

VEGP 3&4 Tier 1 Revision 3

Updated Through 04-17-2015



Tier 1 List of Effective Sections

| Section | R0 | R1 | R2 | R3 |
|---------|----|----|----|----|
| 1.1 | 0 | 0 | 0 | 0 |
| 1.2 | 0 | 0 | 0 | 0 |
| 1.3 | 0 | 0 | 0 | 0 |
| 1.4 | 0 | 0 | 0 | 0 |
| 2.1 | 0 | 0 | 0 | 1 |
| 2.2 | 0 | 0 | 1 | 2 |
| 2.3 | 0 | 0 | 1 | 2 |
| 2.4 | 0 | 0 | 0 | 0 |
| 2.5 | 0 | 0 | 0 | 1 |
| 2.6 | 0 | 0 | 1 | 2 |
| 2.7 | 0 | 0 | 0 | 1 |
| 3.1 | 0 | 0 | 0 | 0 |
| 3.2 | 0 | 0 | 0 | 1 |
| 3.3 | 0 | 1 | 2 | 3 |
| 3.4 | 0 | 0 | 0 | 0 |
| 3.5 | 0 | 0 | 0 | 1 |
| 3.6 | 0 | 0 | 0 | 0 |
| 3.7 | 0 | 0 | 0 | 1 |
| 4.0 | 0 | 0 | 0 | 0 |
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1.0 Introduction

1.1 Definitions

The following definitions apply to terms used in the design descriptions and associated inspections, tests, analyses, and acceptance criteria (ITAAC).

Acceptance Criteria means the performance, physical condition, or analysis result for a structure, system, or component that demonstrates that the design commitment is met.

Analysis means a calculation, mathematical computation, or engineering or technical evaluation. Engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems, or components.

As-built means the physical properties of a structure, system, or component following the completion of its installation or construction activities at its final location at the plant site. In cases where it is technically justifiable, determination of physical properties of the as-built structure, system, or component may be based on measurements, inspections, or tests that occur prior to installation, provided that subsequent fabrication, handling, installation, and testing does not alter the properties.

Column Line is the designation applied to a plant reference grid used to define the location of building walls and columns. Column lines may not represent the center line of walls and columns.

Design Commitment means that portion of the design description that is verified by ITAAC.

Design Description means that portion of the design that is certified.

Design Plant Grade means the elevation of the soil around the nuclear island assumed in the design of the AP1000, i.e., floor elevation 100'-0".

Division (for electrical systems or electrical equipment) is the designation applied to a given safety-related system or set of components that is physically, electrically, and functionally independent from other redundant sets of components.

Floor Elevation is the designation applied to name a floor. The actual elevation may vary due to floor slope and layout requirements.

Functional Arrangement (for a system) means the physical arrangement of systems and components to provide the service for which the system is intended, and which is described in the system design description.

Inspect or **Inspection** means visual observations, physical examinations, or reviews of records based on visual observation or physical examination that compare the structure, system, or component condition to one or more design commitments. Examples include walkdowns, configuration checks, measurements of dimensions, or nondestructive examinations.

Inspect for Retrievability of a display means to visually observe that the specified information appears on a monitor when summoned by the operator.

L_a is the maximum allowable containment leakage as defined in 10 CFR 50 Appendix J.

Physical Arrangement (for a structure) means the arrangement of the building features (e.g., floors, ceilings, walls, and basemat) and of the structures, systems, and components within, which are described in the building design description.

Qualified for Harsh Environment means that equipment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function, for the time required to perform the safety function. These environmental conditions include applicable time-dependent temperature and pressure profiles, humidity, chemical effects, radiation, aging, submergence, and their synergistic effects which have a significant effect on the equipment performance. Equipment identified in the Design Description as being Qualified for Harsh Environment includes the:

- a. equipment itself
- b. sensors, switches and lubricants that are an integral part of the equipment
- c. electrical components connected to the equipment (wiring, cabling and terminations)

Items b and c are Qualified for Harsh Environment only when they are necessary to support operation of the equipment to meet its safety-related function listed in the Design Description table and to the extent such equipment is located in a harsh environment during or following a design basis accident.

Sensor means a transmitter, resistance temperature detector, thermocouple or other transducer, plus associated cables, connectors, preamplifiers, reference junction boxes, or other signal processing equipment that is located in the immediate proximity of the sensor and subject to the same environmental conditions.

Site Grade means the as-built elevation of the soil to the west side of the nuclear island. Adjacent buildings are located on the other sides of the nuclear island.

Tag Number in the ITAACs represents the complete tag number or a portion of the tag number used to identify the actual hardware (or associated software). For instrumentation, the tag number identified in the ITAACs does not include the type of instrument (for example, the Containment Exhaust Fan A Flow Sensor, VFS-11A, does not include the designators FE [flow element] or FT [flow transmitter], which would appear on the actual hardware or in the associated software). This is because the designator VFS-11A and the equipment description are sufficient to uniquely identify the channel associated with the designated instrument function, and this method of identification eliminates the need to list every portion of the instrumentation channel required to perform the function. In most cases, the channel number includes physical hardware. There are, however, a few places where the channel number represents only a calculation in software. In those cases, the channel data can be displayed. In many instances, the word “sensor” is used in the equipment description to identify that the item is an instrument.

Test means the actuation, operation, or establishment of specified conditions to evaluate the performance or integrity of as-built structures, systems, or components, unless explicitly stated otherwise.

Transfer Open (Closed) means to move from a closed (open) position to an open (closed) position.

Type Test means a test on one or more sample components of the same type and manufacturer to qualify other components of the same type and manufacturer. A type test is not necessarily a test of the as-built structures, systems, or components.

UA of a heat exchanger means the product of the heat transfer coefficient and the surface area.

1.2 General Provisions

The following general provisions are applicable to the design descriptions and associated ITAAC.

Treatment of Individual Items

The absence of any discussion or depiction of an item in the design description or accompanying figures shall not be construed as prohibiting a licensee from utilizing such an item, unless it would prevent an item from performing its safety functions as discussed or depicted in the design description or accompanying figures.

If an inspections, tests, or analyses (ITA) requirement does not specify the temperature or other conditions under which a test must be run, then the test conditions are not constrained.

When the term "operate," "operates," or "operation" is used with respect to an item discussed in the acceptance criteria, it refers to the actuation and running of the item. When the term "exist," "exists," or "existence" is used with respect to an item discussed in the acceptance criteria, it means that the item is present and meets the design commitment.

Implementation of ITAAC

The ITAACs are provided in tables with the following three-column format:

| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
|------------------------------|---|--------------------------------|
|------------------------------|---|--------------------------------|

Each design commitment in the left-hand column of the ITAAC tables has an associated ITA requirement specified in the middle column of the tables.

The identification of a separate ITA entry for each design commitment shall not be construed to require that separate inspections, tests, or analyses must be performed for each design commitment. Instead, the activities associated with more than one ITA entry may be combined, and a single inspection, test, or analysis may be sufficient to implement more than one ITA entry.

An ITA may be performed by the licensee of the plant or by its authorized vendors, contractors, or consultants. Furthermore, an ITA may be performed by more than a single individual or group, may be implemented through discrete activities separated by time, and may be performed at any time prior to fuel load (including before issuance of the combined license for those ITAACs that do not necessarily pertain to as-installed equipment). Additionally, an ITA may be performed as part of the activities that are required to be performed under 10 CFR Part 50 (including, for example, the quality assurance (QA) program required under Appendix B to Part 50); therefore, an ITA need not be performed as a separate or discrete activity.

Many of the acceptance criteria include the words "A report exists and concludes that..." When these words are used, it indicates that the ITAAC for that design commitment will be met when it is confirmed that appropriate documentation exists and the documentation shows that the design commitment is met. Appropriate documentation can be a single document or a collection of documents that show that the stated acceptance criteria are met. Examples of appropriate documentation include design reports, test reports,

inspection reports, analysis reports, evaluation reports, design and manufacturing procedures, certified data sheets, commercial dedication procedures and records, quality assurance records, calculation notes, and equipment qualification data packages. For plants at sites which are qualified using the hard rock high frequency (HRHF) ground motion response spectra (GMRS), high frequency seismic screening and qualification testing required as a result of the evaluation of potential high frequency sensitive components is included in the equipment qualification data packages.

Many entries in the ITA column of the ITAAC tables include the words “Inspection will be performed for the existence of a report verifying...” When these words are used it indicates that the ITA is tests, type tests, analyses, or a combination of tests, type tests, and analyses and a report will be produced documenting the results. This report will be available to inspectors.

Many ITAAC are only a reference to another Tier 1 location, either a section, subsection, or ITAAC table entry (for example, “See Tier 1 Material...”). A reference to another ITAAC location is always in both the ITA and acceptance criteria columns for a design commitment. This reference is an indication that the ITA and acceptance criteria for that design commitment are satisfied when the referenced ITA are completed and the acceptance criteria for the referenced Tier 1 sections, subsections, or table entries are satisfied. If a complete Tier 1 section is referenced, this indicates that all the ITA and acceptance criteria in that section must be met before the referencing design commitment is satisfied.

Discussion of Matters Related to Operations

In some cases, the design descriptions in this document refer to matters that relate to operation, such as normal valve or breaker alignment during normal operation modes. Such discussions are provided solely to place the design description provisions in context (for example, to explain automatic features for opening or closing valves or breakers upon off-normal conditions). Such discussions shall not be construed as requiring operators during operation to take any particular action (for example, to maintain valves or breakers in a particular position during normal operation).

Interpretation of Figures

In many but not all cases, the design descriptions in Section 2 include one or more figures. The figures may represent a functional diagram, general structural representation, or another general illustration. For instrumentation and control (I&C) systems, figures may also represent aspects of the relevant logic of the system or part of the system. Unless specified explicitly, the figures are not indicative of the scale, location, dimensions, shape, or spatial relationships of as-built structures, systems, and components. In particular, the as-built attributes of structures, systems, and components may vary from the attributes depicted on the figures, provided that those safety functions discussed in the design description pertaining to the figure are not adversely affected.

Maximum Reactor Core Thermal Power

The initial rated reactor core thermal power for the AP1000 certified design is 3400 megawatts thermal (MWt).

1.3 Figure Legend

The conventions used in this section are for figures described in the design description. The figure legend is provided for information and is not part of the Tier 1 Material.

VALVES

Valve



Check Valve



Relief Valve



VALVE OPERATORS

Operator Of Unspecified Type



Motor Operator



Solenoid Operator



Pneumatic/Hydraulic Operator



Pneumatic Operator



Squib Valve



MECHANICAL EQUIPMENT

Centrifugal Pump



Pump Type Not Specified



Tank



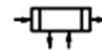
Centrifugal Fan



Axial Fan



Heat Exchanger



Vent



Drain



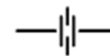
Pipe Cap



Blind Flange



Orifice



DAMPERS

Gravity Or Manually Operated Damper



Remotely Operated Damper

ELECTRICAL EQUIPMENT

Battery



Circuit Breaker



Disconnect Switch



Isolation



Transformer



Fuse



Heater

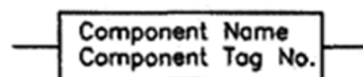


Generator

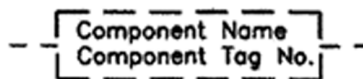


MISCELLANEOUS

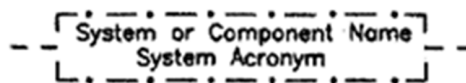
A component that is part of the system functional arrangement shown on the figure and is included in the design commitments for the system.



A component that is part of the system functional arrangement shown on the figure.



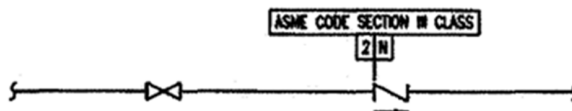
A system or component of another system that is not part of the system functional arrangement shown on the figure.



A functional connection to another system that is not part of the system functional arrangement shown on the figure.

**ASME CODE CLASS BREAK**

An ASME Code class break is identified by a single line to the designated location for the class break, as shown in the example below (see note 1).

**NOTES:**

1. The header, "ASME Code Section III Class," must appear at least once on each figure on which ASME class breaks are shown, but need not appear at every class break shown on a figure.

N Indicates Non-ASME Code Section III

1.4 List of Acronyms and Abbreviations

The acronyms presented in this section are used in the Tier 1 Material. The acronyms are provided for information and are not part of the Tier 1 Material.

| | |
|-------|---|
| ac | Alternating Current |
| AC | Acceptance Criteria |
| ACC | Accumulator |
| ADS | Automatic Depressurization System |
| AHU | Air Handling Units |
| ASME | American Society of Mechanical Engineers |
| BTU | British Thermal Unit |
| CAS | Compressed Air System |
| CAV | Cumulative Absolute Velocity |
| CCS | Component Cooling Water System |
| CDM | Certified Design Material |
| CDS | Condensate System |
| CFR | Code of Federal Regulations |
| CIV | Containment Isolation Valve |
| CL | Cold Leg |
| CMT | Core Makeup Tank |
| CNS | Containment System |
| COL | Combined Operating License/Combined License |
| CRDM | Control Rod Drive Mechanism |
| CSA | Control Support Area |
| CST | Condensate Storage Tank |
| CVS | Chemical and Volume Control System |
| DAC | Design Acceptance Criteria |
| DAS | Diverse Actuation System |
| DBA | Design Basis Accident |
| dc | Direct Current |
| DC | Design Commitment |
| DDS | Data Display and Processing System |
| DOS | Standby Diesel Fuel Oil System |
| DPU | Distributed Processing Unit |
| D-RAP | Design Reliability Assurance Program |
| DTS | Demineralized Water Treatment System |

List of Acronyms and Abbreviations (cont.)

| | |
|-------|---|
| DVI | Direct Vessel Injection |
| DWS | Demineralized Water Transfer and Storage System |
| ECS | Main ac Power System |
| EDS | Non-Class 1E dc and Uninterruptible Power Supply System |
| EFS | Communication System |
| EGS | Grounding and Lightning Protection System |
| ELS | Plant Lighting System |
| EMI | Electromagnetic Interference |
| ERF | Emergency Response Facility |
| ESD | Electrostatic Discharge |
| ESF | Emergency Safety Features |
| ESFAS | Engineering Safety Feature Actuation System |
| F | Fahrenheit |
| FHM | Fuel Handling Machine |
| FHS | Fuel Handling and Refueling System |
| FID | Fixed Incore Detector |
| FPS | Fire Protection System |
| ft | Feet |
| FTS | Fuel Transfer System |
| FWS | Main and Startup Feedwater System |
| gpm | Gallons per Minute |
| HEPA | High Efficiency Particulate Air |
| HFE | Human Factors Engineering |
| HL | Hot Leg |
| hr | Hour |
| HSI | Human-System Interface |
| HVAC | Heating, Ventilation, and Air Conditioning |
| HX | Heat Exchanger |
| Hz | Hertz |
| I&C | Instrumentation and Control |
| IDS | Class 1E dc and Uninterruptible Power Supply System |
| IIS | In-core Instrumentation System |
| ILRT | Integrated Leak Rate Test |
| IHP | Integrated Head Package |
| in | Inches |

List of Acronyms and Abbreviations (cont.)

| | |
|---------|--|
| I/O | Input/Output |
| I&C | Instrumentation and Control |
| IRC | Inside Reactor Containment |
| IRWST | In-containment Refueling Water Storage Tank |
| ISI | Inservice Inspection |
| IST | Inservice Testing |
| ITA | Inspections, Tests, Analyses |
| ITAAC | Inspections, Tests, Analyses, and Acceptance Criteria |
| LBB | Leak Before Break |
| LTOP | Low Temperature Overpressure Protection |
| MBtu | Million British Thermal Units |
| MCC | Motor Control Center |
| MCR | Main Control Room |
| MHS | Mechanical Handling System |
| MMIS | Man-machine Interface System |
| MOV | Motor-operated Valve |
| MSIV | Main Steam Isolation Valve |
| MSLB | Main Steam Line Break |
| MSS | Main Steam System |
| MTS | Main Turbine System |
| MW | Megawatt |
| MWe | Megawatt Electric |
| MWt | Megawatt Thermal |
| N/A | Not Applicable |
| NDE | Nondestructive Examination |
| NI | Nuclear Island |
| NSSS | Nuclear Steam Supply System |
| OCS | Operation and Control Centers System |
| ORC | Outside Reactor Containment |
| ORE | Occupational Radiation Exposure |
| OSA | Operational Sequence Analyses |
| OSC | Operations Support Center |
| PAR | Passive Autocatalytic Recombiner |
| PCCAWST | Passive Containment Cooling Ancillary Water Storage Tank |

List of Acronyms and Abbreviations (cont.)

| | |
|--------|--|
| PCCWST | Passive Containment Cooling Water Storage Tank |
| PCS | Passive Containment Cooling System |
| P&ID | Piping and Instrument Diagram |
| PGS | Plant Gas System |
| pH | Potential of Hydrogen |
| PLS | Plant Control System |
| PMS | Protection and Safety Monitoring System |
| PORV | Power-operated Relief Valve |
| PRA | Probabilistic Risk Assessment |
| PRHR | Passive Residual Heat Removal |
| psia | Pounds per Square Inch Absolute |
| PSS | Primary Sampling System |
| PXS | Passive Core Cooling System |
| PWR | Pressurized Water Reactor |
| RAP | Reliability Assurance Program |
| RAT | Reserve Auxiliary Transformer |
| RCDT | Reactor Coolant Drain Tank |
| RCP | Reactor Coolant Pump |
| RCPB | Reactor Coolant Pressure Boundary |
| RCS | Reactor Coolant System |
| RFI | Radio Frequency Interference |
| RM | Refueling Machine |
| RMS | Radiation Monitoring System |
| RNS | Normal Residual Heat Removal System |
| RPV | Reactor Pressure Vessel |
| RSR | Remote Shutdown Room |
| RSW | Remote Shutdown Workstation |
| RTD | Resistance Temperature Detector |
| RXS | Reactor System |
| RV | Reactor Vessel |
| scf | Standard Cubic Feet |
| scfm | Standard Cubic Feet per Minute |
| SFP | Spent Fuel Pool |
| SFS | Spent Fuel Pool Cooling System |
| SG | Steam Generator |

List of Acronyms and Abbreviations (cont.)

| | |
|------|--|
| SGS | Steam Generator System |
| SJS | Seismic Monitoring System |
| SMS | Special Monitoring System |
| SSAR | Standard Safety Analysis Report |
| SSCs | Structures, Systems, and Components |
| SSE | Safe Shutdown Earthquake |
| SWC | Surge Withstand Capability |
| SWS | Service Water System |
| TID | Total Integrated Dose |
| TSC | Technical Support Center |
| UAT | Unit Auxiliary Transformer |
| UBC | Uniform Building Code |
| UPS | Uninterruptible Power Supply |
| V | Volt |
| VAS | Radiologically Controlled Area Ventilation System |
| VBS | Nuclear Island Nonradioactive Ventilation System |
| VCS | Containment Recirculation Cooling System |
| VES | Main Control Room Emergency Habitability System |
| VFS | Containment Air Filtration System |
| VHS | Health Physics and Hot Machine Shop Areas |
| VLS | Containment Hydrogen Control System |
| VWS | Central Chilled Water System |
| VXS | Annex/Auxiliary Building Nonradioactive Ventilation System |
| VZS | Diesel Generator Building Ventilation System |
| WGS | Gaseous Radwaste System |
| WLS | Liquid Radwaste System |
| WSS | Solid Radwaste System |
| ZOS | Onsite Standby Power System |

2.1 Reactor**2.1.1 Fuel Handling and Refueling System****Design Description**

The fuel handling and refueling system (FHS) transfers fuel assemblies and core components during fueling operations and stores new and spent fuel assemblies in the new and spent fuel storage racks. The refueling machine (RM) and the fuel transfer tube are operated during refueling mode. The fuel handling machine (FHM) is operated during normal modes of plant operation, including startup, power operation, cooldown, shutdown and refueling.

The component locations of the FHS are as shown in Table 2.1.1-2.

1. The functional arrangement of the FHS is as described in the Design Description of this Section 2.1.1.
2. The FHS has the RM, the FHM, and the new and spent fuel storage racks.
3. The FHS preserves containment integrity by isolation of the fuel transfer tube penetrating containment.
4. The RM and FHM/spent fuel handling tool (SFHT) gripper assemblies are designed to prevent opening while the weight of the fuel assembly is suspended from the grippers.
5. The lift height of the RM mast and FHM hoist(s) is limited such that the minimum required depth of water shielding is maintained.
6. The RM and FHM are designed to maintain their load carrying and structural integrity functions during a safe shutdown earthquake.
7. The new and spent fuel storage racks maintain the effective neutron multiplication factor required by 10 CFR 50.68 limits during normal operation, design basis seismic events, and design basis dropped spent fuel assembly accidents over the spent fuel storage racks.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.1-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the FHS.

| Table 2.1.1-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the FHS is as described in the Design Description of this Section 2.1.1. | Inspection of the as-built system will be performed. | The as-built FHS conforms with the functional arrangement as described in the Design Description of this Section 2.1.1. |
| 2. The FHS has the refueling machine (RM), the fuel handling machine (FHM), and the new and spent fuel storage racks. | Inspection of the system will be performed. | The FHS has the RM, the FHM, and the new and spent fuel storage racks. |
| 3. The FHS preserves containment integrity by isolation of the fuel transfer tube penetrating containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 4. The RM and FHM/spent fuel handling tool (SFHT) gripper assemblies are designed to prevent opening while the weight of the fuel assembly is suspended from the grippers. | The RM and FHM/SFHT gripper assemblies will be tested by operating the open controls of the gripper while suspending a dummy fuel assembly. | The RM and FHM/SFHT gripper assemblies will not open while suspending a dummy test assembly. |
| 5. The lift height of the RM mast and FHM hoist(s) is limited such that the minimum required depth of water shielding is maintained. | The RM and FHM will be tested by attempting to raise a dummy fuel assembly. | The bottom of the dummy fuel assembly cannot be raised to within 24 ft, 6 in. of the operating deck floor. |
| 6. The RM and FHM are designed to maintain their load carrying and structural integrity functions during a safe shutdown earthquake. | i) Inspection will be performed to verify that the RM and FHM are located on the nuclear island. ii) Type test, analysis, or a combination of type tests and analyses of the RM and FHM will be performed. | i) The RM and FHM are located on the nuclear island. ii) A report exists and concludes that the RM and FHM can withstand seismic design basis dynamic loads without loss of load carrying or structural integrity functions. |

| Table 2.1.1-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>7. The new and spent fuel storage racks maintain the effective neutron multiplication factor required by 10 CFR 50.68 limits during normal operation, design basis seismic events, and design basis dropped spent fuel assembly accidents over the spent fuel storage racks.</p> | <p>i) Analyses will be performed to calculate the effective neutron multiplication factor in the new and spent fuel storage racks during normal conditions.</p> <p>ii) Inspection will be performed to verify that the new and spent fuel storage racks are located on the nuclear island.</p> <p>iii) Seismic analysis of the new and spent fuel storage racks will be performed.</p> <p>iv) Analysis of the spent fuel storage racks under design basis dropped spent fuel assembly loads will be performed.</p> | <p>i) The calculated effective neutron multiplication factor for the new and spent fuel storage racks meets the requirements of 10 CFR 50.68⁽¹⁾ limits under normal conditions.</p> <p>ii) The new and spent fuel storage racks are located on the nuclear island.</p> <p>iii) A report exists and concludes that the new and spent fuel racks can withstand seismic design basis dynamic loads and maintain the calculated effective neutron multiplication factor required by 10 CFR 50.68⁽¹⁾ limits.</p> <p>iv) A report exists and concludes that the spent fuel racks can withstand design basis dropped spent fuel assembly loads and maintain the calculated effective neutron multiplication factor required by 10 CFR 50.68⁽¹⁾ limits.</p> |
| <p>Note:</p> <p>1. The requirements of 10 CFR 50.68 are summarized as follows:</p> <ul style="list-style-type: none"> • For new fuel storage racks: <ul style="list-style-type: none"> - The effective neutron multiplication factor (K-effective) must not exceed 0.95 when flooded with unborated water and - K-effective must not exceed 0.98 with optimum moderator conditions. • For spent fuel storage racks: <ul style="list-style-type: none"> - If methodology does not take credit for soluble boron: <ul style="list-style-type: none"> • K-effective must not exceed 0.95 when flooded with unborated water. - Or if methodology takes credit for soluble boron: <ul style="list-style-type: none"> • K-effective must not exceed 0.95 when flooded with borated water and • K-effective must remain below 1.0 when flooded with unborated water. | | |

| Table 2.1.1-2 | | |
|--------------------------|-----------|--------------------------------|
| Component Name | Tag No. | Component Location |
| Refueling Machine | FHS-FH-01 | Containment |
| Fuel Handling Machine | FHS-FH-02 | Auxiliary Building |
| Spent Fuel Storage Racks | FHS-FS-02 | Auxiliary Building |
| New Fuel Storage Racks | FHS-FS-01 | Auxiliary Building |
| Fuel Transfer Tube | FHS-FT-01 | Auxiliary Building/Containment |

2.1.2 Reactor Coolant System**Design Description**

The reactor coolant system (RCS) removes heat from the reactor core and transfers it to the secondary side of the steam generators for power generation. The RCS contains two vertical U-tube steam generators, four sealless reactor coolant pumps (RCPs), and one pressurizer.

The RCS is as shown in Figure 2.1.2-1 and the component locations of the RCS are as shown in Table 2.1.2-5.

1. The functional arrangement of the RCS is as described in the Design Description of this Section 2.1.2.
2.
 - a) The components identified in Table 2.1.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.1.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.1.2-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.1.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.1.2-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.1.2-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.1.2-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
6. Each of the as-built lines identified in Table 2.1.2-2 as designed for leak before break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.
7.
 - a) The Class 1E equipment identified in Table 2.1.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

- b) The Class 1E components identified in Table 2.1.2-1 are powered from their respective Class 1E division.
 - c) Separation is provided between RCS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
8. The RCS provides the following safety-related functions:
- a) The pressurizer safety valves provide overpressure protection in accordance with Section III of the ASME Boiler and Pressure Vessel Code.
 - b) The reactor coolant pumps (RCPs) have a rotating inertia to provide RCS flow coastdown on loss of power to the pumps.
 - c) Each RCP flywheel assembly can withstand a design overspeed condition.
 - d) The RCS provides automatic depressurization during design basis events.
 - e) The RCS provides emergency letdown during design basis events.
9. The RCS provides the following nonsafety-related functions:
- a) The RCS provides circulation of coolant to remove heat from the core.
 - b) The RCS provides the means to control system pressure.
 - c) The pressurizer heaters trip after a signal is generated by the PMS.
10. Safety-related displays identified in Table 2.1.2-1 can be retrieved in the main control room (MCR).
11. a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.1.2-1 to perform active functions.
- b) The valves identified in Table 2.1.2-1 as having protection and safety monitoring system (PMS) control perform an active safety function after receiving a signal from the PMS.
 - c) The valves identified in Table 2.1.2-1 as having diverse actuation system (DAS) control perform an active safety function after receiving a signal from DAS.
12. a) The valves identified in Table 2.1.2-1 perform an active safety-related function to change position as indicated in the table.
- b) After loss of motive power, the remotely operated valves identified in Table 2.1.2-1 assume the indicated loss of motive power position.

- 13. a) Controls exist in the MCR to trip the RCPs.
 - b) The RCPs trip after receiving a signal from the PMS.
 - c) The RCPs trip after receiving a signal from the DAS.
- 14. Controls exist in the MCR to cause the components identified in Table 2.1.2-3 to perform the listed function.
- 15. Displays of the parameters identified in Table 2.1.2-3 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.2-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the RCS.

| Table 2.1.2-1 | | | | | | | | | |
|---|------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|----------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Steam Generator 1 | RCS-MB-01 | Yes | Yes | - | -/- | - | - | - | - |
| Steam Generator 2 | RCS-MB-02 | Yes | Yes | - | -/- | - | - | - | - |
| RCP 1A | RCS-MP-01A | Yes | Yes | - | No/No | No | Yes/Yes (pump trip) | No | - |
| RCP 1B | RCS-MP-01B | Yes | Yes | - | No/No | No | Yes/Yes (pump trip) | No | - |
| RCP 2A | RCS-MP-02A | Yes | Yes | - | No/No | No | Yes/Yes (pump trip) | No | - |
| RCP 2B | RCS-MP-02B | Yes | Yes | - | No/No | No | Yes/Yes (pump trip) | No | - |
| Pressurizer | RCS-MV-02 | Yes | Yes | - | No/No (heaters) | - | Yes/No (heater trip) | No | - |
| Automatic Depressurization System (ADS) Sparger A | PXS-MW-01A | Yes | Yes | - | -/- | - | -/- | - | - |
| ADS Sparger B | PXS-MW-01B | Yes | Yes | - | -/- | - | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Pressurizer Safety Valve | RCS-PL-V005A | Yes | Yes | No | -/- | No | -/- | Transfer Open/ Transfer Closed | - |
| Pressurizer Safety Valve | RCS-PL-V005B | Yes | Yes | No | -/- | No | -/- | Transfer Open/ Transfer Closed | - |
| First-stage ADS Motor-operated Valve (MOV) | RCS-PL-V001A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| First-stage ADS MOV | RCS-PL-V001B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Second-stage ADS MOV | RCS-PL-V002A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Second-stage ADS MOV | RCS-PL-V002B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Third-stage ADS MOV | RCS-PL-V003A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Third-stage ADS MOV | RCS-PL-V003B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Fourth-stage ADS Squib Valve | RCS-PL-V004A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Fourth-stage ADS Squib Valve | RCS-PL-V004B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Fourth-stage ADS Squib Valve | RCS-PL-V004C | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Fourth-stage ADS Squib Valve | RCS-PL-V004D | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| ADS Discharge Header A Vacuum Relief Valve | RCS-PL-V010A | Yes | Yes | No | Yes/Yes | No | No/No | Transfer Open | - |
| ADS Discharge Header B Vacuum Relief Valve | RCS-PL-V010B | Yes | Yes | No | Yes/Yes | No | No/No | Transfer Open | - |
| First-stage ADS Isolation MOV | RCS-PL-V011A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| First-stage ADS Isolation MOV | RCS-PL-V011B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Second-stage ADS Isolation MOV | RCS-PL-V012A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|--------------------------------|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Second-stage ADS Isolation MOV | RCS-PL-V012B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Third-stage ADS Isolation MOV | RCS-PL-V013A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Third-stage ADS Isolation MOV | RCS-PL-V013B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| Fourth-stage ADS MOV | RCS-PL-V014A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | None | As Is |
| Fourth-stage ADS MOV | RCS-PL-V014B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | None | As Is |
| Fourth-stage ADS MOV | RCS-PL-V014C | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | None | As Is |
| Fourth-stage ADS MOV | RCS-PL-V014D | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | None | As Is |
| Reactor Vessel Head Vent Valve | RCS-PL-V150A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Open | Closed |
| Reactor Vessel Head Vent Valve | RCS-PL-V150B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Open | Closed |
| Reactor Vessel Head Vent Valve | RCS-PL-V150C | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Open | Closed |
| Reactor Vessel Head Vent Valve | RCS-PL-V150D | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Open | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| RCS Hot Leg 1 Flow Sensor | RCS-101A | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 1 Flow Sensor | RCS-101B | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 1 Flow Sensor | RCS-101C | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 1 Flow Sensor | RCS-101D | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 2 Flow Sensor | RCS-102A | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 2 Flow Sensor | RCS-102B | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 2 Flow Sensor | RCS-102C | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Hot Leg 2 Flow Sensor | RCS-102D | - | Yes | - | Yes/No | No | -/- | - | - |
| RCS Cold Leg 1A Narrow Range Temperature Sensor | RCS-121A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 1B Narrow Range Temperature Sensor | RCS-121B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 1B Narrow Range Temperature Sensor | RCS-121C | - | Yes | - | Yes/Yes | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| RCS Cold Leg 1A Narrow Range Temperature Sensor | RCS-121D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 2B Narrow Range Temperature Sensor | RCS-122A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 2A Narrow Range Temperature Sensor | RCS-122B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 2A Narrow Range Temperature Sensor | RCS-122C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 2B Narrow Range Temperature Sensor | RCS-122D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Cold Leg 1A Dual Range Temperature Sensor | RCS-125A | - | Yes | - | Yes/Yes | Yes (Wide Range) | -/- | - | - |
| RCS Cold Leg 2A Dual Range Temperature Sensor | RCS-125B | - | Yes | - | Yes/Yes | Yes (Wide Range) | -/- | - | - |
| RCS Cold Leg 1B Dual Range Temperature Sensor | RCS-125C | - | Yes | - | Yes/Yes | Yes (Wide Range) | -/- | - | - |
| RCS Cold Leg 2B Dual Range Temperature Sensor | RCS-125D | - | Yes | - | Yes/Yes | Yes (Wide Range) | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-131A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-131B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-131C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-131D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-132A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-132B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-132C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-132D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-133A | - | Yes | - | Yes/Yes | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-133B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Narrow Range Temperature Sensor | RCS-133C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 2 Narrow Range Temperature Sensor | RCS-133D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCS Hot Leg 1 Wide Range Temperature Sensor | RCS-135A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Hot Leg 2 Wide Range Temperature Sensor | RCS-135B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Wide Range Pressure Sensor | RCS-140A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Wide Range Pressure Sensor | RCS-140B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Wide Range Pressure Sensor | RCS-140C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Wide Range Pressure Sensor | RCS-140D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCS Hot Leg 1 Level Sensor | RCS-160A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| RCS Hot Leg 2 Level Sensor | RCS-160B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Passive Residual Heat Removal (PRHR) Return Line Temperature Sensor | RCS-161 | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Pressure Sensor | RCS-191A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Pressure Sensor | RCS-191B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Pressure Sensor | RCS-191C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Pressure Sensor | RCS-191D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Reference Leg Temperature Sensor | RCS-193A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Reference Leg Temperature Sensor | RCS-193B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Reference Leg Temperature Sensor | RCS-193C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|--|----------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Pressurizer Level Reference Leg Temperature Sensor | RCS-193D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Sensor | RCS-195A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Sensor | RCS-195B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Sensor | RCS-195C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Pressurizer Level Sensor | RCS-195D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RCP 1A Bearing Water Temperature Sensor | RCS-211A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1A Bearing Water Temperature Sensor | RCS-211B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1A Bearing Water Temperature Sensor | RCS-211C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1A Bearing Water Temperature Sensor | RCS-211D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1B Bearing Water Temperature Sensor | RCS-212A | - | Yes | - | Yes/Yes | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| RCP 1B Bearing Water Temperature Sensor | RCS-212B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1B Bearing Water Temperature Sensor | RCS-212C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1B Bearing Water Temperature Sensor | RCS-212D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2A Bearing Water Temperature Sensor | RCS-213A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2A Bearing Water Temperature Sensor | RCS-213B | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2A Bearing Water Temperature Sensor | RCS-213C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2A Bearing Water Temperature Sensor | RCS-213D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2B Bearing Water Temperature Sensor | RCS-214A | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2B Bearing Water Temperature Sensor | RCS-214B | - | Yes | - | Yes/Yes | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-1 (cont.) | | | | | | | | | |
|---|----------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| RCP 2B Bearing Water Temperature Sensor | RCS-214C | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2B Bearing Water Temperature Sensor | RCS-214D | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1A Pump Speed Sensor | RCS-281 | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 1B Pump Speed Sensor | RCS-282 | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2A Pump Speed Sensor | RCS-283 | - | Yes | - | Yes/Yes | No | -/- | - | - |
| RCP 2B Pump Speed Sensor | RCS-284 | - | Yes | - | Yes/Yes | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-2 | | | | |
|-------------------------------------|---|-----------------------|-------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| Hot Legs | RCS-L001A RCS-L001B | Yes | Yes | Yes |
| Cold Legs | RCS-L002A RCS-L002B RCS-L002C RCS-L002D | Yes | Yes | Yes |
| Pressurizer Surge Line | RCS-L003 | Yes | Yes | Yes |
| ADS Inlet Headers | RCS-L004A/B RCS-L006A/B RCS-L030A/B RCS-L020A/B | Yes | Yes | Yes |
| Safety Valve Inlet Piping | RCS-L005A RCS-L005B | Yes | Yes | Yes |
| Safety Valve Discharge Piping | RCS-L050A/B RCS-L051A/B | Yes | No | Yes |
| ADS First-stage Valve Inlet Piping | RCS-L010A/B RCS-L011A/B | Yes | No | Yes |
| ADS Second-stage Valve Inlet Piping | RCS-L021A/B RCS-L022A/B | Yes | Yes No | Yes |
| ADS Third-stage Valve Inlet Piping | RCS-L131 RCS-L031A/B RCS-L032A/B | Yes | Yes Yes No | Yes |
| ADS Outlet Piping | RCS-L012A/B RCS-L023A/B RCS-L033A/B RCS-L061A/B RCS-L063A/B RCS-L064A/B RCS-L200 RCS-L069A/B RCS-L240A/B PXS-L130A/B | Yes | No | Yes |
| ADS Fourth-stage Inlet Piping | RCS-L133A/B RCS-L135A/B RCS-L136A/B RCS-L137A/B | Yes | Yes | Yes |

