft Impact Assessment

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

19A.2 Scope of the Assessment

Security-Related Information Withheld Under 10 CFR 2.390

19A.4.2 Plant Arrangements

NAPS COL 19.3(4)

Replace the first paragraph in DCD Subsection 19A.4.2 with the following.

The plant design and arrangement of major structures described in DCD Section 1.2.1.7, DCD Figure 1.2-7, DCD Figures 1.2-14 through 1.2-28, DCD Figures 1.2-34 through 1.2-38, Section 1.2.1.7, Figures 1.2-1R through 1.2-6R, Figures 1.2-8R through 1.2-13R, Figures 1.2-29R through 1.2-33R and Figures 1.2-39R through 1.2-48R are key design features. Specifically, the assessment credited the arrangement of, and design of, the following building features to limit the location and effects of potential aircraft strikes on the R/B, PS/B and PSFSV in the following locations:

Replace paragraph number "4" in DCD Subsection 19A.4.2 with the following.

4. The physical separation of the east and west PS/Bs, as described in DCD Section 3.7.2.8.6, 3.8.4.4.2, DCD Figure 3J-3 and DCD Figure 3J-4, and the physical separation of the east and west PSFSVs, as described in Section 3.8.4.1.3.3, Figure 3.8-201, Figure 3.8-204 and Figures 3.8-212 through 3.8-214 are key design features in limiting the loss of electrical power to key safety systems from the impact of a large commercial aircraft.

19A.4.3 Fire Barriers and Fire Protection Features

NAPS COL 19.3(4)

Replace the first paragraph in DCD Subsection 19A.4.3 with the following.

The design and location of 3-hour fire barriers, including fire doors and watertight fire doors that separate the safety divisions within the R/B, east and west PS/Bs and east and west PSFSVs, are key design features for the protection of safety equipment within these buildings from the impact of a large commercial aircraft. The assessment credited the design and location of fire barriers (including doors) as depicted on DCD Figures 9A-1 through 9A-12 and Figure 9A-27R to limit the effects of a internal fires created by the impact of a large commercial aircraft. In addition, certain fire barriers, including doors and penetration seals, are credited for 5 psid. These 5 psid fire barriers are identified on DCD Figures 9A-1 through 9A-12.