| Table 2.1.2-2 (cont.) | | | | |
|--------------------------|--|--------------------------|----------------------|-----------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| Pressurizer Spray Piping | RCS-L106 RCS-L110A/B RCS-L212A/B RCS-L213 RCS-L215 | Yes | No | No |
| RNS Suction Piping | RCS-L139 RCS-L140 | Yes | Yes | No |
| CVS Purification Piping | RCS-L111 RCS-L112 | Yes | No | No |

| Table 2.1.2-3 | | | |
|---|--------------|---------|------------------|
| Equipment | Tag No. | Display | Control Function |
| RCP 1A Breaker (Status) | ECS-ES-31 | Yes | - |
| RCP 1A Breaker (Status) | ECS-ES-32 | Yes | - |
| RCP 1B Breaker (Status) | ECS-ES-41 | Yes | - |
| RCP 1B Breaker (Status) | ECS-ES-42 | Yes | - |
| RCP 2A Breaker (Status) | ECS-ES-51 | Yes | - |
| RCP 2A Breaker (Status) | ECS-ES-52 | Yes | - |
| RCP 2B Breaker (Status) | ECS-ES-61 | Yes | - |
| RCP 2B Breaker (Status) | ECS-ES-62 | Yes | - |
| Pressurizer Heaters | RCS-EH-03 | Yes | On/Off |
| Pressurizer Heaters | RCS-EH-04A | Yes | On/Off |
| Pressurizer Heaters | RCS-EH-04B | Yes | On/Off |
| Pressurizer Heaters | RCS-EH-04C | Yes | On/Off |
| Pressurizer Heaters | RCS-EH-04D | Yes | On/Off |
| Fourth-stage ADS Squib Valve (Position Indication) | RCS-PL-V004A | Yes | - |
| Fourth-stage ADS Squib Valve (Position Indication) | RCS-PL-V004B | Yes | - |
| Fourth-stage ADS Squib Valve (Position Indication) | RCS-PL-V004C | Yes | - |
| Fourth-stage ADS Squib Valve (Position Indication) | RCS-PL-V004D | Yes | - |
| Pressurizer Safety Valve (Position Indication) | RCS-PL-V005A | Yes | - |
| Pressurizer Safety Valve (Position Indication) | RCS-PL-V005B | Yes | - |
| Pressurizer Spray Valve (Position Indication) | RCS-PL-V110A | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-3 (cont.) | | | |
|---|--------------|---------|------------------|
| Equipment | Tag No. | Display | Control Function |
| Pressurizer Spray Valve (Position Indication) | RCS-PL-V110B | Yes | - |
| Reactor Vessel Head Vent Valve (Position Indication) | RCS-PL-V150A | Yes | - |
| Reactor Vessel Head Vent Valve (Position Indication) | RCS-PL-V150B | Yes | - |
| Reactor Vessel Head Vent Valve (Position Indication) | RCS-PL-V150C | Yes | - |
| Reactor Vessel Head Vent Valve (Position Indication) | RCS-PL-V150D | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.1.2-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the RCS is as described in the Design Description of this Section 2.1.2. | Inspection of the as-built system will be performed. | The as-built RCS conforms with the functional arrangement described in the Design Description of this Section 2.1.2. |
| 2.a) The components identified in Table 2.1.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.1.2-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.1.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME code Section III design reports exist for the as-built piping identified in Table 2.1.2-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.1.2-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.1.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.1.2-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.1.2-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.1.2-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.a) The seismic Category I equipment identified in Table 2.1.2-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.1.2-1 are located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.1.2-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 5.b) Each of the lines identified in Table 2.1.2-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.1.2-2 for which functional capability is required meets the requirements for functional capability. |
| 6. Each of the as-built lines identified in Table 2.1.2-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line. | Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from dynamic effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture. | An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built RCS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided. |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.a) The Class 1E equipment identified in Table 2.1.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.1.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.1.2-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |
| 7.b) The Class 1E components identified in Table 2.1.2-1 are powered from their respective Class 1E division. | Testing will be performed on the RCS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.1.2-1 when the assigned Class 1E division is provided the test signal. |
| 7.c) Separation is provided between RCS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 8.a) The pressurizer safety valves provide overpressure protection in accordance with Section III of the ASME Boiler and Pressure Vessel Code. | i) Inspections will be conducted to confirm that the value of the vendor code plate rating is greater than or equal to system relief requirements. ii) Testing and analysis in accordance with ASME Code Section III will be performed to determine set pressure. | i) The sum of the rated capacities recorded on the valve ASME Code plates of the safety valves exceeds 1,500,000 lb/hr. ii) A report exists and concludes that the safety valves set pressure is 2485 psig \pm 25 psi. |
| 8.b) The RCPs have a rotating inertia to provide RCS flow coastdown on loss of power to the pumps. | A test will be performed to determine the pump flow coastdown curve. | The pump flow coastdown will provide RCS flows greater than or equal to the flow shown in Figure 2.1.2-2, "Flow Transient for Four Cold Legs in Operation, Four Pumps Coasting Down." |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8.c) Each RCP flywheel assembly can withstand a design overspeed condition. | Shop testing of each RCP flywheel assembly will be performed at the vendor facility at overspeed conditions. | Each RCP flywheel assembly has passed an overspeed condition of no less than 125% of operating speed. |
| 8.d) The RCS provides automatic depressurization during design basis events. | <p>i) A low pressure flow test and associated analysis will be conducted to determine the total piping flow resistance of each ADS valve group connected to the pressurizer (i.e., ADS Stages 1-3) from the pressurizer through the outlet of the downstream ADS control valves. The reactor coolant system will be at cold conditions with the pressurizer full of water. The normal residual heat removal pumps will be used to provide injection flow into the RCS discharging through the ADS valves.</p> <p>Inspections and associated analysis of the piping flow paths from the discharge of the ADS valve groups connected to the pressurizer (i.e., ADS Stages 1-3) to the spargers will be conducted to verify the line routings are consistent with the line routings used for design flow resistance calculations.</p> <p>ii) Inspections and associated analysis of each fourth-stage ADS valve group (four valves and associated piping connected to each hot leg) will be conducted to verify the line routing is consistent with the line routing used for design flow resistance calculations.</p> | <p>i) The calculated ADS piping flow resistance from the pressurizer through the sparger with all valves of each ADS group open is $\leq 2.91\text{E-6 ft/gpm}^2$.</p> <p>ii) The calculated flow resistance for each group of fourth-stage ADS valves and piping with all valves open is: Loop 1: $\leq 1.70 \times 10^{-7} \text{ ft/gpm}^2$ Loop 2: $\leq 1.57 \times 10^{-7} \text{ ft/gpm}^2$</p> |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>iii) Inspections of each fourth-stage ADS valve will be conducted to determine the flow area through each valve.</p> <p>iv) Type tests and analysis will be performed to determine the effective flow area through each stage 1,2,3 ADS valve.</p> <p>v) Inspections of the elevation of the ADS stage 4 valve discharge will be conducted.</p> <p>vi) Inspections of the ADS stage 4 valve discharge will be conducted.</p> <p>vii) Inspection of each ADS sparger will be conducted to determine the flow area through the sparger holes.</p> <p>viii) Inspection of the elevation of each ADS sparger will be conducted.</p> | <p>iii) The flow area through each fourth-stage ADS valve is $\geq 67 \text{ in}^2$.</p> <p>iv) A report exists and concludes that the effective flow area through each stage 1 ADS valve $\geq 4.6 \text{ in}^2$ and each stage 2,3 ADS valve is $\geq 21 \text{ in}^2$.</p> <p>v) The minimum elevation of the bottom inside surface of the outlet of these valves is greater than plant elevation 110 feet.</p> <p>vi) The discharge of the ADS stage 4 valves is directed into the steam generator compartments.</p> <p>vii) The flow area through the holes in each ADS sparger is $\geq 274 \text{ in}^2$.</p> <p>viii) The centerline of the connection of the sparger arms to the sparger hub is ≤ 11.5 feet below the IRWST overflow level.</p> |
| 8.e) The RCS provides emergency letdown during design basis events. | Inspections of the reactor vessel head vent valves and inlet and outlet piping will be conducted. | A report exists and concludes that the capacity of the reactor vessel head vent is sufficient to pass not less than 8.2 lbm/sec at 1250 psia in the RCS. |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 9.a) The RCS provides circulation of coolant to remove heat from the core. | Testing and analysis to measure RCS flow with four reactor coolant pumps operating at no-load RCS pressure and temperature conditions will be performed. Analyses will be performed to convert the measured pre-fuel load flow to post-fuel load flow with 10-percent steam generator tube plugging. | The calculated post-fuel load RCS flow rate is $\geq 301,670$ gpm. |
| 9.b) The RCS provides the means to control system pressure. | i) Inspections will be performed to verify the rated capacity of pressurizer heater backup groups A and B. ii) Tests will be performed to verify that the pressurizer spray valves can open and close when operated from the MCR. | i) Pressurizer heater backup groups A and B each has a rated capacity of at least 168 kW. ii) Controls in the MCR operate to cause the pressurizer spray valves to open and close. |
| 9.c) The pressurizer heaters trip after a signal is generated by the PMS. | Testing will be performed to confirm trip of the pressurizer heaters identified in Table 2.1.2-3. | The pressurizer heaters identified in Table 2.1.2-3 trip after a signal is generated by the PMS. |
| 10. Safety-related displays identified in Table 2.1.2-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.1.2-1 can be retrieved in the MCR. |
| 11.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.1.2-1 to perform active functions. | i) Testing will be performed on the squib valves identified in Table 2.1.2-1 using controls in the MCR without stroking the valve. ii) Stroke testing will be performed on the other remotely operated valves listed in Table 2.1.2-1 using controls in the MCR. | i) Controls in the MCR operate to cause a signal at the squib valve electrical leads which is capable of actuating the squib valve. ii) Controls in the MCR operate to cause the remotely operated valves (other than squib valves) to perform active functions. |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | | | | | | | | | |
|---|--|--|---------|----------|------------------|-----------|---------|----------|------------------|----------|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria | | | | | | | | |
| 11.b) The valves identified in Table 2.1.2-1 as having PMS control perform an active safety function after receiving a signal from the PMS. | <p>i) Testing will be performed on the squib valves identified in Table 2.1.2-1 using real or simulated signals into the PMS without stroking the valve.</p> <p>ii) Testing will be performed on the other remotely operated valves identified in Table 2.1.2-1 using real or simulated signals into the PMS.</p> <p>iii) Testing will be performed to demonstrate that remotely operated RCS valves RCS-V001A/B, V002A/B, V003A/B, V011A/B, V012A/B, V013A/B open within the required response times.</p> | <p>i) The squib valves receive a signal at the valve electrical leads that is capable of actuating the squib valve.</p> <p>ii) The other remotely operated valves identified in Table 2.1.2-1 as having PMS control perform the active function identified in the table after receiving a signal from PMS.</p> <p>iii) These valves open within the following times after receipt of an actuation signal:</p> <table><tr><td>V001A/B</td><td>≤ 40 sec</td></tr><tr><td>V002A/B, V003A/B</td><td>≤ 100 sec</td></tr><tr><td>V011A/B</td><td>≤ 30 sec</td></tr><tr><td>V012A/B, V013A/B</td><td>≤ 60 sec</td></tr></table> | V001A/B | ≤ 40 sec | V002A/B, V003A/B | ≤ 100 sec | V011A/B | ≤ 30 sec | V012A/B, V013A/B | ≤ 60 sec |
| V001A/B | ≤ 40 sec | | | | | | | | | |
| V002A/B, V003A/B | ≤ 100 sec | | | | | | | | | |
| V011A/B | ≤ 30 sec | | | | | | | | | |
| V012A/B, V013A/B | ≤ 60 sec | | | | | | | | | |
| 11.c) The valves identified in Table 2.1.2-1 as having DAS control perform an active safety function after receiving a signal from DAS. | <p>i) Testing will be performed on the squib valves identified in Table 2.1.2-1 using real or simulated signals into the DAS without stroking the valve.</p> <p>ii) Testing will be performed on the other remotely operated valves identified in Table 2.1.2-1 using real or simulated signals into the DAS.</p> | <p>i) The squib valves receive a signal at the valve electrical leads that is capable of actuating the squib valve.</p> <p>ii) The other remotely operated valves identified in Table 2.1.2-1 as having DAS control perform the active function identified in the table after receiving a signal from DAS.</p> | | | | | | | | |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 12.a) The automatic depressurization valves identified in Table 2.1.2-1 perform an active safety-related function to change position as indicated in the table. | <p>i) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions.</p> <p>ii) Inspection will be performed for the existence of a report verifying that the as-built motor-operated valves are bounded by the tests or type tests.</p> <p>iii) Tests of the motor-operated valves will be performed under pre-operational flow, differential pressure and temperature conditions.</p> <p>iv) Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design conditions.</p> <p>v) Inspection will be performed for the existence of a report verifying that the as-built squib valves are bounded by the tests or type tests.</p> <p>vi) See item 8.d.i in this table.</p> <p>vii) See item 8.d.ii in this table.</p> <p>viii) See item 8.d.iii in this table.</p> <p>ix) See item 8.d.iv in this table.</p> | <p>i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.1.2-1 under design conditions.</p> <p>ii) A report exists and concludes that the as-built motor-operated valves are bounded by the tests or type tests.</p> <p>iii) Each motor-operated valve changes position as indicated in Table 2.1.2-1 under pre-operational test conditions.</p> <p>iv) A test report exists and concludes that each squib valve changes position as indicated in Table 2.1.2-1 under design conditions.</p> <p>v) A report exists and concludes that the as-built squib valves are bounded by the tests or type tests.</p> <p>vi) See item 8.d.i in this table. The ADS stage 1-3 valve flow resistances are verified to be consistent with the ADS stage 1-3 path flow resistances.</p> <p>vii) See item 8.d.ii in this table. The ADS stage 4 valve flow resistances are verified to be consistent with the ADS stage 4 path flow resistances.</p> <p>viii) See item 8.d.iii in this table.</p> <p>ix) See item 8.d.iv in this table.</p> |

| Table 2.1.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 12.b) After loss of motive power, the remotely operated valves identified in Table 2.1.2-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | Upon loss of motive power, each remotely operated valve identified in Table 2.1.2-1 assumes the indicated loss of motive power position. |
| 13.a) Controls exist in the MCR to trip the RCPs. | Testing will be performed on the RCPs using controls in the MCR. | Controls in the MCR operate to trip the RCPs. |
| 13.b) The RCPs trip after receiving a signal from the PMS. | Testing will be performed using real or simulated signals into the PMS. | The RCPs trip after receiving a signal from the PMS. |
| 13.c) The RCPs trip after receiving a signal from the DAS. | Testing will be performed using real or simulated signals into the DAS. | The RCPs trip after receiving a signal from the DAS. |
| 14. Controls exist in the MCR to cause the components identified in Table 2.1.2-3 to perform the listed function. | Testing will be performed on the components in Table 2.1.2-3 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.1.2-3 to perform the listed functions. |
| 15. Displays of the parameters identified in Table 2.1.2-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the RCS parameters in the MCR. | The displays identified in Table 2.1.2-3 can be retrieved in the MCR. |

| Table 2.1.2-5 | | |
|-------------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Steam Generator 1 | RCS-MB-01 | Containment |
| Steam Generator 2 | RCS-MB-02 | Containment |
| Reactor Coolant Pump 1A | RCS-MP-01A | Containment |
| Reactor Coolant Pump 1B | RCS-MP-01B | Containment |
| Reactor Coolant Pump 2A | RCS-MP-02A | Containment |
| Reactor Coolant Pump 2B | RCS-MP-02B | Containment |
| Pressurizer | RCS-MV-02 | Containment |
| ADS Sparger A | PXS-MW-01A | Containment |
| ADS Sparger B | PXS-MW-01B | Containment |

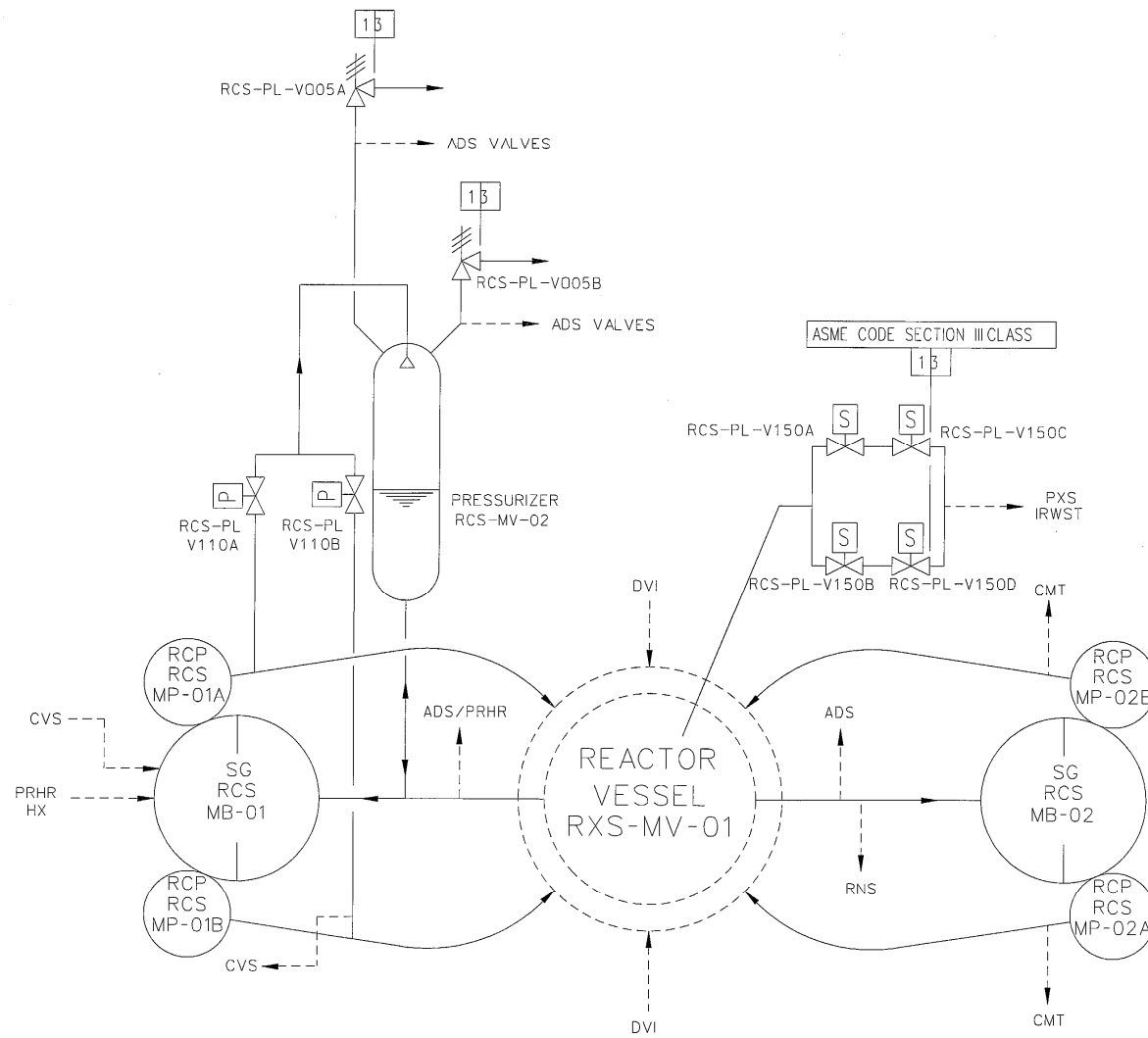


Figure 2.1.2-1 (Sheet 1 of 2)
Reactor Coolant System

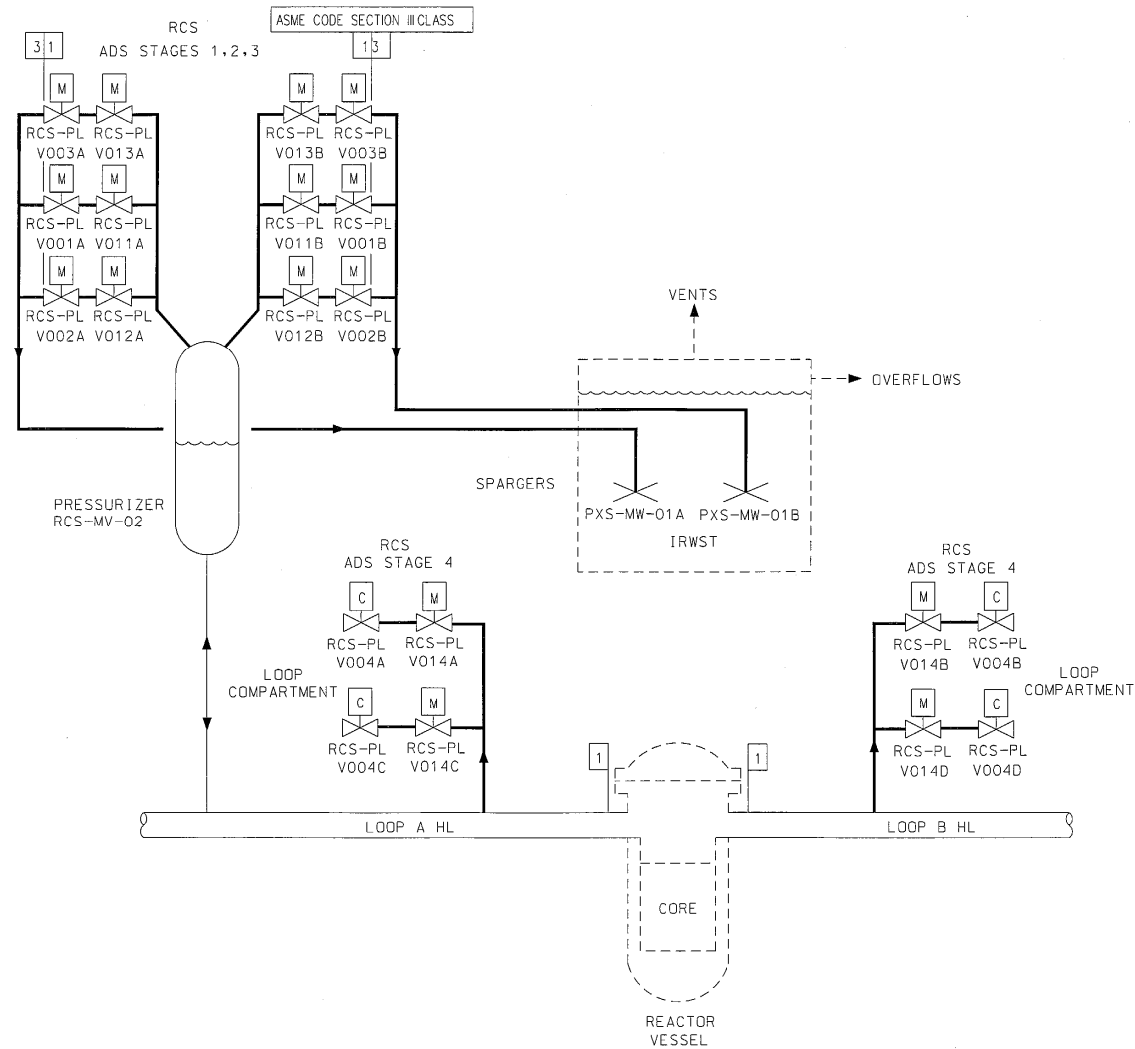


Figure 2.1.2-1 (Sheet 2 of 2)
Reactor Coolant System

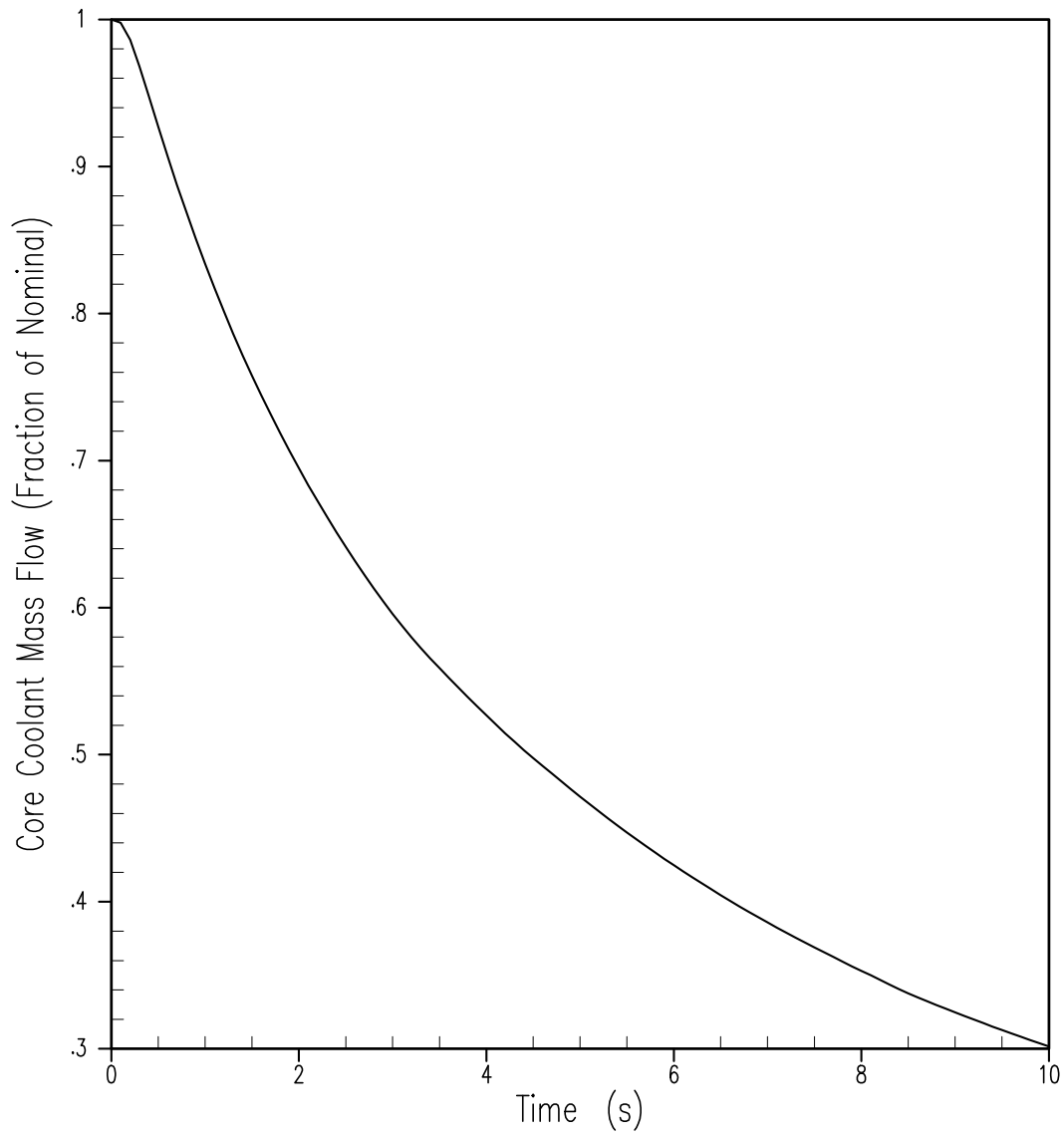


Figure 2.1.2-2
Flow Transient for Four Cold Legs
in Operation, Four Pumps Coasting Down

2.1.3 Reactor System**Design Description**

The reactor system (RXS) generates heat by a controlled nuclear reaction and transfers the heat generated to the reactor coolant, provides a barrier that prevents the release of fission products to the atmosphere and a means to insert negative reactivity into the reactor core and to shutdown the reactor core.

The reactor core contains a matrix of fuel rods assembled into fuel assemblies using structural elements. Rod cluster control assemblies (RCCAs) are positioned and held within the fuel assemblies by control rod drive mechanisms (CRDMs). The CRDMs unlatch upon termination of electrical power to the CRDM thereby releasing the RCCAs. The fuel assemblies and RCCAs are designed in accordance with the principal design requirements.

The RXS is operated during normal modes of plant operation, including startup, power operation, cooldown, shutdown and refueling.

The component locations of the RXS are as shown in Table 2.1.3-3.

1. The functional arrangement of the RXS is as described in the Design Description of this Section 2.1.3.
2.
 - a) The reactor upper internals rod guide arrangement is as shown in Figure 2.1.3-1.
 - b) The rod cluster control and drive rod arrangement is as shown in Figure 2.1.3-2.
 - c) The reactor vessel arrangement is as shown in Figure 2.1.3-3.
3. The components identified in Table 2.1.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
4. Pressure boundary welds in components identified in Table 2.1.3-1 as ASME Code Section III meet ASME Code Section III requirements.
5. The pressure boundary components (reactor vessel [RV], control rod drive mechanisms [CRDMs], and incore instrument QuickLoc assemblies) identified in Table 2.1.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
6. The seismic Category I equipment identified in Table 2.1.3-1 can withstand seismic design basis loads without loss of safety function.
7. The reactor internals will withstand the effects of flow induced vibration.
8. The reactor vessel direct injection nozzle limits the blowdown of the reactor coolant system (RCS) following the break of a direct vessel injection line.
9.
 - a) The Class 1E equipment identified in Table 2.1.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

- b) The Class 1E components identified in Table 2.1.3-1 are powered from their respective Class 1E division.
 - c) Separation is provided between RXS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
10. The reactor lower internals assembly is equipped with holders for at least eight capsules for storing material surveillance specimens.
11. The reactor pressure vessel (RPV) beltline material has a Charpy upper-shelf energy of no less than 75 ft-lb.
12. Safety-related displays of the parameters identified in Table 2.1.3-1 can be retrieved in the main control room (MCR).
13. The fuel assemblies and rod cluster control assemblies intended for initial core load and listed in Table 2.1.3-1 have been designed and constructed in accordance with the principal design requirements.
14. A top-of-the-head visual inspection, including 360 degrees around each reactor vessel head penetration nozzle, can be performed.

Inspections, Tests, Analysis, and Acceptance Criteria

Table 2.1.3-2 specifies the inspections, tests, analysis, and associated acceptance criteria for the RXS.

| Table 2.1.3-1 | | | | | |
|----------------------------------|---|--------------------------------------|----------------|---------------------------------|------------------------|
| Equipment Name | Tag No. | ASME Code Section III Classification | Seismic Cat. I | Class 1E/Qual. for Harsh Envir. | Safety-Related Display |
| RV | RXS-MV-01 | Yes | Yes | - | - |
| Reactor Upper Internals Assembly | RXS-MI-01 | Yes | Yes | - | - |
| Reactor Lower Internals Assembly | RXS-MI-02 | Yes | Yes | - | - |
| Fuel Assemblies (157 locations) | RXS-FA-A07/A08/A09/B05/B06/B07/B08/B09/B10/B11/C04/C05/C06/C07/C08/C09/C10/C11/C12/D03/D04/D05/D06/D07/D08/D09/D10/D11/D12/D13/E02/E03/E04/E05/E06/E07/E08/E09/E10/E11/E12/E13/E14/F02/F03/F04/F05/F06/F07/F08/F09/F10/F11/F12/F13/F14/G01/G02/G03/G04/G05/G06/G07/G08/G09/G10/G11/G12/G13/G14/G15/H01/H02/H03/H04/H05/H06/H07/H08/H09/H10/H11/H12/H13/H14/H15/J01/J02/J03/J04/J05/J06/J07/J08/J09/J10/J11/J12/J13/J14/J15/K02/K03/K04/K05/K06/K07/K08/K09/K10/K11/K12/K13/K14/L02/L03/L04/L05/L06/L07/L08/L09/L10/L11/L12/L13/L14/M03/M04/M05/M06/M07/M08/M09/M10/M11/M12/M13/N04/N05/N06/N07/N08/N09/N10/N11/N12/P05/P06/P07/P08/P09/P10/P11/ R07/R08/R09 | No ⁽¹⁾ | Yes | - | - |

Note: Dash (-) indicates not applicable.

1. Fuel assemblies are designed using ASME Section III as a general guide.

| Table 2.1.3-1 (cont.) | | | | | |
|--|--|--|-------------------|--|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III Classification | Seismic Cat. I | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display |
| Rod Cluster Control Assemblies (RCCAs) (minimum 53 locations) | RXS-FR-B06/B10/C05/C07/C09/C11/D06/ D08/D10/E03/E05/E07/E09/E11/E13/F02/F04/ F12/F14/G03/G05/G07/G09/G11/G13/H04/ H08/H12/J03/J05/J07/J09/J11/J13/K02/K04/ K12/K14/L03/L05/L07/L09/L11/L13/M06/ M08/M10/N05/N07/N09/N11/P06/P10 | No ⁽¹⁾ | Yes | - | - |
| Gray Rod Cluster Assemblies (GRCAs) (16 locations) | RXS-FG-B08/D04/D12/F06/F08/F10/H02/H06/ H10/H14/K06/K08/K10/M04/M12/P08 | No ⁽¹⁾ | Yes | - | - |
| Control Rod Drive Mechanisms (CRDMs) (69 Locations) | RXS-MV-11B06/11B08/11B10/11C05/11C07/ 11C09/11C11/11D04/11D06/11D08/11D10/ 11D12/11E03/11E05/11E07/11E09/11E11/ 11E13/11F02/11F04/11F06/11F08/11F10/ 11F12/11F14/11G03/11G05/11G07/11G09/ 11G11/11G13/11H02/11H04/11H06/11H08/ 11H10/11H12/11H14/11J03/11J05/11J07/ 11J09/11J11/11J13/11K02/11K04/11K06/ 11K08/11K10/11K12/11K14/11L03/11L05/ 11L07/11L09/11L11/11L13/11M04/11M06/ 11M08/11M10/11M12/11N05/11N07/11N09/ 11N11/11P06/11P08/11P10 | Yes | Yes | No/No | No |
| Incore Instrument QuickLoc Assemblies (8 Locations) | RXS-MY-Y11 through Y18 | Yes | Yes | - | - |

Note: Dash (-) indicates not applicable.

1. Fuel assemblies are designed using ASME Section III as a general guide.

| Table 2.1.3-1 (cont.) | | | | | |
|-----------------------------------|------------------------------------|--|-------------------|--|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III Classification | Seismic Cat. I | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display |
| Source Range Detectors (4) | RXS-JE-NE001A/NE001B/NE001C/NE001D | - | Yes | Yes/Yes | No |
| Intermediate Range Detectors (4) | RXS-JE-NE002A/NE002B/NE002C/NE002D | - | Yes | Yes/Yes | Yes |
| Power Range Detectors – Lower (4) | RXS-JE-NE003A/NE003B/NE003C/NE003D | - | Yes | Yes/Yes | No |
| Power Range Detectors – Upper (4) | RXS-JE-NE004A/NE004B/NE004C/NE004D | - | Yes | Yes/Yes | No |

Note: Dash (-) indicates not applicable.

| Table 2.1.3-2 Inspections, Tests, Analysis, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analysis | Acceptance Criteria |
| 1. The functional arrangement of the RXS is as described in the Design Description of this Section 2.1.3. | Inspection of the as-built system will be performed. | The as-built RXS conforms with the functional arrangement as described in the Design Description of this Section 2.1.3. |
| 2.a) The reactor upper internals rod guide arrangement is as shown in Figure 2.1.3-1. | Inspection of the as-built system will be performed. | The as-built RXS will accommodate the fuel assembly and control rod drive mechanism pattern shown in Figure 2.1.3-1. |
| 2.b) The control assemblies (rod cluster and gray rod) and drive rod arrangement is as shown in Figure 2.1.3-2. | Inspection of the as-built system will be performed. | The as-built RXS will accommodate the control assemblies (rod cluster and gray rod) and drive rod arrangement shown in Figure 2.1.3-2. |
| 2.c) The reactor vessel arrangement is as shown in Figure 2.1.3-3. | Inspection of the as-built system will be performed. | The as-built RXS will accommodate the reactor vessel arrangement shown in Figure 2.1.3-3. |
| 3. The components identified in Table 2.1.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.1.3-1 as ASME Code Section III. |
| 4. Pressure boundary welds in components identified in Table 2.1.3-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 5. The pressure boundary components (RV, CRDMs, and incore instrument QuickLoc assemblies) identified in Table 2.1.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components of the RXS required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the pressure boundary components (RV, CRDMs, and incore instrument QuickLoc assemblies) conform with the requirements of the ASME Code Section III. |

| Table 2.1.3-2 (cont.) Inspections, Tests, Analysis, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analysis | Acceptance Criteria |
| 6. The seismic Category I equipment identified in Table 2.1.3-1 can withstand seismic design basis loads without loss of safety function. | <p>i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.1.3-1 is located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> | <p>i) The seismic Category I equipment identified in Table 2.1.3-1 is located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.</p> <p>iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> |
| 7. The reactor internals will withstand the effects of flow induced vibration. | <p>i) A vibration type test will be conducted on the (first unit) reactor internals representative of AP1000.</p> <p>ii) A pre-test inspection, a flow test and a post-test inspection will be conducted on the as-built reactor internals.</p> | <p>i) A report exists and concludes that the (first unit) reactor internals have no observable damage or loose parts as a result of the vibration type test.</p> <p>ii) The as-built reactor internals have no observable damage or loose parts.</p> |
| 8. The reactor vessel direct vessel injection nozzle limits the blowdown of the RCS following the break of a direct vessel injection line. | An inspection will be conducted to verify the flow area of the flow limiting venturi within each direct vessel injection nozzle. | The throat area of the direct vessel injection line nozzle flow limiting venturi is less than or equal to 12.57 in ² . |

| Table 2.1.3-2 (cont.) Inspections, Tests, Analysis, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analysis | Acceptance Criteria |
| 9.a) The Class 1E equipment identified in Table 2.1.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | <p>i) Type tests, analysis, or a combination of type tests and analysis will be performed on Class 1E equipment located in a harsh environment.</p> <p>ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.</p> | <p>i) A report exists and concludes that the Class 1E equipment identified in Table 2.1.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p> <p>ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.1.3-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p> |
| 9.b) The Class 1E components identified in Table 2.1.3-1 are powered from their respective Class 1E division. | Testing will be performed by providing simulated test signals in each Class 1E division. | A simulated test signal exists for Class 1E equipment identified in Table 2.1.3-1 when the assigned Class 1E division is provided the test signal. |
| 9.c) Separation is provided between RXS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 10. The reactor lower internals assembly is equipped with holders for at least eight capsules for storing material surveillance specimens. | Inspection of the reactor lower internals assembly for the presence of capsules will be performed. | At least eight capsules are in the reactor lower internals assembly. |
| 11. The RPV beltline material has a Charpy upper-shelf energy of no less than 75 ft-lb. | Manufacturing tests of the Charpy V-Notch specimen of the RPV beltline material will be performed. | A report exists and concludes that the initial RPV beltline Charpy upper-shelf energy is no less than 75 ft-lb. |
| 12. Safety-related displays of the parameters identified in Table 2.1.3-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.1.3-1 can be retrieved in the MCR. |

| Table 2.1.3-2 (cont.) Inspections, Tests, Analysis, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analysis | Acceptance Criteria |
| 13. The fuel assemblies and rod cluster control assemblies intended for initial core load and listed in Table 2.1.3-1 have been designed and constructed in accordance with the established design requirements. | An analysis is performed of the reactor core design. | A report exists and concludes that the fuel assemblies and rod cluster control assemblies intended for the initial core load and listed in Table 2.1.3-1 have been designed and constructed in accordance with the principal design requirements. |
| 14. A top-of-the-head visual inspection, including 360 degrees around each reactor vessel head penetration nozzle, can be performed. | A preservice visual examination of the reactor vessel head top surface and penetration nozzles will be performed. | A report exists that documents the results of the top-of-the-head visual inspection, including 360 degrees around each reactor vessel head penetration nozzle. |

| Table 2.1.3-3 | | |
|---|--|---|
| Component Name | Tag No. | Component Location |
| RV | RXS-MV-01 | Containment |
| Reactor Upper Internals Assembly | RXS-MI-01 | Containment |
| Reactor Lower Internals Assembly | RXS-MI-02 | Containment |
| Fuel Assemblies (157 locations) | RXS-FA-A07/A08/A09/B05/ B06/B07/B08/B09/B10/B11/ C04/C05/C06/C07/C08/C09/ C10/C11/C12/D03/D04/D05/ D06/D07/D08/D09/D10/D11/ D12/D13/E02/E03/E04/E05/ E06/E07/E08/E09/E10/E11/E12/ E13/E14/F02/F03/F04/F05/F06/ F07/F08/F09/F10/F11/F12/F13/ F14/G01/G02/G03/G04/G05/ G06/G07/G08/G09/G10/G11/ G12/G13/G14/G15/H01/H02/ H03/H04/H05/H06/H07/H08/ H09/H10/H11/H12/H13/H14/ H15/J01/J02/J03/J04/J05/J06/ J07/J08/J09/J10/J11/J12/J13/ J14/J15/K02/K03/K04/K05/ K06/K07/K08/K09/K10/K11/ K12/K13/K14/L02/L03/L04/ L05/L06/L07/L08/L09/L10/L11/ L12/L13/L14/M03/M04/M05/ M06/M07/M08/M09/M10/M11/ M12/M13/N04/N05/N06/N07/ N08/N09/N10/N11/N12/P05/ P06/P07/P08/P09/P10/P11/R07/ R08/R09 | Containment (located in auxiliary building prior to fuel loading) |
| Rod Cluster Control Assemblies (RCCAs) (minimum 53 locations) | RXS-FR-B06/B10/C05/C07/ C09/C11/D06/D08/D10/E03/ E05/E07/E09/E11/E13/F02/F04/ F12/F14/G03/G05/G07/G09/ G11/G13/H04/H08/H12/J03/ J05/J07/J09/J11/J13/K02/K04/ K12/K14/L03/L05/L07/L09/ L11/L13/M06/M08/M10/N05/ N07/N09/N11/P06/P10 | Containment (located in auxiliary building prior to fuel loading) |
| Gray Rod Cluster Assemblies (GRCAs) (16 locations) | RXS-FG-B08/D04/D12/F06/ F08/F10/H02/H06/H10/H14/ K06/K08/K10/M04/M12/P08 | Containment (located in auxiliary building prior to fuel loading) |

| Table 2.1.3-3 (cont.) | | |
|---|--|--------------------|
| Component Name | Tag No. | Component Location |
| Control Rod Drive Mechanisms (CRDMs) (69 Locations) | RXS-MV-11B06/11B08/ 11B10/11C05/11C07/11C09/ 11C11/11D04/11D06/11D08/ 11D10/11D12/11E03/11E05/ 11E07/11E09/11E11/11E13/ 11F02/11F04/11F06/11F08/ 11F10/11F12/11F14/11G03/ 11G05/11G07/11G09/11G11/ 11G13/11H02/11H04/11H06/ 11H08/11H10/11H12/11H14/ 11J03/11J05/11J07/11J09/11J11/ 11J13/11K02/11K04/11K06/ 11K08/11K10/11K12/11K14/ 11L03/11L05/11L07/11L09/ 11L11/11L13/11M04/11M06/ 11M08/11M10/11M12/11N05/ 11N07/11N09/11N11/11P06/ 11P08/11P10 | Containment |
| Incore Instrument QuickLoc Assemblies (8 Locations) | RXS-MY-Y11 through Y18 | Containment |
| Source Range Detectors (4) | RXS-JE-NE001A/NE001B/ NE001C/NE001D | Containment |
| Intermediate Range Detectors (4) | RXS-JE-NE002A/NE002B/ NE002C/NE002D | Containment |
| Power Range Detectors – Lower (4) | RXS-JE-NE003A/NE003B/ NE003C/NE003D | Containment |
| Power Range Detectors – Upper (4) | RXS-JE-NE004A/NE004B/ NE004C/NE004D | Containment |

| Table 2.1.3-4 Key Dimensions and Acceptable Variations of the Reactor Vessel and Internals (Figure 2.1.3-2 and Figure 2.1.3-3) | | | |
|---|--|---------------------------------------|--|
| Description | Dimension or Elevation (inches) | Nominal Value (inches) | Acceptable Variation (inches) |
| RV inside diameter at beltline (inside cladding) | A | 159.0 | +1.0/-1.0 |
| RV wall thickness at beltline (without cladding) | B | 8.4 | +1.0/-0.12 |
| RV wall thickness at bottom head (without cladding) | C | 6.0 | +1.0/-0.12 |
| RV inlet nozzle inside diameter at safe end | D | 22.0 | +0.35/-0.10 |
| RV outlet nozzle inside diameter at safe end | E | 31.0 | +0.35/-0.10 |
| Elevation from RV mating surface to centerline of inlet nozzle | F | 62.5 | +0.25/-0.25 |
| Elevation from RV mating surface to centerline of outlet nozzle | G | 80.0 | +0.25/-0.25 |
| Elevation from RV mating surface to centerline of direct vessel injection nozzle | H | 100.0 | +0.25/-0.25 |
| Elevation from RV mating surface to inside of RV bottom head (inside cladding) | I | 397.59 | +1.0/-0.50 |
| Elevation from RV mating surface to top of lower core support plate | J | 327.3 | +0.50/-0.50 |
| Separation distance between bottom of upper core plate and top of lower core support with RV head in place | K | 189.8 | +0.20/-0.20 |

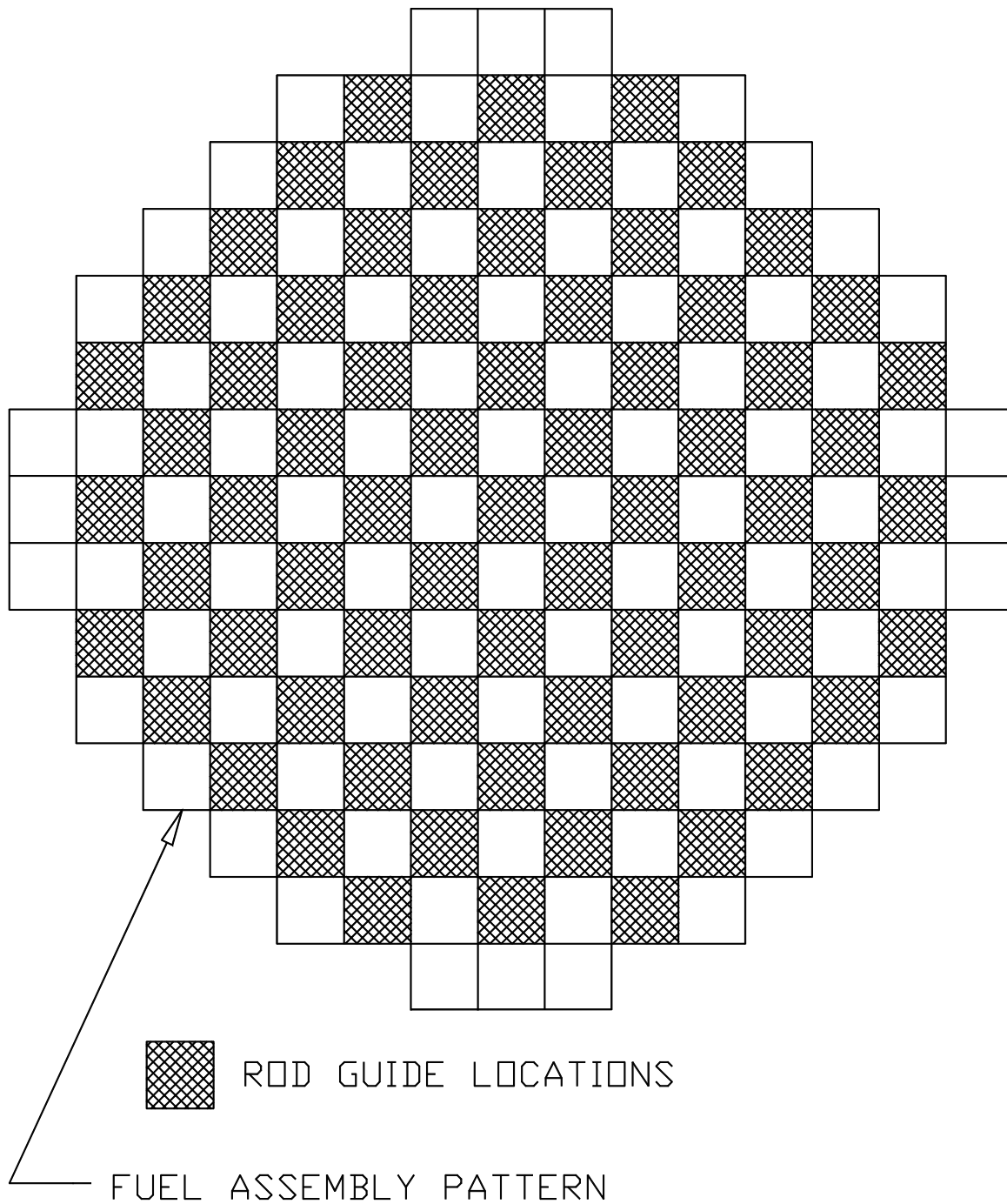


Figure 2.1.3-1
Reactor Upper Internals Rod Guide Arrangement

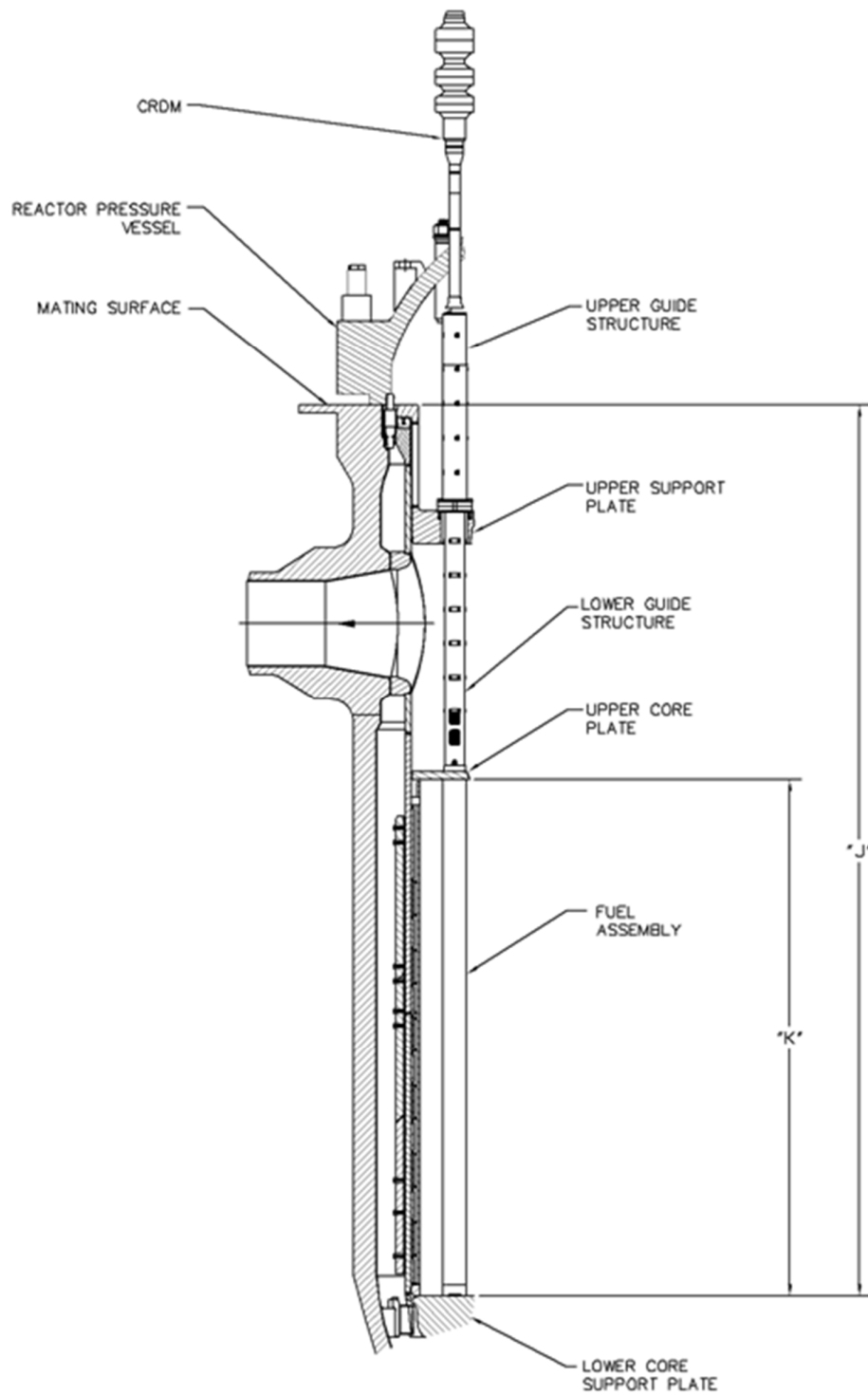


Figure 2.1.3-2
Rod Cluster Control and Drive Rod Arrangement

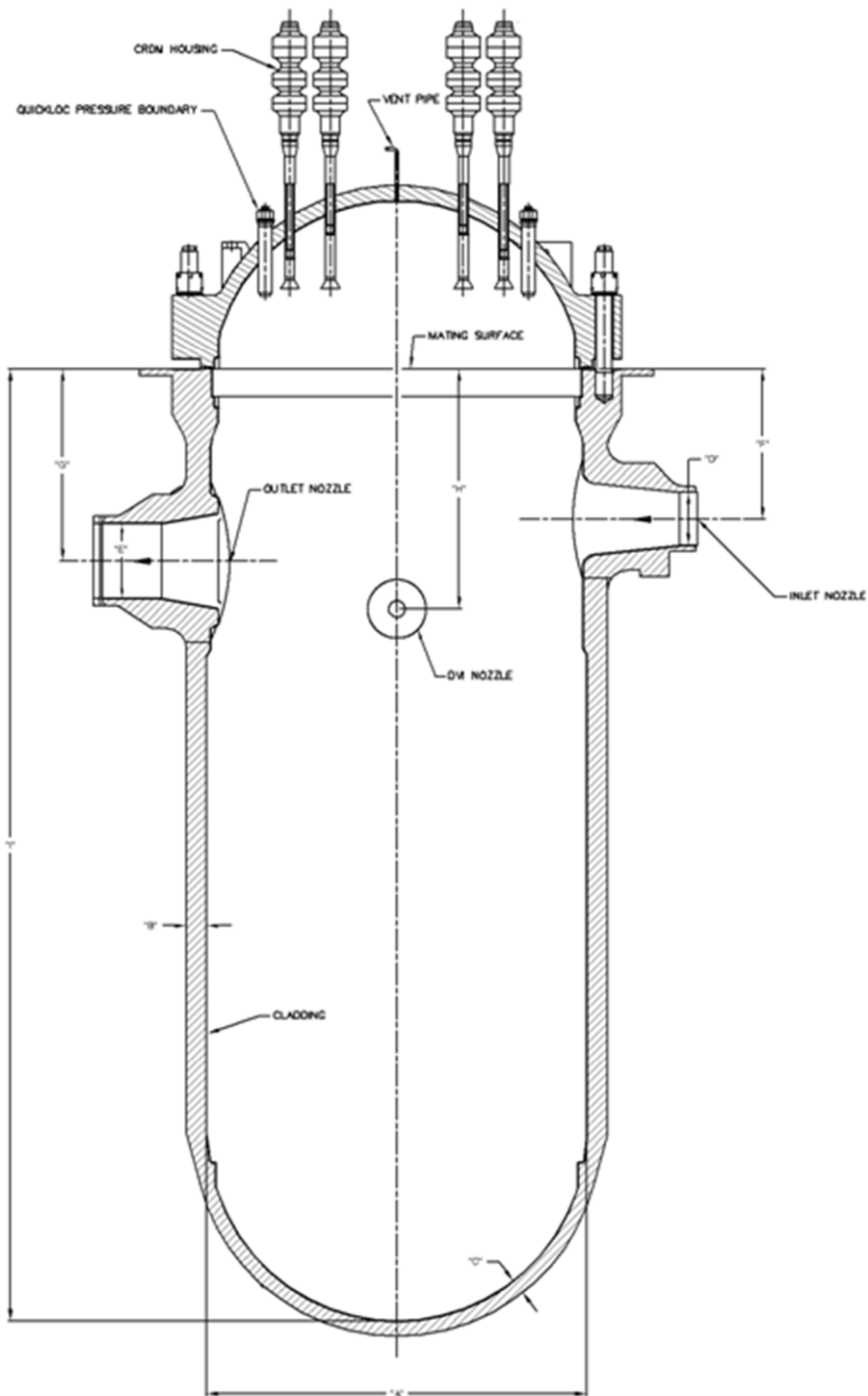


Figure 2.1.3-3
Reactor Vessel Arrangement

2.2 Nuclear Safety Systems

2.2.1 Containment System

Design Description

The containment system (CNS) is the collection of boundaries that separates the containment atmosphere from the outside environment during design basis accidents.

The CNS is as shown in Figure 2.2.1-1 and the component locations of the CNS are as shown in Table 2.2.1-4.

1. The functional arrangement of the CNS and associated systems is as described in the Design Description of this Section 2.2.1.
2.
 - a) The components identified in Table 2.2.1-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.2.1-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.2.1-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.2.1-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.2.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.2.1-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5. The seismic Category I equipment identified in Table 2.2.1-1 can withstand seismic design basis loads without loss of structural integrity and safety function.
6.
 - a) The Class 1E equipment identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.2.1-1 are powered from their respective Class 1E division.
 - c) Separation is provided between CNS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

- d) The non-Class 1E electrical penetrations identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of containment pressure boundary integrity.
- 7. The CNS provides the safety-related function of containment isolation for containment boundary integrity and provides a barrier against the release of fission products to the atmosphere.
- 8. Containment electrical penetration assemblies are protected against currents that are greater than the continuous ratings.
- 9. Safety-related displays identified in Table 2.2.1-1 can be retrieved in the main control room (MCR).
- 10. a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.2.1-1 to perform active functions.
 - b) The valves identified in Table 2.2.1-1 as having protection and safety monitoring system (PMS) control perform an active function after receiving a signal from the PMS.
 - c) The valves identified in Table 2.2.1-1 as having diverse actuation system (DAS) control perform an active function after receiving a signal from the DAS.
- 11. a) The motor-operated and check valves identified in Table 2.2.1-1 perform an active safety-related function to change position as indicated in the table.
 - b) After loss of motive power, the remotely operated valves identified in Table 2.2.1-1 assume the indicated loss of motive power position.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.1-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the CNS.

| Table 2.2.1-1 | | | | | | | | | |
|--|-------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Service Air Supply Outside Containment Isolation Valve | CAS-PL-V204 | Yes | Yes | No | -/- | No | -/- | None | - |
| Service Air Supply Inside Containment Isolation Check Valve | CAS-PL-V205 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |
| Instrument Air Supply Outside Containment Isolation Valve | CAS-PL-V014 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Instrument Air Supply Inside Containment Isolation Check Valve | CAS-PL-V015 | Yes | Yes | No | -/- | - | -/- | Transfer Closed | - |
| Component Cooling Water System (CCS) Containment Isolation Motor-operated Valve (MOV) – Inlet Line Outside Reactor Containment (ORC) | CCS-PL-V200 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| CCS Containment Isolation Check Valve – Inlet Line Inside Reactor Containment (IRC) | CCS-PL-V201 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|--|-------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| CCS Containment Isolation MOV – Outlet Line IRC | CCS-PL-V207 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| CCS Containment Isolation MOV – Outlet Line ORC | CCS-PL-V208 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| CCS Containment Isolation Relief Valve – Outlet Line IRC | CCS-PL-220 | Yes | Yes | No | -/- | No | -/- | Transfer Closed/ Transfer Open | - |
| Demineralized Water Supply Containment Isolation Valve ORC | DWS-PL-V244 | Yes | Yes | No | -/- | No | -/- | None | - |
| Demineralized Water Supply Containment Isolation Check Valve IRC | DWS-PL-V245 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |
| Fuel Transfer Tube | FHS-FT-001 | Yes | Yes | - | -/- | - | -/- | - | - |
| Fuel Transfer Tube Isolation Valve | FHS-PL-V001 | Yes | Yes | - | -/- | - | -/- | Transfer Closed | - |
| Fire Water Containment Supply Isolation Valve – Outside | FPS-PL-V050 | Yes | Yes | No | -/- | No | -/- | None | - |
| Fire Water Containment Isolation Supply Check Valve – Inside | FPS-PL-V052 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|---|-------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Spent Fuel Pool Cooling System (SFS) Discharge Line Containment Isolation Check Valve – IRC | SFS-PL-V037 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |
| SFS Discharge Line Containment Isolation MOV – ORC | SFS-PL-V038 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| SFS Suction Line Containment Isolation MOV – IRC | SFS-PL-V034 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| SFS Suction Line Containment Isolation MOV – ORC | SFS-PL-V035 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| SFS Suction Line Containment Isolation Relief Valve – IRC | SFS-PL-V067 | Yes | Yes | No | -/- | No | -/- | Transfer Closed/Transfer Open | - |
| Containment Purge Inlet Containment Isolation Valve – ORC | VFS-PL-V003 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |
| Containment Purge Inlet Containment Isolation Valve – IRC | VFS-PL-V004 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-----------------|--------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Integrated Leak Rate Testing Vent Discharge Containment Isolation Valve – ORC | VFS-PL-V008 | Yes | Yes | No | -/- | No | -/- | None | - |
| Containment Purge Discharge Containment Isolation Valve – IRC | VFS-PL-V009 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |
| Containment Purge Discharge Containment Isolation Valve – ORC | VFS-PL-V010 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |
| Vacuum Relief Containment Isolation A – ORC | VFS-PL-V800A | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed/ Transfer Open | As Is |
| Vacuum Relief Containment Isolation B – ORC | VFS-PL-V800B | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed/ Transfer Open | As Is |
| Vacuum Relief Containment Isolation Check Valve A – IRC | VFS-PL-V803A | Yes | Yes | No | -/- | No | -/- | Transfer Closed/ Transfer Open | - |
| Vacuum Relief Containment Isolation Check Valve B – IRC | VFS-PL-V803B | Yes | Yes | No | -/- | No | -/- | Transfer Closed/ Transfer Open | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|--|-------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|------------------|--------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Fan Coolers Return Containment Isolation Valve – IRC | VWS-PL-V082 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Fan Coolers Return Containment Isolation Valve – ORC | VWS-PL-V086 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Fan Coolers Return Containment Isolation Relief Valve – IRC | VWS-PL-V080 | Yes | Yes | No | -/- | No | -/- | Transfer Closed/ Transfer Open | - |
| Fan Coolers Supply Containment Isolation Valve – ORC | VWS-PL-V058 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Fan Coolers Supply Containment Isolation Check Valve – IRC | VWS-PL-V062 | Yes | Yes | No | -/- | No | -/- | Transfer Closed | - |
| Reactor Coolant Drain Tank (RCDT) Gas Outlet Containment Isolation Valve – IRC | WLS-PL-V067 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| RCDT Gas Outlet Containment Isolation Valve – ORC | WLS-PL-V068 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|---|-------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|------------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Sump Discharge Containment Isolation Valve – IRC | WLS-PL-V055 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |
| Sump Discharge Containment Isolation Valve – ORC | WLS-PL-V057 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Closed | Closed |
| Sump Discharge Containment Isolation Relief Valve – IRC | WLS-PL-V058 | Yes | Yes | No | -/- | No | -/- | Transfer Closed/ Transfer Open | - |
| Spare Penetration | CNS-PY-C01 | Yes | Yes | - | -/- | - | -/- | - | - |
| Spare Penetration | CNS-PY-C02 | Yes | Yes | - | -/- | - | -/- | - | - |
| Spare Penetration | CNS-PY-C03 | Yes | Yes | - | -/- | - | -/- | - | - |
| Main Equipment Hatch | CNS-MY-Y01 | Yes | Yes | - | -/- | - | -/- | - | - |
| Maintenance Hatch | CNS-MY-Y02 | Yes | Yes | - | -/- | - | -/- | - | - |
| Personnel Hatch | CNS-MY-Y03 | Yes | Yes | - | -/- | - | -/- | - | - |
| Personnel Hatch | CNS-MY-Y04 | Yes | Yes | - | -/- | - | -/- | - | - |
| Containment Vessel | CNS-MV-01 | Yes | Yes | - | -/- | - | -/- | - | - |
| Electrical Penetration P03 | DAS-EY-P03Z | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P01 | ECS-EY-P01X | Yes | Yes | - | No/Yes | - | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|----------------------------|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Electrical Penetration P02 | ECS-EY-P02X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P06 | ECS-EY-P06Y | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P07 | ECS-EY-P07X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P09 | ECS-EY-P09W | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P10 | ECS-EY-P10W | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P11 | IDSA-EY-P11Z | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P12 | IDSA-EY-P12Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P13 | IDSA-EY-P13Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P14 | IDSD-EY-P14Z | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P15 | IDSD-EY-P15Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P16 | IDSD-EY-P16Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P17 | ECS-EY-P17X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P18 | ECS-EY-P18X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P19 | ECS-EY-P19Z | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P20 | ECS-EY-P20Z | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P21 | EDS-EY-P21Z | Yes | Yes | - | No/Yes | - | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-1 (cont.) | | | | | | | | | |
|----------------------------|--------------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Electrical Penetration P22 | ECS-EY-P22X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P23 | ECS-EY-P23X | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P24 | ECS-EY-P24 | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P25 | ECS-EY-P25W | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P26 | ECS-EY-P26W | Yes | Yes | - | No/Yes | - | -/- | - | - |
| Electrical Penetration P27 | IDSC-EY-P27Z | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P28 | IDSC-EY-P28Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P29 | IDSC-EY-P29Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P30 | IDSB-EY-P30Z | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P31 | IDSB-EY-P31Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Electrical Penetration P32 | IDSB-EY-P32Y | Yes | Yes | - | Yes/Yes | - | -/- | - | - |
| Instrument Penetration P46 | PCS-PY-C01 | Yes | Yes | - | -/- | - | -/- | - | - |
| Instrument Penetration P47 | PCS-PY-C02 | Yes | Yes | - | -/- | - | -/- | - | - |
| Instrument Penetration P48 | PCS-PY-C03 | Yes | Yes | - | -/- | - | -/- | - | - |
| Instrument Penetration P49 | PCS-PY-C04 | Yes | Yes | - | -/- | - | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.1-2 | | |
|--|---|-----------------------|
| Line Name | Line Number | ASME Code Section III |
| Instrument Air In | CAS-PL-L015 | Yes |
| Service Air In | CAS-PL-L204 | Yes |
| Component Cooling Water Supply to Containment | CCS-PL-L201 | Yes |
| Component Cooling Water Outlet from Containment | CCS-PL-L207 | Yes |
| Demineralized Water In | DWS-PL-L245, L230 | Yes |
| Fire Protection Supply to Containment | FPS-PL-L107 | Yes |
| Containment Atmosphere Return Line | PSS-PL-L038 | Yes |
| Common Primary Sample Line A/B | PSS-PL-T005A/B | Yes |
| Containment Atmosphere Sample Line | PSS-PL-T031 | Yes |
| Spent Fuel Pool Cooling Discharge | SFS-PL-L017 | Yes |
| Spent Fuel Pool Cooling Suction from Containment | SFS-PL-L038 | Yes |
| Containment Purge Inlet to Containment | VFS-PL-L104, L105, L106 | Yes |
| Containment Purge Discharge from Containment | VFS-PL-L203, L204, L205, L800, L801A/B, L803, L804, L805A/B | Yes |
| Fan Cooler Supply Line to Containment | VWS-PL-L032 | Yes |
| Fan Cooler Return Line from Containment | VWS-PL-L055 | Yes |
| RCDT Gas Out | WLS-PL-L022 | Yes |
| Waste Sump Out | WLS-PL-L073 | Yes |

| Table 2.2.1-3 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the CNS and associated systems is as described in the Design Description of this Section 2.2.1. | Inspection of the as-built system will be performed. | The as-built CNS conforms with the functional arrangement as described in the Design Description of this Section 2.2.1. |
| 2.a) The components identified in Table 2.2.1-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.1-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.2.1-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.2.1-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.2.1-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.2.1-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |

| Table 2.2.1-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.a) The components identified in Table 2.2.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | <p>i) A hydrostatic or pressure test will be performed on the components required by the ASME Code Section III to be tested.</p> <p>ii) Impact testing will be performed on the containment and pressure-retaining penetration materials in accordance with the ASME Code Section III, Subsection NE, to confirm the fracture toughness of the materials.</p> | <p>i) A report exists and concludes that the results of the pressure test of the components identified in Table 2.2.1-1 as ASME Code Section III conform with the requirements of the ASME Code Section III.</p> <p>ii) A report exists and concludes that the containment and pressure-retaining penetration materials conform with fracture toughness requirements of the ASME Code Section III.</p> |
| 4.b) The piping identified in Table 2.2.1-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic or pressure test will be performed on the piping required by the ASME Code Section III to be pressure tested. | A report exists and concludes that the results of the pressure test of the piping identified in Table 2.2.1-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5. The seismic Category I equipment identified in Table 2.2.1-1 can withstand seismic design basis loads without loss of structural integrity and safety function. | <p>i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.2.1-1 are located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> | <p>i) The seismic Category I equipment identified in Table 2.2.1-1 is located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of structural integrity and safety function.</p> <p>iii) The as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> |

| Table 2.2.1-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6.a) The Class 1E equipment identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.2.1-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |
| 6.b) The Class 1E components identified in Table 2.2.1-1 are powered from their respective Class 1E division. | Testing will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.2.1-1 when the assigned Class 1E division is provided the test signal. |
| 6.c) Separation is provided between CNS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 6.d) The non-Class 1E electrical penetrations identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of containment pressure boundary integrity. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on non-Class 1E electrical penetrations located in a harsh environment. ii) Inspection will be performed of the as-built non-Class 1E electrical penetrations located in a harsh environment. | i) A report exists and concludes that the non-Class 1E electrical penetrations identified in Table 2.2.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of containment pressure boundary integrity. ii) A report exists and concludes that the as-built non-Class 1E electrical penetrations identified in Table 2.2.1-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |

| Table 2.2.1-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7. The CNS provides the safety-related function of containment isolation for containment boundary integrity and provides a barrier against the release of fission products to the atmosphere. | i) A containment integrated leak rate test will be performed. ii) Testing will be performed to demonstrate that remotely operated containment isolation valves close within the required response times. | i) The leakage rate from containment for the integrated leak rate test is less than L_a . ii) The containment purge isolation valves (VFS-PL-V003, -V004, -V009, and -V010) close within 20 seconds, containment vacuum relief isolation valves (VFS-PL-V800A and -V800B) close within 30 seconds, SGS valves SGS-PL-V040A/B and SGS-PL-V057A/B are covered in Tier 1 Material, subsection 2.2.4, Table 2.2.4-4 (item 11.b.ii) and all other containment isolation valves close within 60 seconds upon receipt of an actuation signal. |
| 8. Containment electrical penetration assemblies are protected against currents that are greater than the continuous ratings. | An analysis for the as-built containment electrical penetration assemblies will be performed to demonstrate (1) that the maximum current of the circuits does not exceed the continuous rating of the containment electrical penetration assembly, or (2) that the circuits have redundant protection devices in series and that the redundant current protection devices are coordinated with the containment electrical penetration assembly's rated short circuit thermal capacity data and prevent current from exceeding the continuous current rating of the containment electrical penetration assembly. | Analysis exists for the as-built containment electrical penetration assemblies and concludes that the penetrations are protected against currents which are greater than their continuous ratings. |
| 9. Safety-related displays identified in Table 2.2.1-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.2.1-1 can be retrieved in the MCR. |
| 10.a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.2.1-1 to perform active functions. | Stroke testing will be performed on remotely operated valves identified in Table 2.2.1-1 using the controls in the MCR. | Controls in the MCR operate to cause remotely operated valves identified in Table 2.2.1-1 to perform active safety functions. |

| Table 2.2.1-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 10.b) The valves identified in Table 2.2.1-1 as having PMS control perform an active safety function after receiving a signal from the PMS. | Testing will be performed on remotely operated valves listed in Table 2.2.1-1 using real or simulated signals into the PMS. | The remotely operated valves identified in Table 2.2.1-1 as having PMS control perform the active function identified in the table after receiving a signal from PMS. |
| 10.c) The valves identified in Table 2.2.1-1 as having DAS control perform an active safety function after receiving a signal from DAS. | Testing will be performed on remotely operated valves listed in Table 2.2.1-1 using real or simulated signals into the DAS. | The remotely operated valves identified in Table 2.2.1-1 as having DAS control perform the active function identified in the table after receiving a signal from DAS. |
| 11.a) The motor-operated and check valves identified in Table 2.2.1-1 perform an active safety-related function to change position as indicated in the table. | i) Tests or type tests of motor-operated valves will be performed to demonstrate the capability of each valve to operate under design conditions. ii) Inspection will be performed for the existence of a report verifying that the as-built motor-operated valves are bounded by the tests or type tests. iii) Tests of the motor-operated valves will be performed under preoperational flow, differential pressure, and temperature conditions. iv) Exercise testing of the check valves with active safety functions identified in Table 2.2.1-1 will be performed under preoperational test pressure, temperature and fluid flow conditions. | i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.1-1 under design conditions. ii) A report exists and concludes that the as-built motor-operated valves are bounded by the tests or type tests. iii) Each motor-operated valve changes position as indicated in Table 2.2.1-1 under pre-operational test conditions. iv) Each check valve changes position as indicated in Table 2.2.1-1. |
| 11.b) After loss of motive power, the remotely operated valves identified in Table 2.2.1-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.2.1-1 assumes the indicated loss of motive power position. |

| Table 2.2.1-4 | | |
|--------------------|-----------|--------------------|
| Component Name | Tag. No. | Component Location |
| Containment Vessel | CNS-MV-01 | Shield Building |

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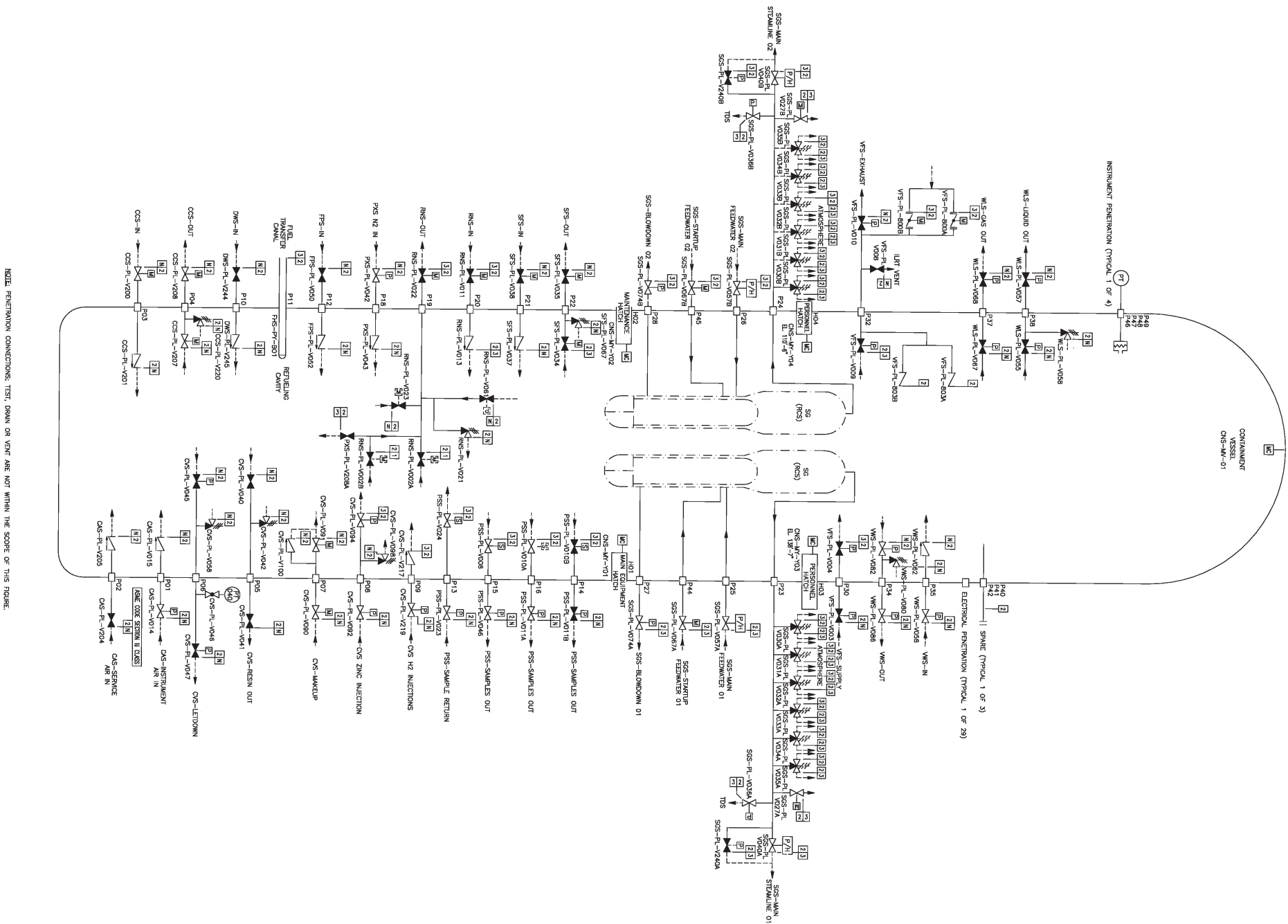


Figure 2.2.1-1
Containment System

2.2.2 Passive Containment Cooling System**Design Description**

The passive containment cooling system (PCS) removes heat from the containment during design basis events.

The PCS is as shown in Figure 2.2.2-1 and the component locations of the PCS are as shown in Table 2.2.2-4.

1. The functional arrangement of the PCS is as described in the Design Description of this Section 2.2.2.
2.
 - a) The components identified in Table 2.2.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The pipelines identified in Table 2.2.2-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.2.2-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in the pipelines identified in Table 2.2.2-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.2.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The pipelines identified in Table 2.2.2-2 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
5.
 - a) The seismic Category I components identified in Table 2.2.2-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the pipelines identified in Table 2.2.2-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
 - c) The passive containment cooling ancillary water storage tank (PCCAWST) can withstand a seismic event.
6.
 - a) The Class 1E components identified in Table 2.2.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.2.2-1 are powered from their respective Class 1E division.
 - c) Separation is provided between PCS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

7. The PCS performs the following safety-related functions:
 - a) The PCS delivers water from the PCCWST to the outside, top of the containment vessel.
 - b) The PCS wets the outside surface of the containment vessel. The inside and outside of the containment vessel above the operating deck are coated with an inorganic zinc coating.
 - c) The PCS provides air flow over the outside of the containment vessel by a natural circulation air flow path from the air inlets to the air discharge structure.
 - d) The PCS drains the excess water from the outside of the containment vessel through the two upper annulus drains.
 - e) The PCS provides a flow path for long-term water makeup to the passive containment cooling water storage tank (PCCWST).
 - f) The PCS provides a flow path for long-term water makeup from the PCCWST to the spent fuel pool.
8. The PCS performs the following nonsafety-related functions:
 - a) The PCCAWST contains an inventory of cooling water sufficient for PCS containment cooling from hour 72 through day 7.
 - b) The PCS delivers water from the PCCAWST to the PCCWST and spent fuel pool simultaneously.
 - c) The PCCWST includes a water inventory for the fire protection system.
9. Safety-related displays identified in Table 2.2.2-1 can be retrieved in the main control room (MCR).
10.
 - a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.2-1 to perform active functions.
 - b) The valves identified in Table 2.2.2-1 as having protection and safety monitoring system (PMS) control perform an active safety function after receiving a signal from the PMS.
 - c) The valves identified in Table 2.2.2-1 as having diverse actuation system (DAS) control perform an active safety function after receiving a signal from the DAS.
11.
 - a) The motor-operated valves identified in Table 2.2.2-1 perform an active safety-related function to change position as indicated in the table.
 - b) After loss of motive power, the remotely operated valves identified in Table 2.2.2-1 assume the indicated loss of motive power position.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.2-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the PCS.

| Table 2.2.2-1 | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| PCCWST | PCS-MT-01 | No | Yes | - | - | - | - | - | - |
| Water Distribution Bucket | PCS-MT-03 | No | Yes | - | - | - | - | - | - |
| Water Distribution Wiers | PCS-MT-04 | No | Yes | - | - | - | - | - | - |
| PCCWST Isolation Valve | PCS-PL-V001A | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Open | Open |
| PCCWST Isolation Valve | PCS-PL-V001B | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Open | Open |
| PCCWST Isolation Valve | PCS-PL-V001C | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/Yes | Transfer Open | As Is |
| PCCWST Isolation Block MOV | PCS-PL-V002A | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Open | As Is |
| PCCWST Isolation Block MOV | PCS-PL-V002B | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Open | As Is |
| PCCWST Isolation Block MOV | PCS-PL-V002C | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Open | As Is |
| PCS Recirculation Return Isolation Valve | PCS-PL-V023 | Yes | Yes | - | -/No | No | - | Transfer Close | - |
| PCCWST Supply to Fire Protection System Isolation Valve | PCS-PL-V005 | Yes | Yes | - | -/No | No | - | Transfer Close | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.2-1 (cont.) | | | | | | | | | |
|---|-------------|-----------------------------|-------------------|-------------------------------|---|-------------------------------|------------------------|----------------------------------|--|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| PCS Makeup to SFS Isolation Valve | PCS-PL-V009 | Yes | Yes | - | -/No | No | - | Transfer Open/ Transfer Close | - |
| Water Makeup Isolation Valve | PCS-PL-V044 | Yes | Yes | - | -/No | No | - | Transfer Open | - |
| Water Bucket Makeup Line Drain Valve | PCS-PL-V015 | Yes | Yes | - | -/No | No | - | Transfer Close | - |
| Water Bucket Makeup Line Isolation Valve | PCS-PL-V020 | Yes | Yes | - | -/No | No | - | Transfer Open | - |
| PCCWST Long-Term Makeup Line Check Valve | PCS-PL-V039 | Yes | Yes | - | -/No | No | - | Transfer Open | - |
| PCCWST Long-Term Makeup Drain Isolation | PCS-PL-V042 | Yes | Yes | - | -/No | No | - | Transfer Close | - |
| PCS Discharge to SFS Pool Isolation Valve | PCS-PL-V045 | Yes | Yes | - | -/No | No | - | Transfer Open | - |
| Recirc Header Discharge to PCCWST Isolation Valve | PCS-PL-V046 | Yes | Yes | - | -/No | No | - | Transfer Close | - |
| PCCWST Drain Isolation Valve | PCS-PL-V049 | Yes | Yes | - | -/No | No | - | Transfer Close | - |
| Recirc Header Discharge to SFS Pool Isolation Valve | PCS-PL-V050 | Yes | Yes | - | -/No | No | - | Transfer Open/Close | - |
| PCCWST Discharge to SFS Pool Isolation Valve | PCS-PL-V051 | Yes | Yes | - | -/No | No | - | Transfer Open/Close | - |
| PCS Water Delivery Flow Sensor | PCS-001 | No | Yes | - | Yes/No | Yes | - | - | - |

| Table 2.2.2-1 (cont.) | | | | | | | | | |
|--|---------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| PCS Water Delivery Flow Sensor | PCS-002 | No | Yes | - | Yes/No | Yes | - | - | - |
| PCS Water Delivery Flow Sensor | PCS-003 | No | Yes | - | Yes/No | Yes | - | - | - |
| PCS Water Delivery Flow Sensor | PCS-004 | No | Yes | - | Yes/No | Yes | - | - | - |
| Containment Pressure Sensor | PCS-005 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Containment Pressure Sensor | PCS-006 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Containment Pressure Sensor | PCS-007 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Containment Pressure Sensor | PCS-008 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| PCCWST Water Level Sensor | PCS-010 | No | Yes | - | Yes/No | Yes | - | - | - |
| PCCWST Water Level Sensor | PCS-011 | No | Yes | - | Yes/No | Yes | - | - | - |
| High-range Containment Pressure Sensor | PCS-012 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| High-range Containment Pressure Sensor | PCS-013 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| High-range Containment Pressure Sensor | PCS-014 | No | Yes | - | Yes/Yes | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.2-2 | | | |
|---|--|-----------------------|--------------------------------|
| Pipeline Name | Line Number | ASME Code Section III | Functional Capability Required |
| PCCWST Discharge Lines | PCS-PL-L001A/B/C/D | Yes | Yes |
| PCCWST Discharge Cross-connect Line | PCS-PL-L002 | Yes | Yes |
| PCCWST Discharge Header Lines | PCS-PL-L003A/B PCS-PL-L005 | Yes | Yes |
| Post-72-hour Supply Line Connection | PCS-PL-L051 PCS-PL-L054 PCS-PL-L065 | Yes | Yes |
| Post-72-hour Containment Cooling Makeup From Supply Line Connections | PCS-PL-L004 PCS-PL-L007 PCS-PL-L008 PCS-PL-L023 PCS-PL-L050 | Yes | Yes |
| Post-72-hour SFS Makeup From PCCWST | PCS-PL-L011 PCS-PL-L017 PCS-PL-L018 PCS-PL-L030* PCS-PL-L073 | Yes | Yes |
| Post-72-hour SFS Makeup From Supply Line Connection | PCS-PL-L025 PCS-PL-L029 PCS-PL-L030* PCS-PL-L048 PCS-PL-L049 | Yes | Yes |
| Note: * Line PCS-PL-L030 is a common makeup line from both sources. | | | |

| Table 2.2.2-3 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the PCS is as described in the Design Description of this Section 2.2.2. | Inspection of the as-built system will be performed. | The as-built PCS conforms to the functional arrangement as described in the Design Description of this Section 2.2.2. |
| 2.a) The components identified in Table 2.2.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.2-1 as ASME Code Section III. |
| 2.b) The pipelines identified in Table 2.2.2-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.2.2-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.2.2-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in the pipelines identified in Table 2.2.2-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.2.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.2-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.b) The pipelines identified in Table 2.2.2-2 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.2.2-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5.a) The seismic Category I components identified in Table 2.2.2-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I components and valves identified in Table 2.2.2-1 are located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I components will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built components including anchorage are seismically bounded by the tested or analyzed conditions. | i) The seismic Category I components identified in Table 2.2.2-1 are located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I components can withstand seismic design basis loads without loss of safety function. iii) The report exists and concludes that the as-built components including anchorage are seismically bounded by the tested or analyzed conditions. |
| 5.b) Each of the pipelines identified in Table 2.2.2-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report concluding that the as-built pipelines meet the requirements for functional capability. | A report exists and concludes that each of the as-built pipelines identified in Table 2.2.2-2 for which functional capability is required meets the requirements for functional capability. |
| 5.c) The PCCAWST can withstand a seismic event. | Inspection will be performed for the existence of a report verifying that the as-built PCCAWST and its anchorage are designed using seismic Category II methods and criteria. | A report exists and concludes that the as-built PCCAWST and its anchorage are designed using seismic Category II methods and criteria. |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6.a) The Class 1E components identified in Table 2.2.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | <p>i) Type tests or a combination of type tests and analyses will be performed on Class 1E components located in a harsh environment.</p> <p>ii) Inspection will be performed of the as-built Class 1E components and the associated wiring, cables, and terminations located in a harsh environment.</p> | <p>i) A report exists and concludes that the Class 1E components identified in Table 2.2.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p> <p>ii) A report exists and concludes that the as-built Class 1E components and the associated wiring, cables, and terminations identified in Table 2.2.2-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p> |
| 6.b) The Class 1E components identified in Table 2.2.2-1 are powered from their respective Class 1E division. | Testing will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E components identified in Table 2.2.2-1 when the assigned Class 1E division is provided the test signal. |
| 6.c) Separation is provided between PCS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.a) The PCS delivers water from the PCCWST to the outside, top of the containment vessel. | i) Testing will be performed to measure the PCCWST delivery rate from each one of the three parallel flow paths. | i) When tested, each one of the three flow paths delivers water at greater than or equal to: <ul style="list-style-type: none"> – 469.1 gpm at a PCCWST water level of 27.4 ft + 0.2, - 0.0 ft above the tank floor – 226.6 gpm when the PCCWST water level uncovers the first (i.e. tallest) standpipe – 176.3 gpm when the PCCWST water level uncovers the second tallest standpipe – 144.2 gpm when the PCCWST water level uncovers the third tallest standpipe |
| | ii) Testing and or analysis will be performed to demonstrate the PCCWST inventory provides 72 hours of adequate water flow. | ii) When tested and/or analyzed with all flow paths delivering and an initial water level at 27.4 + 0.2, - 0.00 ft, the PCCWST water inventory provides greater than or equal to 72 hours of flow, and the flow rate at 72 hours is greater than or equal to 100.7 gpm. |
| | iii) Inspection will be performed to determine the PCCWST standpipes elevations. | iii) The elevations of the standpipes above the tank floor are: <ul style="list-style-type: none"> – 16.8 ft ± 0.2 ft – 20.3 ft ± 0.2 ft – 24.1 ft ± 0.2 ft |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.b) The PCS wets the outside surface of the containment vessel. The inside and the outside of the containment vessel above the operating deck are coated with an inorganic zinc material. | <p>i) Testing will be performed to measure the outside wetted surface of the containment vessel with one of the three parallel flow paths delivering water to the top of the containment vessel.</p> <p>ii) Inspection of the containment vessel exterior coating will be conducted.</p> <p>iii) Inspection of the containment vessel interior coating will be conducted.</p> | <p>i) A report exists and concludes that when the water in the PCCWST uncovers the standpipes at the following levels, the water delivered by one of the three parallel flow paths to the containment shell provides coverage measured at the spring line that is equal to or greater than the stated coverages.</p> <ul style="list-style-type: none"> - 24.1 ± 0.2 ft above the tank floor; at least 90% of the perimeter is wetted. - 20.3 ± 0.2 ft above the tank floor; at least 72.9% of the perimeter is wetted. - 16.8 ± 0.2 ft above the tank floor; at least 59.6% of the perimeter is wetted. <p>ii) A report exists and concludes that the containment vessel exterior surface is coated with an inorganic zinc coating above elevation 135'-3".</p> <p>iii) A report exists and concludes that the containment vessel interior surface is coated with an inorganic zinc coating above 7' above the operating deck.</p> |
| 7.c) The PCS provides air flow over the outside of the containment vessel by a natural circulation air flow path from the air inlets to the air discharge structure. | Inspections of the air flow path segments will be performed. | <p>Flow paths exist at each of the following locations:</p> <ul style="list-style-type: none"> – Air inlets – Base of the outer annulus – Base of the inner annulus – Discharge structure |
| 7.d) The PCS drains the excess water from the outside of the containment vessel through the two upper annulus drains. | Testing will be performed to verify the upper annulus drain flow performance. | With a water level within the upper annulus 10" ± 1" above the annulus drain inlet, the flow rate through each drain is greater than or equal to 525 gpm. |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.e) The PCS provides a flow path for long-term water makeup to the PCCWST. | i) See item 1 in this table. ii) Testing will be performed to measure the delivery rate from the long-term makeup connection to the PCCWST. | i) See item 1 in this table. ii) With a water supply connected to the PCS long-term makeup connection, each PCS recirculation pump delivers greater than or equal to 100 gpm when tested separately. |
| 7.f) The PCS provides a flow path for long-term water makeup from the PCCWST to the spent fuel pool. | i) Testing will be performed to measure the delivery rate from the PCCWST to the spent fuel pool. ii) Inspection of the PCCWST will be performed. | i) With the PCCWST water level at 27.4 ft + 0.2, - 0.0 ft above the bottom of the tank, the flow path from the PCCWST to the spent fuel pool delivers greater than or equal to 118 gpm. ii) The volume of the PCCWST is greater than 756,700 gallons. |
| 8.a) The PCCAWST contains an inventory of cooling water sufficient for PCS containment cooling from hour 72 through day 7. | Inspection of the PCCAWST will be performed. | The volume of the PCCAWST is greater than 780,000 gallons. |
| 8.b) The PCS delivers water from the PCCAWST to the PCCWST and spent fuel pool simultaneously. | Testing will be performed to measure the delivery rate from the PCCAWST to the PCCWST and spent fuel pool simultaneously. | With PCCAWST aligned to the suction of the recirculation pumps, each pump delivers greater than or equal to 100 gpm to the PCCWST and 35 gpm to the spent fuel pool simultaneously when each pump is tested separately. |
| 8.c) The PCCWST includes a water inventory for the fire protection system. | See Tier 1 Material, Table 2.3.4-2, items 1 and 2. | See Tier 1 Material, Table 2.3.4-2, items 1 and 2. |
| 9. Safety-related displays identified in Table 2.2.2-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.2.2-1 can be retrieved in the MCR. |
| 10.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.2-1 to perform active functions. | Stroke testing will be performed on the remotely operated valves identified in Table 2.2.2-1 using the controls in the MCR. | Controls in the MCR operate to cause remotely operated valves identified in Table 2.2.2-1 to perform active functions. |

| Table 2.2.2-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 10.b) The valves identified in Table 2.2.2-1 as having PMS control perform an active safety function after receiving a signal from the PMS. | Testing will be performed on the remotely operated valves in Table 2.2.2-1 using real or simulated signals into the PMS. | The remotely operated valves identified in Table 2.2.2-1 as having PMS control perform the active function identified in the table after receiving a signal from the PMS. |
| 10.c) The valves identified in Table 2.2.2-1 as having DAS control perform an active safety function after receiving a signal from the DAS. | Testing will be performed on the remotely operated valves listed in Table 2.2.2-1 using real or simulated signals into the DAS. | The remotely operated valves identified in Table 2.2.2-1 as having DAS control perform the active function identified in the table after receiving a signal from the DAS. |
| 11.a) The motor-operated valves identified in Table 2.2.2-1 perform an active safety-related function to change position as indicated in the table. | i) Tests or type tests of motor-operated valves will be performed to demonstrate the capability of the valve to operate under its design conditions. ii) Inspection will be performed for the existence of a report verifying that the capability of the as-built motor-operated valves bound the tested conditions. iii) Tests of the motor-operated valves will be performed under preoperational flow, differential pressure, and temperature conditions. | i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.2-1 under design conditions. ii) A report exists and concludes that the capability of the as-built motor-operated valves bound the tested conditions. iii) Each motor-operated valve changes position as indicated in Table 2.2.2-1 under preoperational test conditions. |
| 11.b) After loss of motive power, the remotely operated valves identified in Table 2.2.2-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.2.2-1 assumes the indicated loss of motive power position. |

| Table 2.2.2-4 | | |
|----------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| PCCWST | PCS-MT-01 | Shield Building |
| PCCAWST | PCS-MT-05 | Yard |
| Recirculation Pump A | PCS-MP-01A | Auxiliary Building |
| Recirculation Pump B | PCS-MP-01B | Auxiliary Building |

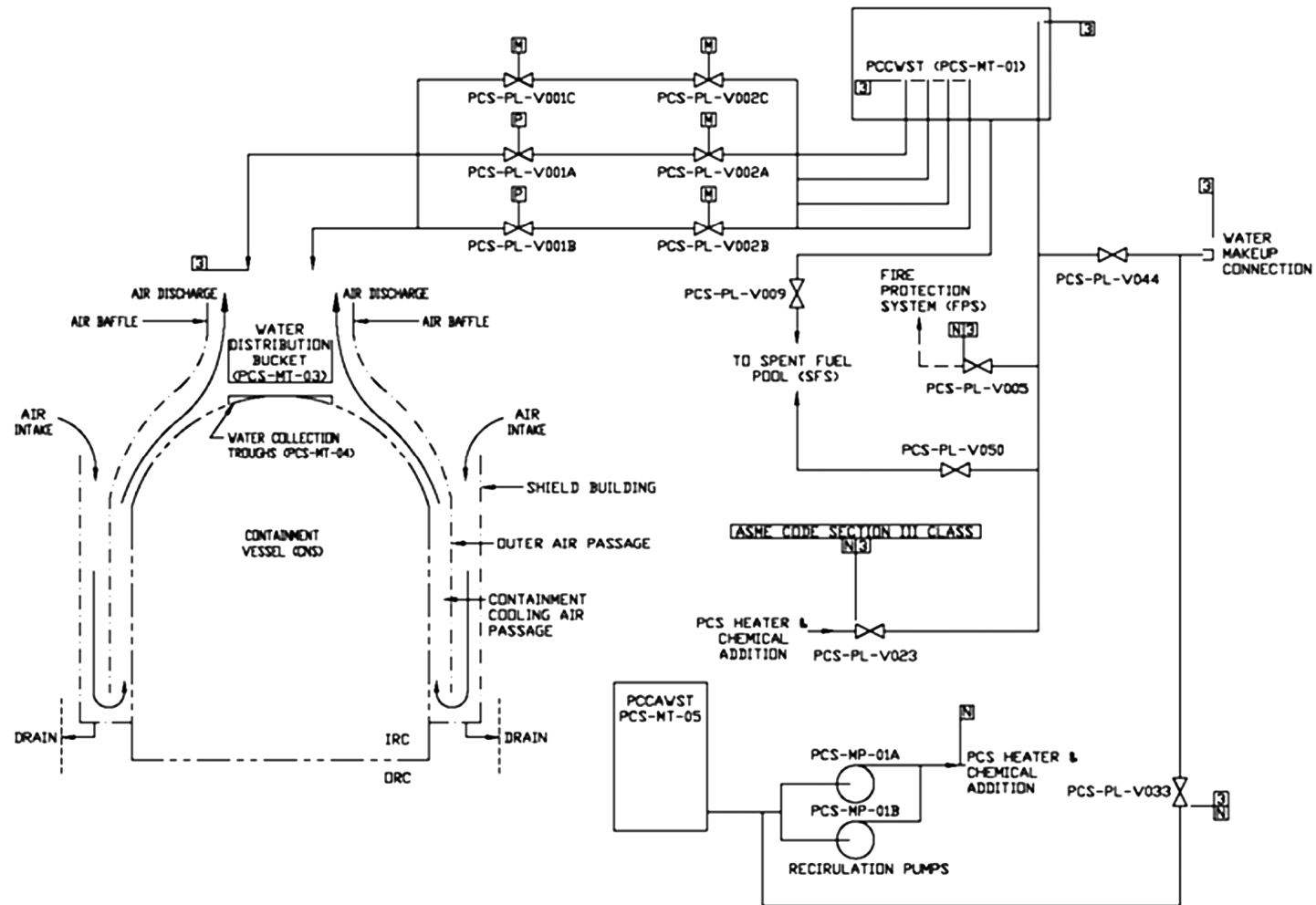


Figure 2.2.2-1
Passive Containment Cooling System

2.2.3 Passive Core Cooling System**Design Description**

The passive core cooling system (PXS) provides emergency core cooling during design basis events.

The PXS is as shown in Figure 2.2.3-1 and the component locations of the PXS are as shown in Table 2.2.3-5.

1. The functional arrangement of the PXS is as described in the Design Description of this Section 2.2.3.
2.
 - a) The components identified in Table 2.2.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.2.3-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.2.3-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.2.3-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.2.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.2.3-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.2.3-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
6. Each of the as-built lines identified in Table 2.2.3-2 as designed for leak before break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.
7.
 - a) The Class 1E equipment identified in Table 2.2.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.2.3-1 are powered from their respective Class 1E division.
 - c) Separation is provided between PXS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

8. The PXS provides the following safety-related functions:
 - a) The PXS provides containment isolation of the PXS lines penetrating the containment.
 - b) The PRHR HX provides core decay heat removal during design basis events.
 - c) The CMTs, accumulators, in-containment refueling water storage tank (IRWST) and containment recirculation provide reactor coolant system (RCS) makeup, boration, and safety injection during design basis events.
 - d) The PXS provides pH adjustment of water flooding the containment following design basis accidents.
9. The PXS has the following features:
 - a) The PXS provides a function to cool the outside of the reactor vessel during a severe accident.
 - b) The accumulator discharge check valves (PXS-PL-V028A/B and V029A/B) are of a different check valve type than the CMT discharge check valves (PXS-PL-V016A/B and V017A/B).
 - c) The equipment listed in Table 2.2.3-6 has sufficient thermal lag to withstand the effects of identified hydrogen burns associated with severe accidents.
10. Safety-related displays of the parameters identified in Table 2.2.3-1 can be retrieved in the main control room (MCR).
11.
 - a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.3-1 to perform their active function(s).
 - b) The valves identified in Table 2.2.3-1 as having protection and safety monitoring system (PMS) control perform their active function after receiving a signal from the PMS.
 - c) The valves identified in Table 2.2.3-1 as having diverse actuation system (DAS) control perform their active function after receiving a signal from the DAS.
12.
 - a) The squib valves and check valves identified in Table 2.2.3-1 perform an active safety-related function to change position as indicated in the table.
 - b) After loss of motive power, the remotely operated valves identified in Table 2.2.3-1 assume the indicated loss of motive power position.
13. Displays of the parameters identified in Table 2.2.3-3 can be retrieved in the MCR.

Inspection, Tests, Analyses, and Acceptance Criteria

Table 2.2.3-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the PXS.

| Table 2.2.3-1 | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Passive Residual Heat Removal Heat Exchanger (PRHR HX) | PXS-ME-01 | Yes | Yes | - | - / - | - | - / - | - | - |
| Accumulator Tank A | PXS-MT-01A | Yes | Yes | - | - / - | - | - / - | - | - |
| Accumulator Tank B | PXS-MT-01B | Yes | Yes | - | - / - | - | - / - | - | - |
| Core Makeup Tank (CMT) A | PXS-MT-02A | Yes | Yes | - | - / - | - | - / - | - | - |
| CMT B | PXS-MT-02B | Yes | Yes | - | - / - | - | - / - | - | - |
| IRWST | PXS-MT-03 | No | Yes | - | - / - | - | - / - | - | - |
| IRWST Screen A | PXS-MY-Y01A | No | Yes | - | - / - | - | - / - | - | - |
| IRWST Screen B | PXS-MY-Y01B | No | Yes | - | - / - | - | - / - | - | - |
| IRWST Screen C | PXS-MY-Y01C | No | Yes | - | - / - | - | - / - | - | - |
| Containment Recirculation Screen A | PXS-MY-Y02A | No | Yes | - | - / - | - | - / - | - | - |
| Containment Recirculation Screen B | PXS-MY-Y02B | No | Yes | - | - / - | - | - / - | - | - |
| pH Adjustment Basket 3A | PXS-MY-Y03A | No | Yes | - | - / - | - | - / - | - | - |
| pH Adjustment Basket 3B | PXS-MY-Y03B | No | Yes | - | - / - | - | - / - | - | - |
| pH Adjustment Basket 4A | PXS-MY-Y04A | No | Yes | | - / - | | - / - | | |
| pH Adjustment Basket 4B | PXS-MY-Y04B | No | Yes | | - / - | | - / - | | |
| CMT A Inlet Isolation Motor-operated Valve | PXS-PL-V002A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/No | None | As Is |
| CMT B Inlet Isolation Motor-operated Valve | PXS-PL-V002B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/No | None | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|---------------------------------|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|--------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| CMT A Discharge Isolation Valve | PXS-PL-V014A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| CMT B Discharge Isolation Valve | PXS-PL-V014B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| CMT A Discharge Isolation Valve | PXS-PL-V015A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| CMT B Discharge Isolation Valve | PXS-PL-V015B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| CMT A Discharge Check Valve | PXS-PL-V016A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| CMT B Discharge Check Valve | PXS-PL-V016B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| CMT A Discharge Check Valve | PXS-PL-V017A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| CMT B Discharge Check Valve | PXS-PL-V017B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Accumulator A Pressure Relief Valve | PXS-PL-V022A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| Accumulator B Pressure Relief Valve | PXS-PL-V022B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| Accumulator A Discharge Isolation Valve | PXS-PL-V027A | Yes | Yes | Yes | - / - | Yes | - /No | None | As Is |
| Accumulator B Discharge Isolation Valve | PXS-PL-V027B | Yes | Yes | Yes | - / - | Yes | - /No | None | As Is |
| Accumulator A Discharge Check Valve | PXS-PL-V028A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Close | - |
| Accumulator B Discharge Check Valve | PXS-PL-V028B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Close | - |
| Accumulator A Discharge Check Valve | PXS-PL-V029A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Close | - |
| Accumulator B Discharge Check Valve | PXS-PL-V029B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Close | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Nitrogen Supply Containment Isolation Valve | PXS-PL-V042 | Yes | Yes | Yes | Yes/No | Yes (position) | Yes/No | Transfer Closed | Close |
| Nitrogen Supply Containment Isolation Check Valve | PXS-PL-V043 | Yes | Yes | No | - / - | No | - / - | Transfer Closed | - |
| PRHR HX Inlet Isolation Motor-operated Valve | PXS-PL-V101 | Yes | Yes | Yes | Yes/Yes | Yes (position) | Yes/No | None | As Is |
| PRHR HX Control Valve | PXS-PL-V108A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| PRHR HX Control Valve | PXS-PL-V108B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | Open |
| Containment Recirculation A Isolation Motor-operated Valve | PXS-PL-V117A | Yes | Yes | Yes | Yes/Yes | Yes (position) | Yes/No | None | As Is |
| Containment Recirculation B Isolation Motor-operated Valve | PXS-PL-V117B | Yes | Yes | Yes | Yes/Yes | Yes (position) | Yes/No | None | As Is |
| Containment Recirculation A Squib Valve | PXS-PL-V118A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| Containment Recirculation B Squib Valve | PXS-PL-V118B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Containment Recirculation A Check Valve | PXS-PL-V119A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| Containment Recirculation B Check Valve | PXS-PL-V119B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| Containment Recirculation A Squib Valve | PXS-PL-V120A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| Containment Recirculation B Squib Valve | PXS-PL-V120B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| IRWST Injection A Check Valve | PXS-PL-V122A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| IRWST Injection B Check Valve | PXS-PL-V122B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| IRWST Injection A Squib Valve | PXS-PL-V123A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| IRWST Injection B Squib Valve | PXS-PL-V123B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|-------------------------------|--------------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| IRWST Injection A Check Valve | PXS-PL-V124A | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| IRWST Injection B Check Valve | PXS-PL-V124B | Yes | Yes | No | - / - | No | - / - | Transfer Open/ Transfer Closed | - |
| IRWST Injection A Squib Valve | PXS-PL-V125A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| IRWST Injection B Squib Valve | PXS-PL-V125B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Open | As Is |
| IRWST Gutter Isolation Valve | PXS-PL-V130A | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Closed | Closed |
| IRWST Gutter Isolation Valve | PXS-PL-V130B | Yes | Yes | Yes | Yes/Yes | Yes (Position) | Yes/Yes | Transfer Closed | Closed |
| CMT A Level Sensor | PXS-011A | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT A Level Sensor | PXS-011B | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT A Level Sensor | PXS-011C | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT A Level Sensor | PXS-011D | - | Yes | - | Yes/Yes | Yes | - / - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|-----------------------|----------|-----------------------|----------------|-------------------------|------------------------------|------------------------|------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety-Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| CMT B Level Sensor | PXS-012A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT B Level Sensor | PXS-012B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT B Level Sensor | PXS-012C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT B Level Sensor | PXS-012D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT A Level Sensor | PXS-013A | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT A Level Sensor | PXS-013B | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT A Level Sensor | PXS-013C | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT A Level Sensor | PXS-013D | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| CMT B Level Sensor | PXS-014A | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT B Level Sensor | PXS-014B | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT B Level Sensor | PXS-014C | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| CMT B Level Sensor | PXS-014D | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| IRWST Level Sensor | PXS-045 | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| IRWST Level Sensor | PXS-046 | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| IRWST Level Sensor | PXS-047 | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| IRWST Level Sensor | PXS-048 | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| PRHR HX Flow Sensor | PXS-049A | - | Yes | - | Yes/Yes | Yes | - / - | - | - |
| PRHR HX Flow Sensor | PXS-049B | - | Yes | - | Yes/Yes | Yes | - / - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-1 (cont.) | | | | | | | | | |
|--------------------------------------|--------------|--------------------------------|-------------------|-------------------------------|---------------------------------------|-------------------------------|------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. Harsh Envir. | Safety- Related Display | Control PMS/ DAS | Active Function | Loss of Motive Power Position |
| Containment Flood-up Level Sensor | PXS-050 | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Containment Flood-up Level Sensor | PXS-051 | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| Containment Flood-up Level Sensor | PXS-052 | - | Yes | - | Yes/Yes | Yes | -/- | - | - |
| RNS Suction Leak Test Valve | PXS-PL-V208A | Yes | Yes | No | - / - | No | -/- | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-2 | | | | |
|---|--|-----------------------|-------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| PRHR HX inlet line from hot leg and outlet line to steam generator channel head | RCS-L134, PXS-L102, PXS-L103, PXS-L104A, PXS-L104B, PXS-L105, RCS-L113 | Yes | Yes | Yes |
| | PXS-L107 | Yes | Yes | No |
| CMT A inlet line from cold leg C and outlet line to reactor vessel direct vessel injection (DVI) nozzle A | RCS-L118A, PXS-L007A, PXS-L015A, PXS-L016A, PXS-L017A, PXS-L018A, PXS-L020A, PXS-L021A | Yes | Yes | Yes |
| | PXS-L019A, PXS-L070A | Yes | Yes | No |
| CMT B inlet line from cold leg D and outlet line to reactor vessel DVI nozzle B | RCS-L118B, PXS-L007B, PXS-L015B, PXS-L016B, PXS-L017B, PXS-L018B, PXS-L020B, PXS-L021B | Yes | Yes | Yes |
| | PXS-L019B, PXS-L070B | Yes | Yes | No |
| Accumulator A discharge line to DVI line A | PXS-L025A, PXS-L027A, PXS-L029A | Yes | Yes | Yes |
| Accumulator B discharge line to DVI line B | PXS-L025B, PXS-L027B, PXS-L029B | Yes | Yes | Yes |
| IRWST injection line A to DVI line A | PXS-L125A, PXS-L127A | Yes | Yes | Yes |
| | PXS-L123A, PXS-L124A, PXS-L118A, PXS-L117A, PXS-L116A, PXS-L112A | Yes | No | Yes |
| IRWST injection line B to DVI line B | PXS-L125B, PXS-L127B | Yes | Yes | Yes |
| | PXS-L123B, PXS-L124B, PXS-L118B, PXS-L117B, PXS-L116B, PXS-L114B, PXS-L112B, PXS-L120 | Yes | No | Yes |

| Table 2.2.3-2 (cont.) | | | | |
|----------------------------------|---------------------------------|-----------------------------|-------------------------|--------------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| IRWST screen cross-connect line | PXS-L180A, PXS-L180B | Yes | No | Yes |
| Containment recirculation line A | PXS-L113A, PXS-L131A, PXS-L132A | Yes | No | Yes |
| Containment recirculation line B | PXS-L113B, PXS-L131B, PXS-L132B | Yes | No | Yes |
| IRWST gutter drain line | PXS-L142A, PXS-L142B | Yes | No | Yes |
| | PXS-L141A, PXS-L141B | Yes | No | No |

| Table 2.2.3-3 | | | |
|--|--------------|----------------|------------------|
| Equipment | Tag No. | Display | Control Function |
| CMT A Discharge Isolation Valve (Position) | PXS-PL-V014A | Yes (Position) | - |
| CMT B Discharge Isolation Valve (Position) | PXS-PL-V014B | Yes (Position) | - |
| CMT A Discharge Isolation Valve (Position) | PXS-PL-V015A | Yes (Position) | - |
| CMT B Discharge Isolation Valve (Position) | PXS-PL-V015B | Yes (Position) | - |
| Accumulator A Nitrogen Vent Valve (Position) | PXS-PL-V021A | Yes (Position) | - |
| Accumulator B Nitrogen Vent Valve (Position) | PXS-PL-V021B | Yes (Position) | - |
| Accumulator A Discharge Isolation Valve (Position) | PXS-PL-V027A | Yes (Position) | - |
| Accumulator B Discharge Isolation Valve (Position) | PXS-PL-V027B | Yes (Position) | - |
| PRHR HX Control Valve (Position) | PXS-PL-V108A | Yes (Position) | - |
| PRHR HX Control Valve (Position) | PXS-PL-V108B | Yes (Position) | - |
| Containment Recirculation A Isolation Valve | PXS-PL-V017A | Yes (Position) | - |
| Containment Recirculation B Isolation Valve | PXS-PL-V017B | Yes (Position) | - |
| Containment Recirculation A Isolation Valve (Position) | PXS-PL-V118A | Yes (Position) | - |
| Containment Recirculation B Isolation Valve (Position) | PXS-PL-V118B | Yes (Position) | - |
| Containment Recirculation A Isolation Valve (Position) | PXS-PL-V120A | Yes (Position) | - |
| Containment Recirculation B Isolation Valve (Position) | PXS-PL-V120B | Yes (Position) | - |
| IRWST Line A Isolation Valve (Position) | PXS-PL-V121A | Yes (Position) | - |
| IRWST Line B Isolation Valve (Position) | PXS-PL-V121B | Yes (Position) | - |
| IRWST Injection A Isolation Squib (Position) | PXS-PL-V123A | Yes (Position) | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-3 (cont.) | | | |
|--|--------------|----------------|------------------|
| Equipment | Tag No. | Display | Control Function |
| IRWST Injection B Isolation Squib (Position) | PXS-PL-V123B | Yes (Position) | - |
| IRWST Injection A Isolation Squib (Position) | PXS-PL-V125A | Yes (Position) | - |
| IRWST Injection B Isolation Squib (Position) | PXS-PL-V125B | Yes (Position) | - |
| IRWST Gutter Bypass Isolation Valve (Position) | PXS-PL-V130A | Yes (Position) | - |
| IRWST Gutter Bypass Isolation Valve (Position) | PXS-PL-V130B | Yes (Position) | - |
| Accumulator A Level Sensor | PXS-JE-L021 | Yes | - |
| Accumulator B Level Sensor | PXS-JE-L022 | Yes | - |
| Accumulator A Level Sensor | PXS-JE-L023 | Yes | - |
| Accumulator B Level Sensor | PXS-JE-L024 | Yes | - |
| PRHR HX Inlet Temperature Sensor | PXS-JE-T064 | Yes | - |
| IRWST Surface Temperature Sensor | PXS-JE-T041 | Yes | - |
| IRWST Surface Temperature Sensor | PXS-JE-T042 | Yes | - |
| IRWST Bottom Temperature Sensor | PXS-JE-T043 | Yes | - |
| IRWST Bottom Temperature Sensor | PXS-JE-T044 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.3-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the PXS is as described in the Design Description of this Section 2.2.3. | Inspection of the as-built system will be performed. | The as-built PXS conforms with the functional arrangement as described in the Design Description of this Section 2.2.3. |
| 2.a) The components identified in Table 2.2.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.3-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.2.3-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.2.3-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.2.3-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.2.3-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.2.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.3-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.2.3-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.2.3-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.a) The seismic Category I equipment identified in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function. | <p>i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.2.3-1 are located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> | <p>i) The seismic Category I equipment identified in Table 2.2.3-1 is located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of safety function. For the PXS containment recirculation and IRWST screens, a report exists and concludes that the screens can withstand seismic dynamic loads and also post-accident operating loads, including head loss and debris weights.</p> <p>iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. For the PXS containment recirculation and IRWST screens, a report exists and concludes that the as-built screens including their anchorage are bounded by the seismic loads and also post-accident operating loads, including head loss and debris weights.</p> |
| 5.b) Each of the lines identified in Table 2.2.3-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed verifying that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.2.3-2 for which functional capability is required meets the requirements for functional capability. |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6. Each of the as-built lines identified in Table 2.2.3-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line. | Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from dynamic effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture. | An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built PXS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided. |
| 7.a) The Class 1E equipment identified in Table 2.2.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.2.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.2.3-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |
| 7.b) The Class 1E components identified in Table 2.2.3-1 are powered from their respective Class 1E division. | Testing will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.2.3-1 when the assigned Class 1E division is provided the test signal. |
| 7.c) Separation is provided between PXS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 8.a) The PXS provides containment isolation of the PXS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8.b) The PXS provides core decay heat removal during design basis events. | <p>A heat removal performance test and analysis of the PRHR HX will be performed to determine the heat transfer from the HX. For the test, the reactor coolant hot leg temperature will be initially at $\geq 540^{\circ}\text{F}$ with the reactor coolant pumps stopped. The IRWST water level for the test will be above the top of the HX. The IRWST water temperature is not specified for the test. The test will continue until the hot leg temperature decreases below 420°F.</p> <p>Inspection of the elevation of the PRHR HX will be conducted.</p> | <p>A report exists and concludes that the PRHR HX heat transfer rate with the design basis number of PRHR HX tubes plugged is:</p> <p>$\geq 1.78 \times 10^8$ Btu/hr with 520°F HL Temp and 80°F IRWST temperatures.</p> <p>$\geq 1.11 \times 10^8$ Btu/hr with 420°F HL Temp and 80°F IRWST temperatures.</p> <p>The elevation of the centerline of the HX's upper channel head is greater than the HL centerline by at least 26.3 ft.</p> |
| 8.c) The PXS provides RCS makeup, boration, and safety injection during design basis events. | <p>i) A low-pressure injection test and analysis for each CMT, each accumulator, each IRWST injection line, and each containment recirculation line will be conducted. Each test is initiated by opening isolation valve(s) in the line being tested. Test fixtures may be used to simulate squib valves.</p> <p>CMTs: Each CMT will be initially filled with water. All valves in these lines will be open during the test.</p> <p>Accumulators: Each accumulator will be partially filled with water and pressurized with nitrogen. All valves in these lines will be open during the test. Sufficient flow will be provided to fully open the check valves.</p> | <p>i) The injection line flow resistance from each source is as follows:</p> <p>CMTs: The calculated flow resistance between each CMT and the reactor vessel is $\geq 1.81 \times 10^{-5}$ ft/gpm² and $\leq 2.25 \times 10^{-5}$ ft/gpm².</p> <p>Accumulators: The calculated flow resistance between each accumulator and the reactor vessel is $\geq 1.47 \times 10^{-5}$ ft/gpm² and $\leq 1.83 \times 10^{-5}$ ft/gpm².</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>IRWST Injection: The IRWST will be partially filled with water. All valves in these lines will be open during the test. Sufficient flow will be provided to fully open the check valves.</p> <p>Containment Recirculation: A temporary water supply will be connected to the recirculation lines. All valves in these lines will be open during the test. Sufficient flow will be provided to fully open the check valves.</p> <p>ii) A low-pressure test and analysis will be conducted for each CMT to determine piping flow resistance from the cold leg to the CMT. The test will be performed by filling the CMT via the cold leg balance line by operating the normal residual heat removal pumps.</p> <p>iii) Inspections of the routing of the following pipe lines will be conducted:</p> <ul style="list-style-type: none"> – CMT inlet line, cold leg to high point – PRHR HX inlet line, hot leg to high point | <p>IRWST Injection: The calculated flow resistance for each IRWST injection line between the IRWST and the reactor vessel is: Line A: $\geq 5.53 \times 10^{-6}$ ft/gpm² and $\leq 9.20 \times 10^{-6}$ ft/gpm² and Line B: $\geq 6.21 \times 10^{-6}$ ft/gpm² and $\leq 1.03 \times 10^{-5}$ ft/gpm².</p> <p>Containment Recirculation: The calculated flow resistance for each containment recirculation line between the containment and the reactor vessel is: Line A: $\leq 1.11 \times 10^{-5}$ ft/gpm² and Line B: $\leq 1.04 \times 10^{-5}$ ft/gpm².</p> <p>ii) The flow resistance from the cold leg to the CMT is $\leq 7.21 \times 10^{-6}$ ft/gpm².</p> <p>iii) These lines have no downward sloping sections between the connection to the RCS and the high point of the line.</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>iv) Inspections of the elevation of the following pipe lines will be conducted:</p> <ul style="list-style-type: none"> – IRWST injection lines; IRWST connection to DVI nozzles – Containment recirculation lines; containment to IRWST lines – CMT discharge lines to DVI connection – PRHR HX outlet line to SG connection <p>v) Inspections of the elevation of the following tanks will be conducted:</p> <ul style="list-style-type: none"> – CMTs – IRWST <p>vi) Inspections of each of the following tanks will be conducted:</p> <ul style="list-style-type: none"> – CMTs – Accumulators – IRWST <p>vii) Inspection of the as-built components will be conducted for plates located above the containment recirculation screens.</p> | <p>iv) The maximum elevation of the top inside surface of these lines is less than the elevation of:</p> <ul style="list-style-type: none"> – IRWST bottom inside surface – IRWST bottom inside surface – CMT bottom inside surface – PRHR HX lower channel head top inside surface <p>v) The elevation of the bottom inside tank surface is higher than the direct vessel injection nozzle centerline by the following:</p> <ul style="list-style-type: none"> – CMTs ≥ 7.5 ft – IRWST ≥ 3.4 ft <p>vi) The calculated volume of each of the following tanks is as follows:</p> <ul style="list-style-type: none"> – CMTs ≥ 2487 ft³ – Accumulators ≥ 2000 ft³ – IRWST $\geq 73,900$ ft³ between the tank outlet connection and the tank overflow <p>vii) Plates located above each containment recirculation screen are no more than 1 ft above the top of the screen and extend out at least 10 ft perpendicular to and at least 7 ft to the side of the screen surface.</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>viii) Inspections of the IRWST and containment recirculation screens will be conducted. The inspections will include measurements of the pockets and the number of pockets used in each screen. The pocket frontal face area is based on a width times a height. The width is the distance between pocket centerlines for pockets located beside each other. The height is the distance between pocket centerlines for pockets located above each other. The pocket screen area is the total area of perforated plate inside each pocket; this area will be determined by inspection of the screen manufacturing drawings.</p> <p>ix) Inspections will be conducted of the insulation used inside the containment on the ASME Class 1 lines, reactor vessel, reactor coolant pumps, pressurizer and steam generators.</p> <p>Inspections will be conducted of other insulation used inside the containment within the zone of influence (ZOI).</p> | <p>viii) The screens utilize pockets with a frontal face area of $\geq 6.2 \text{ in}^2$ and a screen surface area $\geq 140 \text{ in}^2$ per pocket. IRWST Screens A and B each have a sufficient number of pockets to provide a frontal face area $\geq 20 \text{ ft}^2$, a screen surface area $\geq 500 \text{ ft}^2$, and a screen mesh size of $\leq 0.0625 \text{ inch}$. IRWST Screen C has a sufficient number of pockets to provide a frontal face area $\geq 40 \text{ ft}^2$, a screen surface area $\geq 1000 \text{ ft}^2$, and a screen mesh size $\leq 0.0625 \text{ inch}$. Each containment recirculation screen has a sufficient number of pockets to provide a frontal face area $\geq 105 \text{ ft}^2$, a screen surface area $\geq 2500 \text{ ft}^2$, and a screen mesh size $\leq 0.0625 \text{ inch}$.</p> <p>A debris curb exists in front of the containment recirculation screens which is $\geq 2 \text{ ft}$ above the loop compartment floor. The bottoms of the IRWST screens are located $\geq 6 \text{ in}$ above the bottom of the IRWST.</p> <p>ix) The type of insulation used on these lines and equipment is a metal reflective type or a suitable equivalent. If an insulation other than metal reflective insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.</p> <p>The type of insulation used on these lines and equipment is a metal reflective type or a suitable equivalent. If an insulation other than metal reflective insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>Inspection will be conducted of other insulation below the maximum flood level of a design basis loss-of-coolant accident (LOCA).</p> | <p>The type of insulation used on these lines is metal reflective insulation, jacketed fiberglass, or a suitable equivalent. If an insulation other than metal reflective or jacketed fiberglass insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.</p> |
| | <p>x) Inspections will be conducted of the as-built nonsafety-related coatings or of plant records of the nonsafety-related coatings used inside containment on walls, floors, ceilings, and structural steel except in the CVS room. Inspections will be conducted of the as-built non-safety-related coatings or of plant records of the non-safety-related coatings used on components below the maximum flood level of a design basis LOCA or located above the maximum flood level and not inside cabinets or enclosures.</p> <p>Inspections will be conducted on caulking, tags, and signs used inside containment below the maximum flood level of a design basis LOCA or located above the maximum flood level and not inside cabinets or enclosures.</p> <p>Inspections will be conducted of ventilation filters and fiber-producing fire barriers used inside containment within the ZOI or below the maximum flood level of a design basis LOCA.</p> | <p>x) A report exists and concludes that the coatings used on these surfaces have a dry film density of $\geq 100 \text{ lb/ft}^3$. If a coating is used that has a lower dry film density, a report must exist and conclude that the coating will not transport. A report exists and concludes that inorganic zinc coatings used on these surfaces are Safety – Service Level I.</p> <p>A report exists and concludes that tags and signs used in these locations are made of steel or another metal with a density $\geq 100 \text{ lb/ft}^3$. In addition, a report exists and concludes that caulking used in these locations or coatings used on these signs or tags have a dry film density of $\geq 100 \text{ lb/ft}^3$. If a material is used that has a lower density, a report must exist and conclude that there is insufficient water flow to transport lightweight caulking, signs, or tags.</p> <p>A report exists and concludes that the ventilation filters and fire barriers in these locations have a density of $\geq 100 \text{ lb/ft}^3$.</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | xi) Inspection of the as-built CMT inlet diffuser will be conducted. xii) Inspections will be conducted of the CMT level sensors (PXS-11A/B/D/C, - 12A/B/C/D, - 13A/B/C/D, - 14A/B/C/D) upper level tap lines. | xi) The CMT inlet diffuser has a flow area $\geq 165 \text{ in}^2$. xii) Each upper level tap line has a downward slope of ≥ 2.4 degrees from the centerline of the connection to the CMT to the centerline of the connection to the standpipe. |
| | xiii) Inspections will be conducted of the surfaces in the vicinity of the containment recirculation screens. The surfaces in the vicinity of the containment recirculation screens are the surfaces located above the bottom of the recirculation screens up to and including the bottom surface of the plate discussed in Table 2.2.3-4, item 8.c.vii, out at least 10 feet perpendicular to and at least 7 feet perpendicular to the side of the screen face. xiv) Inspections will be conducted of the exposed surfaces of the source range, intermediate range, and power range detectors. | xiii) These surfaces are stainless steel. xiv) These surfaces are made of stainless steel or titanium. |
| 8.d) The PXS provides pH adjustment of water flooding the containment following design basis accidents. | Inspections of the pH adjustment baskets will be conducted. | pH adjustment baskets exist, with a total calculated volume $\geq 560 \text{ ft}^3$. The pH baskets are located below plant elevation 107 ft, 2 in. |
| 9.a) The PXS provides a function to cool the outside of the reactor vessel during a severe accident. | i) A flow test and analysis for each IRWST drain line to the containment will be conducted. The test is initiated by opening isolation valves in each line. Test fixtures may be used to simulate squib valves. ii) Inspections of the as-built reactor vessel insulation will be performed. | i) The calculated flow resistance for each IRWST drain line between the IRWST and the containment is $\leq 4.07 \times 10^{-6} \text{ ft/gpm}^2$. ii) The combined total flow area of the water inlets is not less than 6 ft^2 . The combined total flow area of the steam outlet(s) is not less than 12 ft^2 . |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | A report exists and concludes that the minimum flow area between the vessel insulation and reactor vessel for the flow path that vents steam is not less than 12 ft ² considering the maximum deflection of the vessel insulation with a static pressure of 12.95 ft of water. |
| | iii) Inspections will be conducted of the flow path(s) from the loop compartments to the reactor vessel cavity. | iii) A flow path with a flow area not less than 6 ft ² exists from the loop compartment to the reactor vessel cavity. |
| 9.b) The accumulator discharge check valves (PXS-PL-V028A/B and V029A/B) are of a different check valve type than the CMT discharge check valves (PXS-PL-V016A/B and V017A/B). | An inspection of the accumulator and CMT discharge check valves is performed. | The accumulator discharge check valves are of a different check valve type than the CMT discharge check valves. |
| 9.c) The equipment listed in Table 2.2.3-6 has sufficient thermal lag to withstand the effects of identified hydrogen burns associated with severe accidents. | Type tests, analyses, or a combination of type tests and analyses will be performed to determine the thermal lag of this equipment. | A report exists and concludes that the thermal lag of this equipment is greater than the value required. |
| 10. Safety-related displays of the parameters identified in Table 2.2.3-1 can be retrieved in the MCR. | Inspection will be performed for the retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.2.3-1 can be retrieved in the MCR. |
| 11.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.3-1 to perform their active function(s). | <p>i) Testing will be performed on the squib valves identified in Table 2.2.3-1 using controls in the MCR, without stroking the valve.</p> <p>ii) Stroke testing will be performed on remotely operated valves other than squib valves identified in Table 2.2.3-1 using the controls in the MCR.</p> | <p>i) Controls in the MCR operate to cause a signal at the squib valve electrical leads that is capable of actuating the squib valve.</p> <p>ii) Controls in the MCR operate to cause remotely operated valves other than squib valves to perform their active functions.</p> |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 11.b) The valves identified in Table 2.2.3-1 as having PMS control perform their active function after receiving a signal from the PMS. | i) Testing will be performed on the squib valves identified in Table 2.2.3-1 using real or simulated signals into the PMS without stroking the valve. ii) Testing will be performed on the remotely operated valves other than squib valves identified in Table 2.2.3-1 using real or simulated signals into the PMS. | i) Squib valves receive an electrical signal at the valve electrical leads that is capable of actuating the valve after a signal is input to the PMS. ii) Remotely operated valves other than squib valves perform the active function identified in the table after a signal is input to the PMS. |
| | iii) Testing will be performed to demonstrate that remotely operated PXS isolation valves PXS-V014A/B, V015A/B, V108A/B open within the required response times. | iii) These valves open within 20 seconds after receipt of an actuation signal. |
| 11.c) The valves identified in Table 2.2.3-1 as having DAS control perform their active function after receiving a signal from the DAS. | i) Testing will be performed on the squib valves identified in Table 2.2.3-1 using real or simulated signals into the DAS without stroking the valve. ii) Testing will be performed on the remotely operated valves other than squib valves identified in Table 2.2.3-1 using real or simulated signals into the DAS. | i) Squib valves receive an electrical signal at the valve electrical leads that is capable of actuating the valve after a signal is input to the DAS. ii) Remotely operated valves other than squib valves perform the active function identified in Table 2.2.3-1 after a signal is input to the DAS. |

| Table 2.2.3-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 12.a) The squib valves and check valves identified in Table 2.2.3-1 perform an active safety-related function to change position as indicated in the table. | i) Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design condition. ii) Inspection will be performed for the existence of a report verifying that the as-built squib valves are bounded by the tests or type tests. iii) Deleted iv) Exercise testing of the check valves with active safety functions identified in Table 2.2.3-1 will be performed under preoperational test pressure, temperature, and fluid flow conditions. | i) A test report exists and concludes that each squib valve changes position as indicated in Table 2.2.3-1 under design conditions. ii) A report exists and concludes that the as-built squib valves are bounded by the tests or type tests. iii) Deleted iv) Each check valve changes position as indicated in Table 2.2.3-1 |
| 12.b) After loss of motive power, the remotely operated valves identified in Table 2.2.3-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.2.3-1 assumes the indicated loss of motive power position. |
| 13. Displays of the parameters identified in Table 2.2.3-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.2.3-3 in the MCR. | Displays identified in Table 2.2.3-3 can be retrieved in the MCR. |

| Table 2.2.3-5 | | |
|--|-------------|----------------------|
| Component Name | Tag No. | Component Location |
| Passive Residual Heat Removal Heat Exchanger (PRHR HX) | PXS-ME-01 | Containment Building |
| Accumulator Tank A | PXS-MT-01A | Containment Building |
| Accumulator Tank B | PXS-MT-01B | Containment Building |
| Core Makeup Tank (CMT) A | PXS-MT-02A | Containment Building |
| CMT B | PXS-MT-02B | Containment Building |
| IRWST | PXS-MT-03 | Containment Building |
| IRWST Screen A | PXS-MY-Y01A | Containment Building |
| IRWST Screen B | PXS-MY-Y01B | Containment Building |
| IRWST Screen C | PXS-MY-Y01C | Containment Building |
| Containment Recirculation Screen A | PXS-MY-Y02A | Containment Building |
| Containment Recirculation Screen B | PXS-MY-Y02B | Containment Building |
| pH Adjustment Basket 3A | PXS-MY-Y03A | Containment Building |
| pH Adjustment Basket 3B | PXS-MY-Y03B | Containment Building |
| pH Adjustment Basket 4A | PXS-MY-Y04A | Containment Building |
| pH Adjustment Basket 4B | PXS-MY-Y04B | Containment Building |

| Table 2.2.3-6 | | |
|---|---|-------------------------------|
| Equipment | Tag No. | Function |
| Hot Leg Sample Isolation Valves | PSS-PL-V001A/B | Transfer open |
| Liquid Sample Line Containment Isolation Valves IRC | PSS-PL-V010A/B | Transfer open |
| Containment Pressure Sensors | PCS-012, 013, 014 | Sense pressure |
| RCS Wide Range Pressure Sensors | RCS-140 A, B, C, D | Sense pressure |
| SG1 Wide Range Level Sensors | SGS-011, 012, 015, 016 | Sense level |
| SG2 Wide Range Level Sensors | SGS-013, 014, 017, 018 | Sense level |
| Hydrogen Monitors | VLS-001, 002, 003 | Sense concentration |
| Hydrogen Igniters | VLS-EH-01 through 64 | Ignite hydrogen |
| Containment Electrical Penetrations | P01, P02, P03, P06, P07, P09, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32 | Maintain containment boundary |

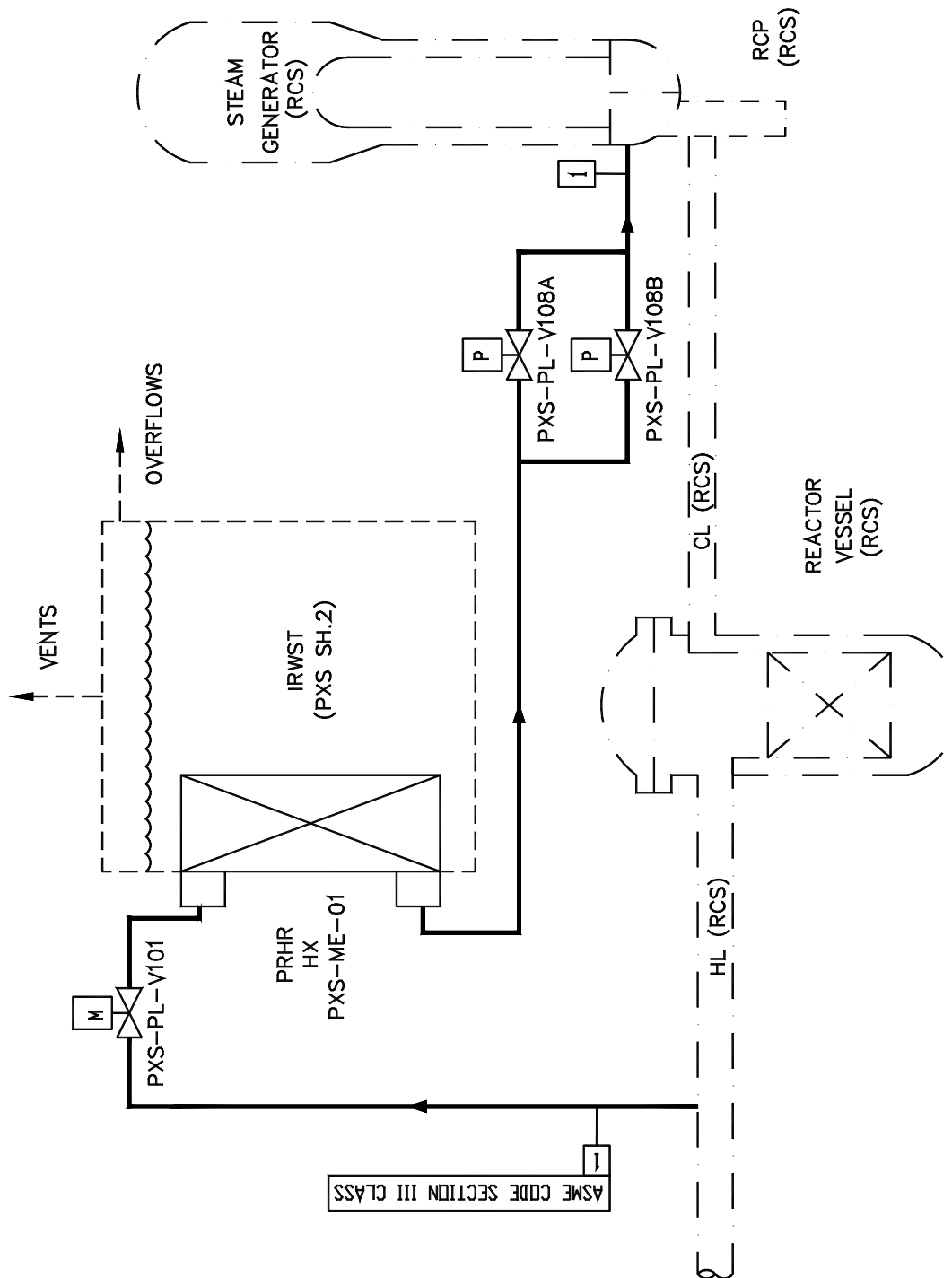


Figure 2.2.3-1 (Sheet 1 of 2)
Passive Core Cooling System

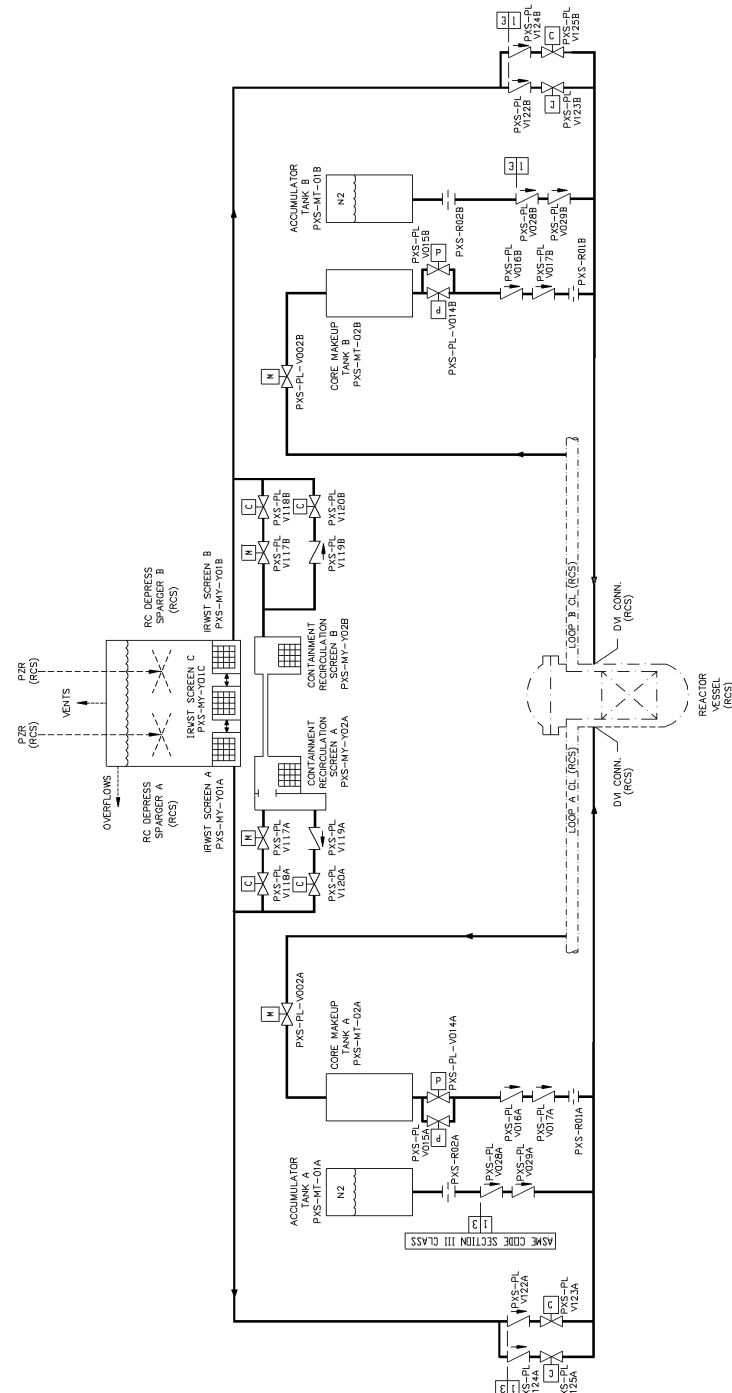


Figure 2.2.3-1 (Sheet 2 of 2)
Passive Core Cooling System

2.2.4 Steam Generator System**Design Description**

The steam generator system (SGS) and portions of the main and startup feedwater system (FWS) transport and control feedwater from the condensate system to the steam generators during normal operation. The SGS and portions of the main steam system (MSS) and turbine system (MTS) transport and control steam from the steam generators to the turbine generator during normal operations. These systems also isolate the steam generators from the turbine generator and the condensate system during design basis accidents.

The SGS is as shown in Figure 2.2.4-1, sheets 1 and 2, and portions of the FWS, MSS, and MTS are as shown in Figure 2.2.4-1, sheet 3, and the locations of the components in these systems is as shown in Table 2.2.4-5.

1. The functional arrangement of the SGS and portions of the FWS, MSS, and MTS are as described in the Design Description of this Section 2.2.4.
2.
 - a) The components identified in Table 2.2.4-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.2.4-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.2.4-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.2.4-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.2.4-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.2.4-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.2.4-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.2.4-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
6. Each of the as-built lines identified in Table 2.2.4-2 as designed for leak before break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.

7.
 - a) The Class 1E equipment identified in Table 2.2.4-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.2.4-1 are powered from their respective Class 1E division.
 - c) Separation is provided between SGS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
8. The SGS provides the following safety-related functions:
 - a) The SGS provides a heat sink for the reactor coolant system (RCS) and provides overpressure protection.
 - b) During design basis events, the SGS limits steam generator blowdown and feedwater flow to the steam generator.
 - c) The SGS preserves containment integrity by isolation of the SGS lines penetrating the containment. The inside containment isolation function (isolating the RCS and containment atmosphere from the environment) is provided by the steam generator, tubes, and SGS lines inside containment while isolation outside containment is provided by manual and automatic valves.
9. The SGS provides the following nonsafety-related functions:
 - a) Components within the main steam system, main and startup feedwater system, and the main turbine system identified in Table 2.2.4-3 provide backup isolation of the SGS to limit steam generator blowdown and feedwater flow to the steam generator.
 - b) During shutdown operations, the SGS removes decay heat by delivery of startup feedwater to the steam generator and venting of steam from the steam generators to the atmosphere.
10. Safety-related displays identified in Table 2.2.4-1 can be retrieved in the main control room (MCR).
11.
 - a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.4-1 to perform active functions.
 - b) The valves identified in Table 2.2.4-1 as having PMS control perform an active safety function after receiving a signal from PMS.
12.
 - a) The motor-operated valves identified in Table 2.2.4-1 perform an active safety-related function to change position as indicated in the table.
 - b) After loss of motive power, the remotely operated valves identified in Table 2.2.4-1 assume the indicated loss of motive power position.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.4-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the SGS.

| Table 2.2.4-1 | | | | | | | | | |
|------------------------------|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Main Steam Safety Valve SG01 | SGS-PL-V030A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V030B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG01 | SGS-PL-V031A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V031B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG01 | SGS-PL-V032A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V032B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|------------------------------|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Main Steam Safety Valve SG01 | SGS-PL-V033A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V033B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG01 | SGS-PL-V034A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V034B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG01 | SGS-PL-V035A | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |
| Main Steam Safety Valve SG02 | SGS-PL-V035B | Yes | Yes | - | -/- | No | - | Transfer Open/ Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Power-operated Relief Valve Block Motor-operated Valve Steam Generator 01 | SGS-PL-V027A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Power-operated Relief Valve Block Motor-operated Valve Steam Generator 02 | SGS-PL-V027B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Steam Line Condensate Drain Isolation Valve | SGS-PL-V036A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Steam Line Condensate Drain Isolation Valve | SGS-PL-V036B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Main Steam Line Isolation Valve | SGS-PL-V040A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Main Steam Line Isolation Valve | SGS-PL-V040B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Steam Line Condensate Drain Control Valve | SGS-PL-V086A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Steam Line Condensate Drain Control Valve | SGS-PL-V086B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Main Feedwater Isolation Valve | SGS-PL-V057A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Main Feedwater Isolation Valve | SGS-PL-V057B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Startup Feedwater Isolation Motor-operated Valve | SGS-PL-V067A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Startup Feedwater Isolation Motor-operated Valve | SGS-PL-V067B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| Steam Generator Blowdown Isolation Valve | SGS-PL-V074A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Steam Generator Blowdown Isolation Valve | SGS-PL-V074B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Steam Generator Blowdown Isolation Valve | SGS-PL-V075A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Steam Generator Blowdown Isolation Valve | SGS-PL-V075B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Power-operated Relief Valve | SGS-PL-V233A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Power-operated Relief Valve | SGS-PL-V233B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Main Steam Isolation Valve Bypass Isolation | SGS-PL-V240A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Main Steam Isolation Valve Bypass Isolation | SGS-PL-V240B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Main Feedwater Control Valve | SGS-PL-V250A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Main Feedwater Control Valve | SGS-PL-V250B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Startup Feedwater Control Valve | SGS-PL-V255A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| Startup Feedwater Control Valve | SGS-PL-V255B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|---|---------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Steam Generator 1 Narrow Range Level Sensor | SGS-001 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Narrow Range Level Sensor | SGS-002 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Narrow Range Level Sensor | SGS-003 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Narrow Range Level Sensor | SGS-004 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Narrow Range Level Sensor | SGS-005 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Narrow Range Level Sensor | SGS-006 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Narrow Range Level Sensor | SGS-007 | No | Yes | - | Yes/Yes | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|---|---------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Steam Generator 2 Narrow Range Level Sensor | SGS-008 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Wide Range Level Sensor | SGS-011 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Wide Range Level Sensor | SGS-012 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Wide Range Level Sensor | SGS-013 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Wide Range Level Sensor | SGS-014 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Wide Range Level Sensor | SGS-015 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 1 Wide Range Level Sensor | SGS-016 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Steam Generator 2 Wide Range Level Sensor | SGS-017 | No | Yes | - | Yes/Yes | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|---|---------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Steam Generator 2 Wide Range Level Sensor | SGS-018 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Main Steam Line Steam Generator 1 Pressure Sensor | SGS-030 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Main Steam Line Steam Generator 1 Pressure Sensor | SGS-031 | No | Yes | - | Yes/No | Yes | - | - | - |
| Main Steam Line Steam Generator 1 Pressure Sensor | SGS-032 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Main Steam Line Steam Generator 1 Pressure Sensor | SGS-033 | No | Yes | - | Yes/No | Yes | - | - | - |
| Main Steam Line Steam Generator 2 Pressure Sensor | SGS-034 | No | Yes | - | Yes/Yes | Yes | - | - | - |
| Main Steam Line Steam Generator 2 Pressure Sensor | SGS-035 | No | Yes | - | Yes/No | Yes | - | - | - |
| Main Steam Line Steam Generator 2 Pressure Sensor | SGS-036 | No | Yes | - | Yes/Yes | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-1 (cont.) | | | | | | | | | |
|---|---------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Main Steam Line Steam Generator 2 Pressure Sensor | SGS-037 | No | Yes | - | Yes/No | Yes | - | - | - |
| Steam Generator 1 Startup Feedwater Flow Sensor | SGS-55A | No | Yes | - | Yes/No | Yes | - | - | - |
| Steam Generator 1 Startup Feedwater Flow Sensor | SGS-55B | No | Yes | - | Yes/No | Yes | - | - | - |
| Steam Generator 2 Startup Feedwater Flow Sensor | SGS-56A | No | Yes | - | Yes/No | Yes | - | - | - |
| Steam Generator 2 Startup Feedwater Flow Sensor | SGS-56B | No | Yes | - | Yes/No | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-2 | | | | |
|--|---|-----------------------|-------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| Main Feedwater Line | SGS-PL-L002A, L002B | Yes | No | No |
| Main Feedwater Line | SGS-PL-L003A, L003B | Yes | No | No |
| Startup Feedwater Line | SGS-PL-L004A, L004B | Yes | No | No |
| Startup Feedwater Line | SGS-PL-L005A, L005B | Yes | No | No |
| Main Steam Line (within containment) | SGS-PL-L006A, L006B | Yes | Yes | Yes |
| Main Steam Line (outside of containment) | SGS-PL-L006A, L006B | Yes | No | Yes |
| Main Steam Line | SGS-PL-L007A, L007B | Yes | No | No |
| Safety Valve Inlet Line | SGS-PL-L015A, L015B, L015C, L015D, L015E, L015F, L015G, L015H, L015J, L015K, L015L, L015M | Yes | No | Yes |
| Safety Valve Discharge Line | SGS-PL-L018A, L018B, L018C, L018D, L018E, L018F, L018G, L018H, L018J, L018K, L018L, L018M | Yes | No | Yes |
| Power-operated Relief Block Valve Inlet Line | SGS-PL-L024A, L024B | Yes | No | No |
| Power-operated Relief Valve Inlet Line | SGS-PL-L014A, L014B | Yes | No | No |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-2 | | | | |
|---|---------------------|-----------------------|-------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| Main Steam Isolation Valve Bypass Inlet Line | SGS-PL-L022A, L022B | Yes | No | No |
| Main Steam Isolation Valve Bypass Outlet Line | SGS-PL-L023A, L023B | Yes | No | No |
| Main Steam Condensate Drain Line | SGS-PL-L021A, L021B | Yes | No | No |
| Steam Generator Blowdown Line | SGS-PL-L009A, L009B | Yes | No | No |
| Steam Generator Blowdown Line | SGS-PL-L027A, L027B | Yes | No | No |
| Steam Generator Blowdown Line | SGS-PL-L010A, L010B | Yes | No | No |

Note: Dash (-) indicates not applicable.

| Table 2.2.4-3 | | |
|---|--------------|------------------|
| Equipment Name | Tag No. | Control Function |
| Turbine Stop Valve | MTS-PL-V001A | Close |
| Turbine Stop Valve | MTS-PL-V001B | Close |
| Turbine Control Valve | MTS-PL-V002A | Close |
| Turbine Control Valve | MTS-PL-V002B | Close |
| Turbine Stop Valve | MTS-PL-V003A | Close |
| Turbine Stop Valve | MTS-PL-V003B | Close |
| Turbine Control Valve | MTS-PL-V004A | Close |
| Turbine Control Valve | MTS-PL-V004B | Close |
| Turbine Bypass Control Valve | MSS-PL-V001 | Close |
| Turbine Bypass Control Valve | MSS-PL-V002 | Close |
| Turbine Bypass Control Valve | MSS-PL-V003 | Close |
| Turbine Bypass Control Valve | MSS-PL-V004 | Close |
| Turbine Bypass Control Valve | MSS-PL-V005 | Close |
| Turbine Bypass Control Valve | MSS-PL-V006 | Close |
| Moisture Separator Reheater 2nd Stage Steam Isolation Valve | MSS-PL-V015A | Close |
| Moisture Separator Reheater 2nd Stage Steam Isolation Valve | MSS-PL-V015B | Close |
| Main Feedwater Pump | FWS-MP-02A | Trip |
| Main Feedwater Pump | FWS-MP-02B | Trip |
| Main Feedwater Pump | FWS-MP-02C | Trip |
| Startup Feedwater Pump | FWS-MP-03A | Trip |
| Startup Feedwater Pump | FWS-MP-03B | Trip |

| Table 2.2.4-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the SGS and portions of the FWS, MSS, and MTS are as described in the Design Description of this Section 2.2.4. | Inspection of the as-built system will be performed. | The as-built SGS and portions of the FWS, MSS, and MTS conform with the functional arrangement as defined in the Design Description of this Section 2.2.4. |
| 2.a) The components identified in Table 2.2.4-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.4-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.2.4-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.2.4-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.2.4-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.2.4-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |

| Table 2.2.4-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.a) The components identified in Table 2.2.4-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.4-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.2.4-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.2.4-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5.a) The seismic Category I equipment identified in Table 2.2.4-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.2.4-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.2.4-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 5.b) Each of the lines identified in Table 2.2.4-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report concluding that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.2.4-2 for which functional capability is required meets the requirements for functional capability. |

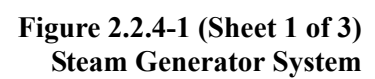
| Table 2.2.4-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6. Each of the as-built lines identified in Table 2.2.4-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line. | Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture. | An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built SGS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided. |
| 7.a) The Class 1E equipment identified in Table 2.2.4-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | <p>i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.</p> <p>ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.</p> | <p>i) A report exists and concludes that the Class 1E equipment identified in Table 2.2.4-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p> <p>ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.2.4-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p> |
| 7.b) The Class 1E components identified in Table 2.2.4-1 are powered from their respective Class 1E division. | Testing will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.2.4-1 when the assigned Class 1E division is provided the test signal. |
| 7.c) Separation is provided between SGS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |

| Table 2.2.4-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8.a) The SGS provides a heat sink for the RCS and provides overpressure protection in accordance with Section III of the ASME Boiler and Pressure Vessel Code. | i) Inspections will be conducted to confirm that the value of the vendor code plate rating of the steam generator safety valves is greater than or equal to system relief requirements. ii) Testing and analyses in accordance with ASME Code Section III will be performed to determine set pressure. | i) The sum of the rated capacities recorded on the valve vendor code plates of the steam generator safety valves exceeds 8,240,000 lb/hr per steam generator. ii) A report exists to indicate the set pressure of the valves is less than 1305 psig. |
| 8.b) During design basis events, the SGS limits steam generator blowdown and feedwater flow to the steam generator. | i) Testing will be performed to confirm isolation of the main feedwater, startup feedwater, blowdown, and main steam lines. See item 11 in this table. ii) Inspection will be performed for the existence of a report confirming that the area of the flow limiting orifice within the SG main steam outlet nozzle will limit releases to the containment. | See item 11 in this table. ii) A report exists to indicate the installed flow limiting orifice within the SG main steam line discharge nozzle does not exceed 1.4 sq. ft. |
| 8.c) The SGS preserves containment integrity by isolation of the SGS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, item 7. | See Tier 1 Material, Table 2.2.1-3, item 7. |
| 9.a) Components within the main steam system, main and startup feedwater system, and the main turbine system identified in Table 2.2.4-3 provide backup isolation of the SGS to limit steam generator blowdown and feedwater flow to the steam generator. | i) Testing will be performed to confirm closure of the valves identified in Table 2.2.4-3. ii) Testing will be performed to confirm the trip of the pumps identified in Table 2.2.4-3. | i) The valves identified in Table 2.2.4-3 close after a signal is generated by the PMS. ii) The pumps identified in Table 2.2.4-3 trip after a signal is generated by the PMS. |

| Table 2.2.4-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 9.b) During shutdown operations, the SGS removes decay heat by delivery of startup feedwater to the steam generator and venting of steam from the steam generators to the atmosphere. | i) Tests will be performed to demonstrate the ability of the startup feedwater system to provide feedwater to the steam generators. ii) Type tests and/or analyses will be performed to demonstrate the ability of the power-operated relief valves to discharge steam from the steam generators to the atmosphere. | i) See Tier 1 Material, Table 2.4.1-2, Item 2. ii) A report exists and concludes that each power-operated relief valve will relieve greater than 300,000 lb/hr at 1106 psia \pm 10 psi. |
| 10. Safety-related displays identified in Table 2.2.4-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.2.4-1 can be retrieved in the MCR. |
| 11.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.4-1 to perform active functions. | Stroke testing will be performed on the remotely operated valves listed in Table 2.2.4-1 using controls in the MCR. | Controls in the MCR operate to cause the remotely operated valves to perform active safety functions. |
| 11.b) The valves identified in Table 2.2.4-1 as having PMS control perform an active safety function after receiving a signal from PMS. | i) Testing will be performed on the remotely operated valves listed in Table 2.2.4-1 using real or simulated signals into the PMS. ii) Testing will be performed to demonstrate that remotely operated SGS isolation valves SGS-V027A/B, V040A/B, V057A/B, V250A/B close within the required response times. | i) The remotely-operated valves identified in Table 2.2.4-1 as having PMS control perform the active function identified in the table after receiving a signal from the PMS. ii) These valves close within the following times after receipt of an actuation signal: V027A/B < 44 sec V040A/B, V057A/B < 5 sec V250A/B < 5 sec |

| Table 2.2.4-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 12.a) The motor-operated valves identified in Table 2.2.4-1 perform an active safety-related function to change position as indicated in the table. | <p>i) Tests or type tests of motor-operated valves will be performed to demonstrate the capability of the valve to operate under its design conditions.</p> <p>ii) Inspection will be performed for the existence of a report verifying that the as-built motor-operated valves are bounded by the tests or type tests.</p> <p>iii) Tests of the motor-operated valves will be performed under pre-operational flow, differential pressure, and temperature conditions.</p> | <p>i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.4-1 under design conditions.</p> <p>ii) A report exists and concludes that the as-built motor-operated valves are bounded by the tests or type tests.</p> <p>iii) Each motor-operated valve changes position as indicated in Table 2.2.4-1 under pre-operational test conditions.</p> |
| 12.b) After loss of motive power, the remotely operated valves identified in Table 2.2.4-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.2.4-1 assumes the indicated loss of motive power position. Motive power to SGS-PL-V040A/B and SGS-PL-V057A/B is electric power to the actuator from plant services. |

| Table 2.2.4-5 | | |
|---------------------------------|--|--------------------|
| Component Name | Tag No. | Component Location |
| Main Steam Line Isolation Valve | SGS-PL-V040A | Auxiliary Building |
| Main Steam Line Isolation Valve | SGS-PL-V040B | Auxiliary Building |
| Main Feedwater Isolation Valve | SGS-PL-V057A | Auxiliary Building |
| Main Feedwater Isolation Valve | SGS-PL-V057B | Auxiliary Building |
| Main Feedwater Control Valve | SGS-PL-V250A | Auxiliary Building |
| Main Feedwater Control Valve | SGS-PL-V250B | Auxiliary Building |
| Turbine Stop Valves | MTS-PL-V001A MTS-PL-V001B MTS-PL-V003A MTS-PL-V003B | Turbine Building |
| Turbine Control Valves | MTS-PL-V002A MTS-PL-V002B MTS-PL-V004A MTS-PL-V004B | Turbine Building |
| Main Feedwater Pumps | FWS-MP-02A FWS-MP-02B FWS-MP-02C | Turbine Building |
| Feedwater Booster Pumps | FWS-MP-01A FWS-MP-01B FWS-MP-01C | Turbine Building |



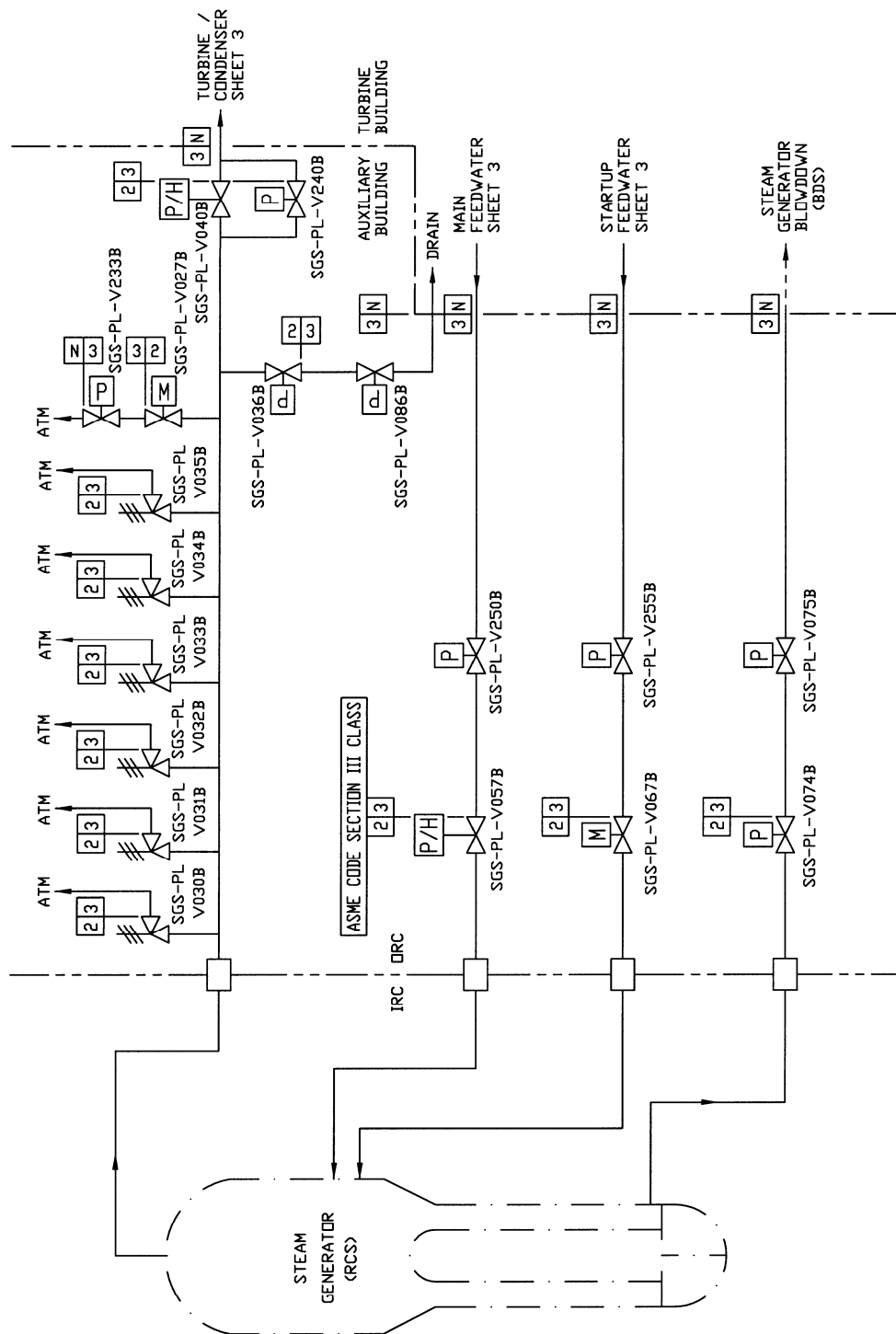


Figure 2.2.4-1 (Sheet 2 of 3)
Steam Generator System

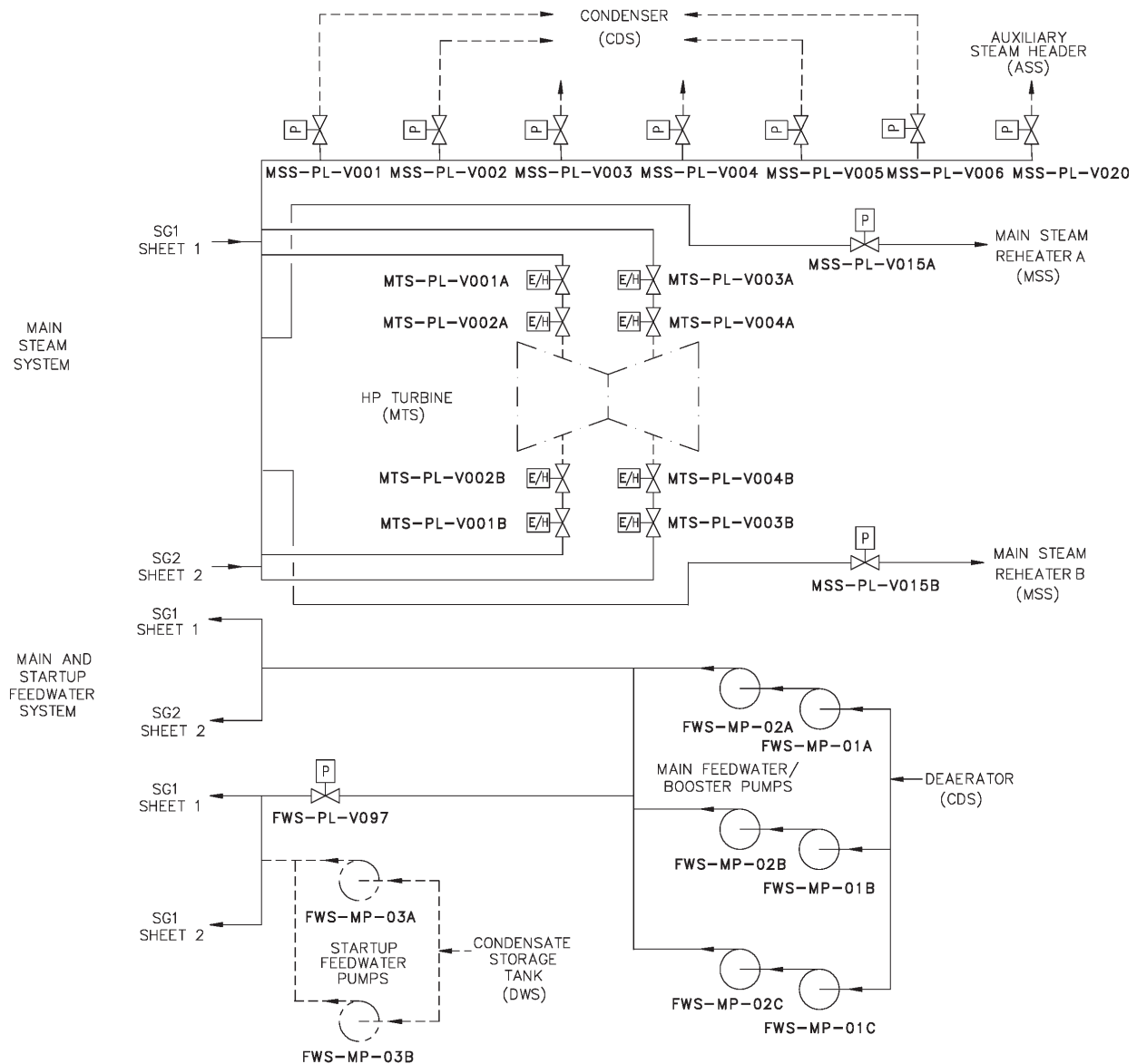


Figure 2.2.4-1 (Sheet 3 of 3)
Steam Generator System

2.2.5 Main Control Room Emergency Habitability System**Design Description**

The main control room emergency habitability system (VES) provides a supply of breathable air for the main control room (MCR) occupants and maintains the MCR at a positive pressure with respect to the surrounding areas whenever ac power is not available to operate the nuclear island nonradioactive ventilation system (VBS) or high radioactivity is detected in the MCR air supply. (See Tier 1 material, Section 3.5 for Radiation Monitoring). The VES also limits the heatup of the MCR, the 1E instrumentation and control (I&C) equipment rooms, and the Class 1E dc equipment rooms by using the heat capacity of surrounding structures.

The VES is as shown in Figure 2.2.5-1 and the component locations of the VES are as shown in Table 2.2.5-6.

1. The functional arrangement of the VES is as described in the Design Description of this Section 2.2.5.
2.
 - a) The components identified in Table 2.2.5-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.2.5-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.2.5-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.2.5-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.2.5-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.2.5-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.2.5-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.2.5-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
6.
 - a) The Class 1E components identified in Table 2.2.5-1 are powered from their respective Class 1E division.
 - b) Separation is provided between VES Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

7. The VES provides the following safety-related functions:
 - a) The VES provides a 72-hour supply of breathable quality air for the occupants of the MCR.
 - b) The VES maintains the MCR pressure boundary at a positive pressure with respect to the surrounding areas. There is a discharge of air through the MCR vestibule.
 - c) The heat loads within the MCR, the I&C equipment rooms, and the Class 1E dc equipment rooms are within design basis assumptions to limit the heatup of the rooms identified in Table 2.2.5-4.
 - d) The system provides a passive recirculation flow of MCR air to maintain main control room dose rates below an acceptable level during VES operation.
8. Safety-related displays identified in Table 2.2.5-1 can be retrieved in the MCR.
9.
 - a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.2.5-1 to perform their active functions.
 - b) The valves identified in Table 2.2.5-1 as having protection and safety monitoring system (PMS) control perform their active safety function after receiving a signal from the PMS.
10. After loss of motive power, the remotely operated valves identified in Table 2.2.5-1 assume the indicated loss of motive power position.
11. Displays of the parameters identified in Table 2.2.5-3 can be retrieved in the MCR.
12. The background noise level in the MCR does not exceed 65 dB(A) at the operator workstations when the VES is operating.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.5-5 specifies the inspections, tests, analyses, and associated acceptance criteria for the VES.

| Table 2.2.5-1 | | | | | | | | | |
|-------------------------------|-----------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Emergency Air Storage Tank 01 | VES-MT-01 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 02 | VES-MT-02 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 03 | VES-MT-03 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 04 | VES-MT-04 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 05 | VES-MT-05 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 06 | VES-MT-06 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 07 | VES-MT-07 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 08 | VES-MT-08 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 09 | VES-MT-09 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 10 | VES-MT-10 | No | Yes | - | -/- | - | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-1 (cont.) | | | | | | | | | |
|-------------------------------|-----------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Emergency Air Storage Tank 11 | VES-MT-11 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 12 | VES-MT-12 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 13 | VES-MT-13 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 14 | VES-MT-14 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 15 | VES-MT-15 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 16 | VES-MT-16 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 17 | VES-MT-17 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 18 | VES-MT-18 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 19 | VES-MT-19 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 20 | VES-MT-20 | No | Yes | - | -/- | - | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-1 (cont.) | | | | | | | | | |
|-------------------------------|-----------|--------------------------------|-------------------|-------------------------------|---|-------------------------------|----------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety- Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Emergency Air Storage Tank 21 | VES-MT-21 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 22 | VES-MT-22 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 23 | VES-MT-23 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 24 | VES-MT-24 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 25 | VES-MT-25 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 26 | VES-MT-26 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 27 | VES-MT-27 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 28 | VES-MT-28 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 29 | VES-MT-29 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 30 | VES-MT-30 | No | Yes | - | -/- | - | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Emergency Air Storage Tank 31 | VES-MT-31 | No | Yes | - | -/- | - | - | - | - |
| Emergency Air Storage Tank 32 | VES-MT-32 | No | Yes | - | -/- | - | - | - | - |
| Air Delivery Alternate Isolation Valve | VES-PL-V001 | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Eductor Flow Path Isolation Valve | VES-PL-V045 | Yes | Yes | No | -/- | No | - | Transfer Close | - |
| Eductor Bypass Isolation Valve | VES-PL-V046 | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Pressure Regulating Valve A | VES-PL-V002A | Yes | Yes | No | -/- | No | - | Throttle Flow | - |
| Pressure Regulating Valve B | VES-PL-V002B | Yes | Yes | No | -/- | No | - | Throttle Flow | - |
| MCR Air Delivery Isolation Valve A | VES-PL-V005A | Yes | Yes | Yes | Yes/No | No | Yes | Transfer Open | Open |
| MCR Air Delivery Isolation Valve B | VES-PL-V005B | Yes | Yes | Yes | Yes/No | No | Yes | Transfer Open | Open |
| MCR Pressure Relief Isolation Valve A | VES-PL-V022A | Yes | Yes | Yes | Yes/No | No | Yes | Transfer Open | Open |
| MCR Pressure Relief Isolation Valve B | VES-PL-V022B | Yes | Yes | Yes | Yes/No | No | Yes | Transfer Open | Open |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Air Tank Safety Relief Valve A | VES-PL-V040A | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Air Tank Safety Relief Valve B | VES-PL-V040B | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Air Tank Safety Relief Valve C | VES-PL-V040C | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Air Tank Safety Relief Valve D | VES-PL-V040D | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Main Air Flow Path Isolation Valve | VES-PL-V044 | Yes | Yes | No | -/- | No | - | Transfer Close | - |
| MCR Air Filtration Line Eductor | VES-PY-N01 | Yes | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Charcoal Filter | VES-MY-F01 | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line HEPA Filter | VES-MY-F02 | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Postfilter | VES-MY-F03 | No | Yes | - | - | - | - | - | - |
| MCR Gravity Relief Dampers | VES-MD-D001A | No | Yes | - | - | - | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-1 (cont.) | | | | | | | | | |
|---------------------------------------|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| MCR Gravity Relief Dampers | VES-MD-D001B | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Supply Damper | VES-MD-D002 | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Supply Damper | VES-MD-D003 | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Silencer | VES-MY-Y01 | No | Yes | - | - | - | - | - | - |
| MCR Air Filtration Line Silencer | VES-MY-Y02 | No | Yes | - | - | - | - | - | - |
| MCR Air Delivery Line Flow Sensor | VES-003A | No | Yes | - | Yes/No | Yes | - | - | - |
| MCR Air Delivery Line Flow Sensor | VES-003B | No | Yes | - | Yes/No | Yes | - | - | - |
| MCR Differential Pressure Sensor A | VES-004A | No | Yes | - | Yes/No | Yes | - | - | - |
| MCR Differential Pressure Sensor B | VES-004B | No | Yes | - | Yes/No | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.2.5-2 | | | |
|-----------------|-------------|-----------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Functional Capability Required |
| MCR Relief Line | VES-PL-022A | Yes | Yes |
| MCR Relief Line | VES-PL-022B | Yes | Yes |

| Table 2.2.5-3 | | |
|---------------------------|----------|---------|
| Equipment | Tag No. | Display |
| Air Storage Tank Pressure | VES-001A | Yes |
| Air Storage Tank Pressure | VES-001B | Yes |

| Table 2.2.5-4 | | | |
|--------------------|--------------|--|----------------------------------|
| Room Name | Room Numbers | Heat Load 0 to 24 Hours (Btu/s) | Heat Load 24 to 72 Hours (Btu/s) |
| MCR Envelope | 12401 | 12.8 (hour 0 through 3) 5.1 (hour 4 through 24) | 3.9 |
| I&C Rooms | 12301, 12305 | 8.8 | 0 |
| I&C Rooms | 12302, 12304 | 13.0 | 4.2 |
| dc Equipment Rooms | 12201, 12205 | 3.7 (hour 0 through 1) 2.4 (hour 2 through 24) | 0 |
| dc Equipment Rooms | 12203, 12207 | 5.8 (hour 0 through 1) 4.5 (hour 2 through 24) | 2.0 |

| Table 2.2.5-5 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VES is as described in the Design Description of this Section 2.2.5. | Inspection of the as-built system will be performed. | The as-built VES conforms with the functional arrangement described in the Design Description of this Section 2.2.5. |
| 2.a) The components identified in Table 2.2.5-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.5-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.2.5-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.2.5-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.2.5-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.2.5-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.2.5-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.5-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.2.5-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.2.5-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.2.5-5 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.a) The seismic Category I equipment identified in Table 2.2.5-1 can withstand seismic design basis loads without loss of safety function. | <p>i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.2.5-1 are located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> | <p>i) The seismic Category I equipment identified in Table 2.2.5-1 is located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.</p> <p>iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> |
| 5.b) Each of the lines identified in Table 2.2.5-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.2.5-2 for which functional capability is required meets the requirements for functional capability. |
| 6.a) The Class 1E components identified in Table 2.2.5-1 are powered from their respective Class 1E division. | Testing will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.2.5-1 when the assigned Class 1E division is provided the test signal. |
| 6.b) Separation is provided between VES Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |

| Table 2.2.5-5 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.a) The VES provides a 72-hour supply of breathable quality air for the occupants of the MCR. | i) Testing will be performed to confirm that the required amount of air flow is delivered to the MCR. ii) Analysis of storage capacity will be performed based on manufacturers data. iii) MCR air samples will be taken during VES testing and analyzed for quality. | i) The air flow rate from the VES is at least 60 scfm and not more than 70 scfm. ii) The calculated storage capacity is greater than or equal to 327,574 scf. iii) The MCR air is of breathable quality. |
| 7.b) The VES maintains the MCR pressure boundary at a positive pressure with respect to the surrounding areas. | i) Testing will be performed with VES flow rate between 60 and 70 scfm to confirm that the MCR is capable of maintaining the required pressurization of the pressure boundary. ii) Air leakage into the MCR will be measured during VES testing using a tracer gas. | i) The MCR pressure boundary is pressurized to greater than or equal to 1/8-in. water gauge with respect to the surrounding area. ii) Air leakage into the MCR is less than or equal to 10 cfm. |
| 7.c) The heat loads within the MCR, the I&C equipment rooms, and the Class 1E dc equipment rooms are within design basis assumptions to limit the heatup of the rooms identified in Table 2.2.5-4. | An analysis will be performed to determine that the heat loads from as-built equipment within the rooms identified in Table 2.2.5-4 are less than or equal to the design basis assumptions. | A report exists and concludes that: the heat loads within rooms identified in Table 2.2.5-4 are less than or equal to the specified values or that an analysis report exists that concludes: <ul style="list-style-type: none"> – The temperature and humidity in the MCR remain within limits for reliable human performance for the 72-hour period. – The maximum temperature for the 72-hour period for the I&C rooms is less than or equal to 120°F. – The maximum temperature for the 72-hour period for the Class 1E dc equipment rooms is less than or equal to 120°F. |

| Table 2.2.5-5 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7d) The system provides a passive recirculation flow of MCR air to maintain main control room dose rates below an acceptable level during VES operation. | Testing will be performed to confirm that the required amount of air flow circulates through the MCR passive filtration system, | The air flow rate at the outlet of the MCR passive filtration system is at least 600 cfm greater than the flow measured by VES-003A/B. |
| 8. Safety-related displays identified in Table 2.2.5-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.2.5-1 can be retrieved in the MCR. |
| 9.a) Controls exist in the MCR to cause remotely operated valves identified in Table 2.2.5-1 to perform their active functions. | Stroke testing will be performed on remotely operated valves identified in Table 2.2.5-1 using the controls in the MCR. | Controls in the MCR operate to cause remotely operated valves identified in Table 2.2.5-1 to perform their active safety functions. |
| 9.b) The valves identified in Table 2.2.5-1 as having PMS control perform their active safety function after receiving a signal from the PMS. | Testing will be performed on remotely operated valves listed in Table 2.2.5-1 using real or simulated signals into the PMS. | The remotely operated valves identified in Table 2.2.5-1 as having PMS control perform the active safety function identified in the table after receiving a signal from the PMS. |
| 10. After loss of motive power, the remotely operated valves identified in Table 2.2.5-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.2.5-1 assumes the indicated loss of motive power position. |
| 11. Displays of the parameters identified in Table 2.2.5-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.2.5-3 can be retrieved in the MCR. |
| 12. The background noise level in the MCR does not exceed 65 dB(A) at the operator workstations when VES is operating. | The as-built VES will be operated, and background noise levels in the MCR will be measured at the operator work stations with the plant not operating. | The background noise level in the MCR does not exceed 65 dB(A) at the operator work stations when the VES is operating. |

| Table 2.2.5-6 | | |
|-------------------------------|------------|--------------------|
| Component Name | Tag Number | Component Location |
| Emergency Air Storage Tank 01 | VES-MT-01 | Auxiliary Building |
| Emergency Air Storage Tank 02 | VES-MT-02 | Auxiliary Building |
| Emergency Air Storage Tank 03 | VES-MT-03 | Auxiliary Building |
| Emergency Air Storage Tank 04 | VES-MT-04 | Auxiliary Building |
| Emergency Air Storage Tank 05 | VES-MT-05 | Auxiliary Building |
| Emergency Air Storage Tank 06 | VES-MT-06 | Auxiliary Building |
| Emergency Air Storage Tank 07 | VES-MT-07 | Auxiliary Building |
| Emergency Air Storage Tank 08 | VES-MT-08 | Auxiliary Building |
| Emergency Air Storage Tank 09 | VES-MT-09 | Auxiliary Building |
| Emergency Air Storage Tank 10 | VES-MT-10 | Auxiliary Building |
| Emergency Air Storage Tank 11 | VES-MT-11 | Auxiliary Building |
| Emergency Air Storage Tank 12 | VES-MT-12 | Auxiliary Building |
| Emergency Air Storage Tank 13 | VES-MT-13 | Auxiliary Building |
| Emergency Air Storage Tank 14 | VES-MT-14 | Auxiliary Building |
| Emergency Air Storage Tank 15 | VES-MT-15 | Auxiliary Building |
| Emergency Air Storage Tank 16 | VES-MT-16 | Auxiliary Building |
| Emergency Air Storage Tank 17 | VES-MT-17 | Auxiliary Building |
| Emergency Air Storage Tank 18 | VES-MT-18 | Auxiliary Building |
| Emergency Air Storage Tank 19 | VES-MT-19 | Auxiliary Building |
| Emergency Air Storage Tank 20 | VES-MT-20 | Auxiliary Building |
| Emergency Air Storage Tank 21 | VES-MT-21 | Auxiliary Building |
| Emergency Air Storage Tank 22 | VES-MT-22 | Auxiliary Building |
| Emergency Air Storage Tank 23 | VES-MT-23 | Auxiliary Building |
| Emergency Air Storage Tank 24 | VES-MT-24 | Auxiliary Building |
| Emergency Air Storage Tank 25 | VES-MT-25 | Auxiliary Building |
| Emergency Air Storage Tank 26 | VES-MT-26 | Auxiliary Building |
| Emergency Air Storage Tank 27 | VES-MT-27 | Auxiliary Building |
| Emergency Air Storage Tank 28 | VES-MT-28 | Auxiliary Building |

| Table 2.2.5-6 (cont.) | | |
|-------------------------------|-------------------|---------------------------|
| Component Name | Tag Number | Component Location |
| Emergency Air Storage Tank 29 | VES-MT-29 | Auxiliary Building |
| Emergency Air Storage Tank 30 | VES-MT-30 | Auxiliary Building |
| Emergency Air Storage Tank 31 | VES-MT-31 | Auxiliary Building |
| Emergency Air Storage Tank 32 | VES-MT-32 | Auxiliary Building |

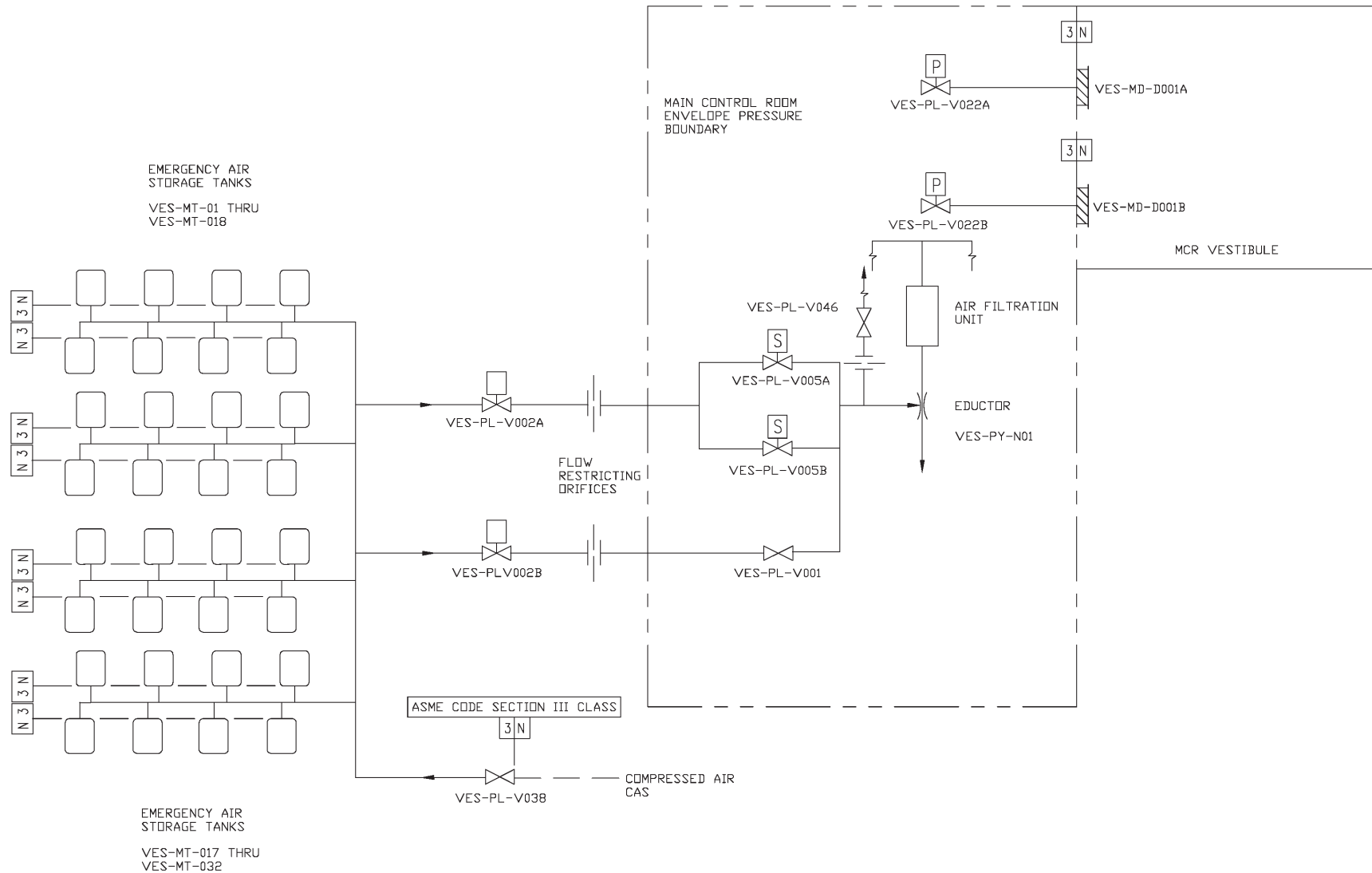


Figure 2.2.5-1
Main Control Room Emergency Habitability System

2.3 Auxiliary Systems**2.3.1 Component Cooling Water System****Design Description**

The component cooling water system (CCS) removes heat from various plant components and transfers this heat to the service water system (SWS) during normal modes of plant operation including power generation, shutdown and refueling. The CCS has two pumps and two heat exchangers.

The CCS is as shown in Figure 2.3.1-1 and the CCS component locations are as shown in Table 2.3.1-3.

1. The functional arrangement of the CCS is as described in the Design Description of this Section 2.3.1.
2. The CCS preserves containment integrity by isolation of the CCS lines penetrating the containment.
3. The CCS provides the nonsafety-related functions of transferring heat from the normal residual heat removal system (RNS) during shutdown and the spent fuel pool cooling system during all modes of operation to the SWS.
4. Controls exist in the main control room (MCR) to cause the pumps identified in Table 2.3.1-1 to perform the listed functions.
5. Displays of the parameters identified in Table 2.3.1-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.1-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the CCS.

| Table 2.3.1-1 | | | |
|--|--------------|---------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| CCS Pump A | CCS-MP-01A | Yes (Run Status) | Start |
| CCS Pump B | CCS-MP-01B | Yes (Run Status) | Start |
| CCS Discharge Header Flow Sensor | CCS-101 | Yes | - |
| CCS to Normal Residual Heat Removal System Heat Exchanger (RNS HX) A Flow Sensor | CCS-301 | Yes | - |
| CCS to RNS HX B Flow Sensor | CCS-302 | Yes | - |
| CCS to Spent Fuel Pool Cooling System (SFS) HX A Flow Sensor | CCS-341 | Yes | - |
| CCS to SFS HX B Flow Sensor | CCS-342 | Yes | - |
| CCS Surge Tank Level Sensor A | CCS-130 | Yes | - |
| CCS Surge Tank Level Sensor B | CCS-131 | Yes | - |
| CCS Heat Exchanger Inlet Temperature Sensor | CCS-121 | Yes | - |
| CCS Heat Exchanger Outlet Temperature Sensor | CCS-122 | Yes | - |
| CCS Flow to Reactor Coolant Pump (RCP) 1A Valve (Position Indicator) | CCS-PL-V256A | Yes | - |
| CCS Flow to RCP 1B Valve (Position Indicator) | CCS-PL-V256B | Yes | - |
| CCS Flow to RCP 2A Valve (Position Indicator) | CCS-PL-V256C | Yes | - |
| CCS Flow to RCP 2B Valve (Position Indicator) | CCS-PL-V256D | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.1-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the CCS is as described in the Design Description of this Section 2.3.1. | Inspection of the as-built system will be performed. | The as-built CCS conforms with the functional arrangement described in the Design Description of this Section 2.3.1. |
| 2. The CCS preserves containment integrity by isolation of the CCS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 3. The CCS provides the nonsafety-related functions of transferring heat from the RNS during shutdown and the spent fuel pool cooling system during all modes of operation to the SWS. | i) Inspection will be performed for the existence of a report that determines the heat transfer capability of the CCS heat exchangers. ii) Testing will be performed to confirm that the CCS can provide cooling water to the RNS HXs while providing cooling water to the SFS HXs. | i) A report exists and concludes that the UA of each CCS heat exchanger is greater than or equal to 14.0 million Btu/hr-°F. ii) Each pump of the CCS can provide at least 2685 gpm of cooling water to one RNS HX and at least 1200 gpm of cooling water to one SFS HX while providing at least 4415 gpm to other users of cooling water. |
| 4. Controls exist in the MCR to cause the pumps identified in Table 2.3.1-1 to perform the listed functions. | Testing will be performed to actuate the pumps identified in Table 2.3.1-1 using controls in the MCR. | Controls in the MCR operate to cause pumps listed in Table 2.3.1-1 to perform the listed functions. |
| 5. Displays of the parameters identified in Table 2.3.1-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | Displays identified in Table 2.3.1-1 can be retrieved in the MCR. |

| Table 2.3.1-3 | | |
|----------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| CCS Pump A | CCS-MP-01A | Turbine Building |
| CCS Pump B | CCS-MP-01B | Turbine Building |
| CCS Heat Exchanger A | CCS-ME-01A | Turbine Building |
| CCS Heat Exchanger B | CCS-ME-01B | Turbine Building |

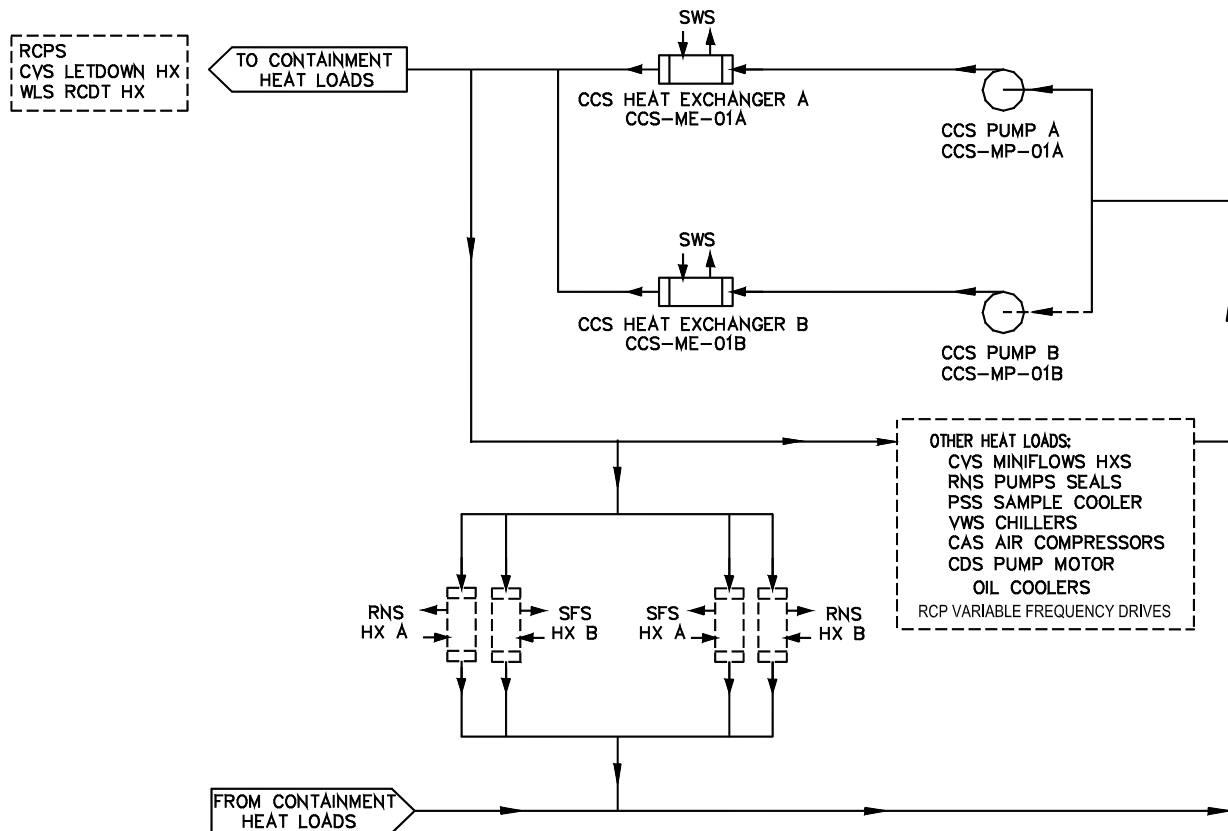


Figure 2.3.1-1
Component Cooling Water System

2.3.2 Chemical and Volume Control System**Design Description**

The chemical and volume control system (CVS) provides reactor coolant system (RCS) purification, RCS inventory control and makeup, chemical shim and chemical control, oxygen control, and auxiliary pressurizer spray. The CVS performs these functions during normal modes of operation including power generation and shutdown.

The CVS is as shown in Figure 2.3.2-1 and the component locations of the CVS are as shown in Table 2.3.2-5.

1. The functional arrangement of the CVS is as described in the Design Description of this Section 2.3.2.
2.
 - a) The components identified in Table 2.3.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.3.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.3.2-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.3.2-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.3.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.3.2-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5. The seismic Category I equipment identified in Table 2.3.2-1 can withstand seismic design basis loads without loss of safety function.
6.
 - a) The Class 1E equipment identified in Table 2.3.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.3.2-1 are powered from their respective Class 1E division.
 - c) Separation is provided between CVS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

7. The CVS provides the following safety-related functions:
 - a) The CVS preserves containment integrity by isolation of the CVS lines penetrating the containment.
 - b) The CVS provides termination of an inadvertent RCS boron dilution by isolating demineralized water from the RCS.
 - c) The CVS provides isolation of makeup to the RCS.
8. The CVS provides the following nonsafety-related functions:
 - a) The CVS provides makeup water to the RCS.
 - b) The CVS provides the pressurizer auxiliary spray.
9. Safety-related displays in Table 2.3.2-1 can be retrieved in the main control room (MCR).
10.
 - a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.3.2-1 to perform active functions.
 - b) The valves identified in Table 2.3.2-1 as having protection and safety monitoring system (PMS) control perform an active safety function after receiving a signal from the PMS.
11.
 - a) The motor-operated and check valves identified in Table 2.3.2-1 perform an active safety-related function to change position as indicated in the table.
 - b) After a loss of motive power, the remotely operated valves identified in Table 2.3.2-1 assume the indicated loss of motive power position.
12.
 - a) Controls exist in the MCR to cause the pumps identified in Table 2.3.2-3 to perform the listed function.
 - b) The pumps identified in Table 2.3.2-3 start after receiving a signal from the PLS.
13. Displays of the parameters identified in Table 2.3.2-3 can be retrieved in the MCR.
14. The nonsafety-related piping located inside containment and designated as reactor coolant pressure boundary, as identified in Table 2.3.2-2 (pipe lines with "No" in the ASME Code column), has been designed to withstand a seismic design basis event and maintain structural integrity.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.2-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the CVS.

| Table 2.3.2-1 | | | | | | | | | |
|---|-------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| RCS Purification Motor-operated Isolation Valve | CVS-PL-V001 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RCS Purification Motor-operated Isolation Valve | CVS-PL-V002 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RCS Purification Motor-operated Isolation Valve | CVS-PL-V003 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| CVS Resin Flush Line Containment Isolation Valve | CVS-PL-V040 | Yes | Yes | No | - / - | - | - | - | - |
| CVS Resin Flush Line Containment Isolation Valve | CVS-PL-V041 | Yes | Yes | No | - / - | - | - | - | - |
| CVS Demineralizer Resin Flush Line Containment Isolation Thermal Relief Valve | CVS-PL-V042 | Yes | Yes | No | - / - | - | - | Transfer Open/ Transfer Closed | - |
| CVS Letdown Containment Isolation Valve | CVS-PL-V045 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| CVS Letdown Containment Isolation Valve | CVS-PL-V047 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.3.2-1 (cont.) | | | | | | | | | |
|--|-------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| CVS Letdown Line Containment Isolation Thermal Relief Valve | CVS-PL-V058 | Yes | Yes | No | - / - | - | - | Transfer Open/ Transfer Closed | - |
| CVS Makeup Return Line Bypass Check Valve | CVS-PL-V067 | Yes | Yes | No | - / - | - | - | Transfer Open Transfer Closed | - |
| CVS Purification Return Line Pressure Boundary Check Valve | CVS-PL-V080 | Yes | Yes | No | - / - | - | - | Transfer Closed | - |
| CVS Purification Return Line Pressure Boundary Isolation Check Valve | CVS-PL-V081 | Yes | Yes | No | - / - | No | - | Transfer Closed | - |
| CVS Purification Return Line Pressure Boundary Check Valve | CVS-PL-V082 | Yes | Yes | No | - / - | - | - | Transfer Closed | - |
| CVS Auxiliary Pressurizer Spray Line Pressure Boundary Valve | CVS-PL-V084 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| CVS Auxiliary Pressurizer Spray Line Pressure Boundary Check Valve | CVS-PL-V085 | Yes | Yes | No | Yes/Yes | - | - | Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.2-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| CVS Makeup Line Containment Isolation Motor-operated Valve | CVS-PL-V090 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| CVS Makeup Line Containment Isolation Motor-operated Valve | CVS-PL-V091 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| CVS Zinc Injection Containment Isolation Valve ORC | CVS-PL-V092 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| CVS Zinc Injection Containment Isolation Valve IRC | CVS-PL-V094 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| CVS Zinc Addition Line Ctmt Isol Thermal Relief Valve | CVS-PL-V098 | Yes | Yes | No | - / - | - | - | Transfer Open/ Transfer Closed | - |
| CVS Makeup Line Containment Isolation Thermal Relief Valve | CVS-PL-V100 | Yes | Yes | No | - / - | - | - | Transfer Open/ Transfer Closed | - |
| CVS Demineralized Water Isolation Valve | CVS-PL-V136A | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.3.2-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| CVS Demineralized Water Isolation Valve | CVS-PL-V136B | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | Closed |
| CVS Hydrogen Injection Containment Isolation Check Valve IRC | CVS-PL-V217 | Yes | Yes | No | - / - | - | - | Transfer Closed | - |
| CVS Hydrogen Injection Containment Isolation Valve ORC | CVS-PL-V219 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.3.2-2 | | |
|---|---------------------|-----------------------|
| Line Name | Line Number | ASME Code Section III |
| CVS Purification Line | L001 | Yes |
| | L040 | Yes |
| CVS Resin Flush Containment Penetration Line | L026 | Yes |
| CVS Purification Line Return | L038 | Yes |
| CVS Pressurizer Auxiliary Spray Connection | L070 | Yes |
| | L071 | Yes |
| CVS Letdown Containment Penetration Line | L051 | Yes |
| CVS Makeup Containment Penetration Line | L053 | Yes |
| CVS Hydrogen Injection Containment Penetration Line | L213 | Yes |
| | L214 | |
| | L217 | |
| CVS Zinc Injection Containment Penetration Line | L061 | Yes |
| CVS Supply Line to Regenerative Heat Exchanger | L002 | No |
| CVS Return Line from Regenerative Heat Exchanger | L018 | No |
| | L036 | Yes |
| CVS Line from Regenerative Heat Exchanger to Letdown Heat Exchanger | L003 | No |
| CVS Lines from Letdown Heat Exchanger to Demin. Tanks | L004 | No |
| | L005 | No |
| | L072 | No |
| CVS Lines from Demin Tanks to RC Filters and Connected Lines | L006 ⁽¹⁾ | No |
| | L007 ⁽¹⁾ | No |
| | L010 ⁽¹⁾ | No |
| | L011 ⁽¹⁾ | No |
| | L012 | No |
| | L015 ⁽¹⁾ | No |
| | L016 ⁽¹⁾ | No |
| | L020 | No |
| | L021 | No |
| | L022 | No |
| | L023 ⁽¹⁾ | No |
| | L024 ⁽¹⁾ | No |
| | L029 | No |
| | L037 | No |

| Table 2.3.2-2 (cont.) | | |
|--|---------------------|-----------------------|
| Line Name | Line Number | ASME Code Section III |
| CVS Lines from RC Filters to Regenerative Heat Exchanger | L030 | No |
| | L031 | No |
| | L034 | No |
| | L050 | No |
| | L073 | No |
| CVS Resin Fill Lines to Demin. Tanks | L008 ⁽¹⁾ | No |
| | L013 ⁽¹⁾ | No |
| | L025 ⁽¹⁾ | No |

Note:

1. Special seismic requirements include only the portion of piping normally exposed to RCS pressure. Piping beyond the first normally closed isolation valve is evaluated as seismic Category II piping extending to either an interface anchor, a rigid support following a six-way anchor, or the last seismic support of a rigidly supported region of the piping system as necessary to satisfy analysis requirements for piping connected to seismic Category I piping systems.

| Table 2.3.2-3 | | | |
|--|-------------|---------------------|------------------|
| Equipment | Tag No. | Display | Control Function |
| CVS Makeup Pump A | CVS-MP-01A | Yes (Run Status) | Start |
| CVS Makeup Pump B | CVS-MP-01B | Yes (Run Status) | Start |
| Purification Flow Sensor | CVS-001 | Yes | - |
| Purification Return Flow Sensor | CVS-025 | Yes | - |
| CVS Purification Return Line (Position Indicator) | CVS-PL-V081 | Yes | - |
| Auxiliary Spray Line Isolation Valve (Position Indicator) | CVS-PL-V084 | Yes | - |
| Boric Acid Storage Tank Level Sensor | CVS-109 | Yes | - |
| Boric Acid Flow Sensor | CVS-115 | Yes | - |
| Makeup Blend Valve (Position Indicator) | CVS-PL-V115 | Yes | - |
| CVS Demineralized Water Isolation Valve (Position Indicator) | CVS-PL-136A | Yes | - |
| CVS Demineralized Water Isolation Valve (Position Indicator) | CVS-PL-136B | Yes | - |
| Makeup Pump Discharge Flow Sensor | CVS-157 | Yes | - |
| Makeup Flow Control Valve (Position Indicator) | CVS-PL-V157 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.2-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the CVS is as described in the Design Description of this Section 2.3.2. | Inspection of the as-built system will be performed. | The as-built CVS conforms with the functional arrangement as described in the Design Description of this Section 2.3.2. |
| 2.a) The components identified in Table 2.3.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.3.2-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.3.2-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.3.2-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.3.2-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.3.2-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.3.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.3.2-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.3.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.b) The piping identified in Table 2.3.2-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.3.2-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5. The seismic Category I equipment identified in Table 2.3.2-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.3.2-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.3.2-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 6.a) The Class 1E equipment identified in Table 2.3.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.3.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.3.2-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |

| Table 2.3.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6.b) The Class 1E components identified in Table 2.3.2-1 are powered from their respective Class 1E division. | Testing will be performed on the CVS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.3.2-1 when the assigned Class 1E division is provided the test signal. |
| 6.c) Separation is provided between CVS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 7.a) The CVS preserves containment integrity by isolation of the CVS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, item 7. | See Tier 1 Material, Table 2.2.1-3, item 7. |
| 7.b) The CVS provides termination of an inadvertent RCS boron dilution by isolating demineralized water from the RCS. | See item 10b in this table. | See item 10b in this table. |
| 7.c) The CVS provides isolation of makeup to the RCS. | See item 10b in this table. | See item 10b in this table. |
| 8.a) The CVS provides makeup water to the RCS. | i) Testing will be performed by aligning a flow path from each CVS makeup pump, actuating makeup flow to the RCS at pressure greater than or equal to 2000 psia, and measuring the flow rate in the makeup pump discharge line with each pump suction aligned to the boric acid storage tank. ii) Inspection of the boric acid storage tank volume will be performed. iii) Testing will be performed to measure the delivery rate from the DWS to the RCS. Both CVS makeup pumps will be operating and the RCS pressure will be below 6 psig. | i) Each CVS makeup pump provides a flow rate of greater than or equal to 100 gpm. ii) The volume in the boric acid storage tank is at least 70,000 gallons between the tank outlet connection and the tank overflow. iii) The total CVS makeup flow to the RCS is less than or equal to 200 gpm. |

| Table 2.3.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8.b) The CVS provides the pressurizer auxiliary spray. | Testing will be performed by aligning a flow path from each CVS makeup pump to the pressurizer auxiliary spray and measuring the flow rate in the makeup pump discharge line with each pump suction aligned to the boric acid storage tank and with RCS pressure greater than or equal to 2000 psia. | Each CVS makeup pump provides spray flow to the pressurizer. |
| 9. Safety-related displays identified in Table 2.3.2-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.3.2-1 can be retrieved in the MCR. |
| 10.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.3.2-1 to perform active functions. | Stroke testing will be performed on the remotely operated valves identified in Table 2.3.2-1 using the controls in the MCR. | Controls in the MCR operate to cause the remotely operated valves identified in Table 2.3.2-1 to perform active functions. |
| 10.b) The valves identified in Table 2.3.2-1 as having PMS control perform an active safety function after receiving a signal from the PMS. | i) Testing will be performed using real or simulated signals into the PMS. ii) Testing will be performed to demonstrate that the remotely operated CVS isolation valves CVS-V090, V091, V136A/B close within the required response time. | i) The valves identified in Table 2.3.2-1 as having PMS control perform the active function identified in the table after receiving a signal from the PMS. ii) These valves close within the following times after receipt of an actuation signal: V090, V091 < 30 sec V136A/B < 20 sec |
| 11.a) The motor-operated and check valves identified in Table 2.3.2-1 perform an active safety-related function to change position as indicated in the table. | i) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions. ii) Inspection will be performed for the existence of a report verifying that the as-built motor-operated valves are bounded by the tested conditions. | i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.3.2-1 under design conditions. ii) A report exists and concludes that the as-built motor-operated valves are bounded by the tests or type tests. |

| Table 2.3.2-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | iii) Tests of the motor-operated valves will be performed under pre-operational flow, differential pressure, and temperature conditions. iv) Exercise testing of the check valves with active safety functions identified in Table 2.3.2-1 will be performed under pre-operational test pressure, temperature and fluid flow conditions. | iii) Each motor-operated valve changes position as indicated in Table 2.3.2-1 under pre-operational test conditions. iv) Each check valve changes position as indicated in Table 2.3.2-1. |
| 11.b) After loss of motive power, the remotely operated valves identified in Table 2.3.2-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | Upon loss of motive power, each remotely operated valve identified in Table 2.3.2-1 assumes the indicated loss of motive power position. |
| 12.a) Controls exist in the MCR to cause the pumps identified in Table 2.3.2-3 to perform the listed function. | Testing will be performed to actuate the pumps identified in Table 2.3.2-3 using controls in the MCR. | Controls in the MCR cause pumps identified in Table 2.3.2-3 to perform the listed function. |
| 12.b) The pumps identified in Table 2.3.2-3 start after receiving a signal from the PLS. | Testing will be performed to confirm starting of the pumps identified in Table 2.3.2-3. | The pumps identified in Table 2.3.2-3 start after a signal is generated by the PLS. |
| 13. Displays of the parameters identified in Table 2.3.2-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.3.2-3 in the MCR. | Displays identified in Table 2.3.2-3 can be retrieved in the MCR. |
| 14. The nonsafety-related piping located inside containment and designated as reactor coolant pressure boundary, as identified in Table 2.3.2-2, has been designed to withstand a seismic design basis event and maintain structural integrity. | Inspection will be conducted of the as-built components as documented in the CVS Seismic Analysis Report. | The CVS Seismic Analysis Reports exist for the non-safety related piping located inside containment and designated as reactor coolant pressure boundary as identified in Table 2.3.2-2. |

| Table 2.3.2-5 | | |
|-----------------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| CVS Makeup Pump A | CVS-MP-01A | Auxiliary Building |
| CVS Makeup Pump B | CVS-MP-01B | Auxiliary Building |
| Boric Acid Storage Tank | CVS-MT-01 | Yard |
| Regenerative Heat Exchanger | CVS-ME-01 | Containment |
| Letdown Heat Exchanger | CVS-ME-02 | Containment |
| Mixed Bed Demineralizer A | CVS-MV-01A | Containment |
| Mixed Bed Demineralizer B | CVS-MV-01B | Containment |
| Cation Bed Demineralizer | CVS-MV-02 | Containment |
| Reactor Coolant Filter A | CVS-MV-03A | Containment |
| Reactor Coolant Filter B | CVS-MV-03B | Containment |

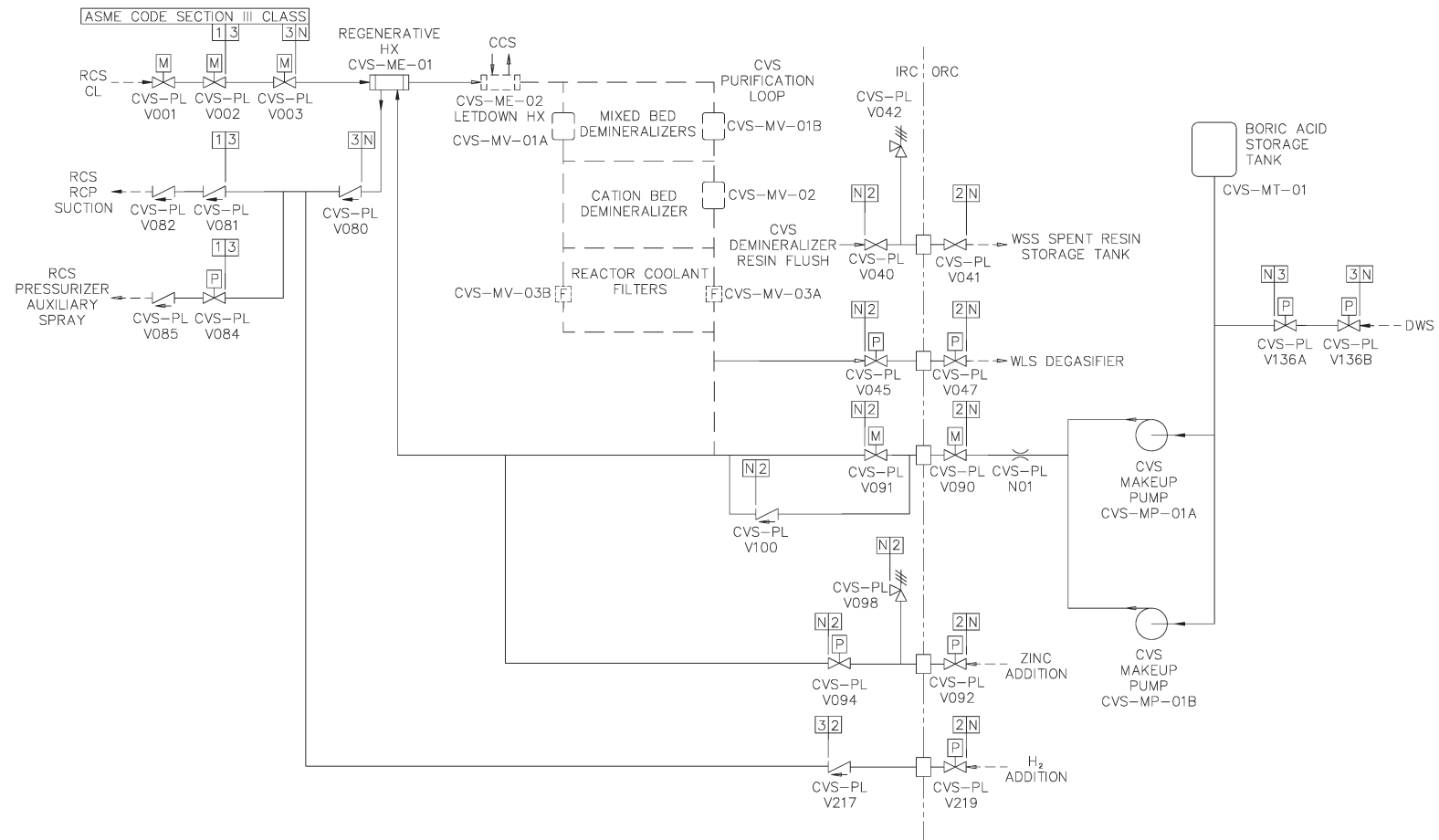


Figure 2.3.2-1
Chemical and Volume Control System

2.3.3 Standby Diesel Fuel Oil System**Design Description**

The standby diesel fuel oil system (DOS) supplies diesel fuel oil for the onsite standby power system. The diesel fuel oil is supplied by two above-ground fuel oil storage tanks. The DOS also provides fuel oil for the ancillary diesel generators. A single fuel oil storage tank services both ancillary diesel generators.

The DOS is as shown in Figure 2.3.3-1 and the component locations of the DOS are as shown in Table 2.3.3-3.

1. The functional arrangement of the DOS is as described in the Design Description of this Section 2.3.3.
2. The ancillary diesel generator fuel tank can withstand a seismic event.
3. The DOS provides the following nonsafety-related functions:
 - a) Each fuel oil storage tank provides for at least 7 days of continuous operation of the associated standby diesel generator.
 - b) Each fuel oil day tank provides for at least four hours of continuous operation of the associated standby diesel engine generator.
 - c) The fuel oil flow rate to the day tank of each standby diesel generator provides for continuous operation of the associated diesel generator.
 - d) The ancillary diesel generator fuel tank is sized to supply power to long-term safety-related post-accident monitoring loads and control room lighting through a regulating transformer and one PCS recirculation pump for a period of 4 days.
4. Controls exist in the main control room (MCR) to cause the components identified in Table 2.3.3-1 to perform the listed function.
5. Displays of the parameters identified in Table 2.3.3-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.3-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the DOS.

| Table 2.3.3-1 | | | |
|--|------------|---------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Diesel Fuel Oil Pump 1A (Motor) | DOS-MP-01A | Yes (Run Status) | Start |
| Diesel Fuel Oil Pump 1B (Motor) | DOS-MP-01B | Yes (Run Status) | Start |
| Diesel Generator Fuel Oil Day Tank A Level | DOS-016A | Yes | - |
| Diesel Generator Fuel Oil Day Tank B Level | DOS-016B | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.3-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the DOS is as described in the Design Description of this Section 2.3.3. | Inspection of the as-built system will be performed. | The as-built DOS conforms with the functional arrangement described in the Design Description of this Section 2.3.3. |
| 2. The ancillary diesel generator fuel tank can withstand a seismic event. | Inspection will be performed for the existence of a report verifying that the as-built ancillary diesel generator fuel tank and its anchorage are designed using seismic Category II methods and criteria. | A report exists and concludes that the as-built ancillary diesel generator fuel tank and its anchorage are designed using seismic Category II methods and criteria. |
| 3.a) Each fuel oil storage tank provides for at least 7 days of continuous operation of the associated standby diesel generator. | Inspection of each fuel oil storage tank will be performed. | The volume of each fuel oil storage tank available to the standby diesel generator is greater than or equal to 55,000 gallons. |
| 3.b) Each fuel oil storage day tank provides for at least 4 hours of operation of the associated standby diesel generator. | Inspection of the fuel oil day tank will be performed. | The volume of each fuel oil day tank is greater than or equal to 1300 gallons. |
| 3.c) The fuel oil flow rate to the day tank of each standby diesel generator provides for continuous operation of the associated diesel generator. | Testing will be performed to determine the flow rate. | The flow rate delivered to each day tank is 8 gpm or greater. |
| 3.d) The ancillary diesel generator fuel tank is sized to supply power to long-term safety-related post accident monitoring loads and control room lighting through a regulating transformer and one PCS recirculation pump for four days. | Inspection of the ancillary diesel generator fuel tank will be performed. | The volume of the ancillary diesel generator fuel tank is greater than or equal to 650 gallons. |
| 4. Controls exist in the MCR to cause the components identified in Table 2.3.3-1 to perform the listed function. | Testing will be performed on the components in Table 2.3.3-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.3.3-1 to perform the listed functions. |
| 5. Displays of the parameters identified in Table 2.3.3-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.3.3-1 can be retrieved in the MCR. |

| Table 2.3.3-3 | | |
|--|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Diesel Oil Transfer Package A | DOS-MS-01A | Yard |
| Diesel Oil Transfer Package B | DOS-MS-01B | Yard |
| Fuel Oil Storage Tank A | DOS-MT-01A | Yard |
| Fuel Oil Storage Tank B | DOS-MT-01B | Yard |
| Diesel Generator A Fuel Oil Day Tank | DOS-MT-02A | Diesel Building |
| Diesel Generator B Fuel Oil Day Tank | DOS-MT-02B | Diesel Building |
| Ancillary Diesel Fuel Oil Storage Tank | DOS-MT-03 | Annex Building |

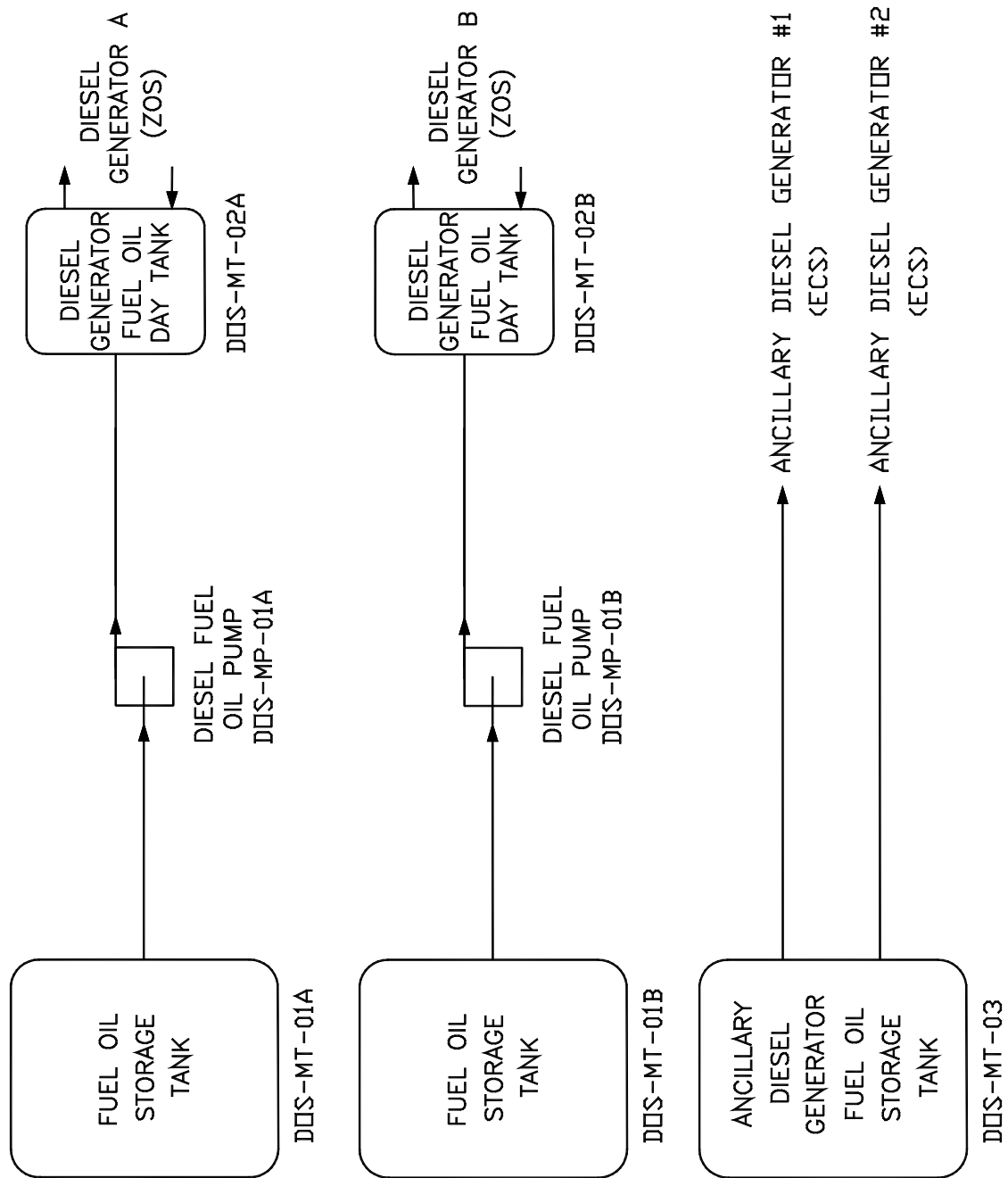


Figure 2.3.3-1
Standby Diesel Fuel Oil System

2.3.4 Fire Protection System**Design Description**

The fire protection system (FPS) detects and suppresses fires in the plant. The FPS consists of water distribution systems, automatic and manual suppression systems, a fire detection and alarm system, and portable fire extinguishers. The FPS provides fire protection for the nuclear island, the annex building, the turbine building, the radwaste building and the diesel generator building.

The FPS is as shown in Figure 2.3.4-1 and the component locations of the FPS are as shown in Table 2.3.4-3.

1. The functional arrangement of the FPS is as described in the Design Description of this Section 2.3.4.
2. The FPS piping identified in Table 2.3.4-4 remains functional following a safe shutdown earthquake.
3. The FPS provides the safety-related function of preserving containment integrity by isolation of the FPS line penetrating the containment.
4. The FPS provides for manual fire fighting capability in plant areas containing safety-related equipment.
5. Displays of the parameters identified in Table 2.3.4-1 can be retrieved in the main control room (MCR).
6. The FPS provides nonsafety-related containment spray for severe accident management.
7. The FPS provides two fire water storage tanks, each capable of holding at least 300,000 gallons of water.
8. Two FPS fire pumps provide at least 2000 gpm each at a total head of at least 300 ft.
9. The fuel tank for the diesel-driven fire pump is capable of holding at least 240 gallons.
10. Individual fire detectors provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment.
11. The FPS seismic standpipe subsystem can be supplied from the FPS fire main by opening the normally closed cross-connect valve to the FPS plant fire main.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.4-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the FPS.

| Table 2.3.4-1 | | | |
|-------------------------|------------|------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Motor-driven Fire Pump | FPS-MP-01A | Yes (Run Status) | Start |
| Diesel-driven Fire Pump | FPS-MP-01B | Yes (Run Status) | Start |
| Jockey Pump | FPS-MP-02 | Yes (Run Status) | Start |

| Table 2.3.4-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the FPS is as described in the Design Description of this Section 2.3.4. | Inspection of the as-built system will be performed. | The as-built FPS conforms with the functional arrangement described in the Design Description of this Section 2.3.4. |
| 2. The FPS piping identified in Table 2.3.4-4 remains functional following a safe shutdown earthquake. | i) Inspection will be performed to verify that the piping identified in Table 2.3.4-4 is located on the Nuclear Island. ii) A reconciliation analysis using the as-designed and as-built piping information will be performed, or an analysis of the as-built piping will be performed. | i) The piping identified in Table 2.3.4-4 is located on the Nuclear Island. ii) The as-built piping stress report exists and concludes that the piping remains functional following a safe shutdown earthquake. |
| 3. The FPS provides the safety-related function of preserving containment integrity by isolation of the FPS line penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 4. The FPS provides for manual fire fighting capability in plant areas containing safety-related equipment. | i) Inspection of the passive containment cooling system (PCS) storage tank will be performed. ii) Testing will be performed by measuring the water flow rate as it is simultaneously discharged from the two highest fire-hose stations and when the water for the fire is supplied from the PCS storage tank. | i) The volume of the PCS tank above the standpipe feeding the FPS and below the overflow is at least 18,000 gal. ii) Water is simultaneously discharged from each of the two highest fire-hose stations in plant areas containing safety-related equipment at not less than 75 gpm. |

| Table 2.3.4-2 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5. Displays of the parameters identified in Table 2.3.4-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.3.4-1 can be retrieved in the MCR. |
| 6. The FPS provides nonsafety-related containment spray for severe accident management. | Inspection of the containment spray headers will be performed. | The FPS has spray headers and nozzles as follows: At least 44 nozzles at plant elevation of at least 260 feet, and 24 nozzles at plant elevation of at least 275 feet. |
| 7. The FPS provides two fire water storage tanks, each capable of holding at least 300,000 gallons of water. | Inspection of each fire water storage tank will be performed. | The volume of each fire water storage tank supplying the FPS is at least 300,000 gallons. |
| 8. Two FPS fire pumps provide at least 2000 gpm each at a total head of at least 300 ft. | Testing and/or analysis of each fire pump will be performed. | The tests and/or analysis concludes that each fire pump provides a flow rate of at least 2000 gpm at a total head of at least 300 ft. |
| 9. The fuel tank for the diesel-driven fire pump is capable of holding at least 240 gallons. | Inspection of the diesel-driven fire pump fuel tank will be performed. | The volume of the diesel driven fire pump fuel tank is at least 240 gallons. |
| 10. Individual fire detectors provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment. | Testing will be performed on the as-built individual fire detectors in the fire areas identified in Tier 1 Material, subsection 3.3, Table 3.3-3. (Individual fire detectors will be tested using simulated fire conditions.) | The tested individual fire detectors respond to simulated fire conditions. |
| 11. The FPS seismic standpipe subsystem can be supplied from the FPS fire main by opening the normally closed cross-connect valve to the FPS plant fire main. | Inspection for the existence of a cross-connect valve from the FPS seismic standpipe subsystem to FPS plant fire main will be performed. | Valve FPS-PL-V101 exists and can connect the FPS seismic standpipe subsystem to the FPS plant fire main. |

| Table 2.3.4-3 | | |
|---|----------------|------------------|
| Component Name | Tag No. | Location |
| Motor-driven Fire Pump | FPS-MP-01A | Turbine Building |
| Diesel-driven Fire Pump | FPS-MP-01B | Yard |
| Jockey Pump | FPS-MP-02 | Turbine Building |
| Primary Fire Water Tank | FPS-MT-01A | Yard |
| Secondary Fire Water/Clearwell Storage Tank | FPS-MT-01B | Yard |
| Fire Pump Diesel Fuel Day Tank | FPS-MT-02 | Yard |

| Table 2.3.4-4 FPS Piping Which Must Remain Functional Following a Safe Shutdown Earthquake | | | |
|---|-------|------|------|
| L049 | L114 | L142 | L188 |
| L090A | L115 | L143 | L189 |
| L090B | L116 | L144 | L190 |
| L091A | L117 | L145 | L191 |
| L091B | L118 | L146 | L192 |
| L091C | L119 | L147 | L193 |
| L092A | L120 | L148 | L194 |
| L092B | L121 | L149 | L195 |
| L092C | L122 | L150 | L196 |
| L093 | L123 | L151 | L197 |
| L094 | L124 | L152 | L198 |
| L095 | L125 | L153 | L199 |
| L096 | L126 | L154 | L301 |
| L102 | L127 | L155 | L701 |
| L103 | L128 | L156 | L702 |
| L105 | L129 | L159 | L703 |
| L106 | L130 | L180 | L704 |
| L107 | L131 | L181 | L705 |
| L108 | L132 | L182 | L706 |
| L109 | L133A | L183 | L707 |
| L110 | L133B | L184 | L708 |
| L111 | L133C | L185 | L709 |
| L112 | L140 | L186 | |
| L113 | L141 | L187 | |

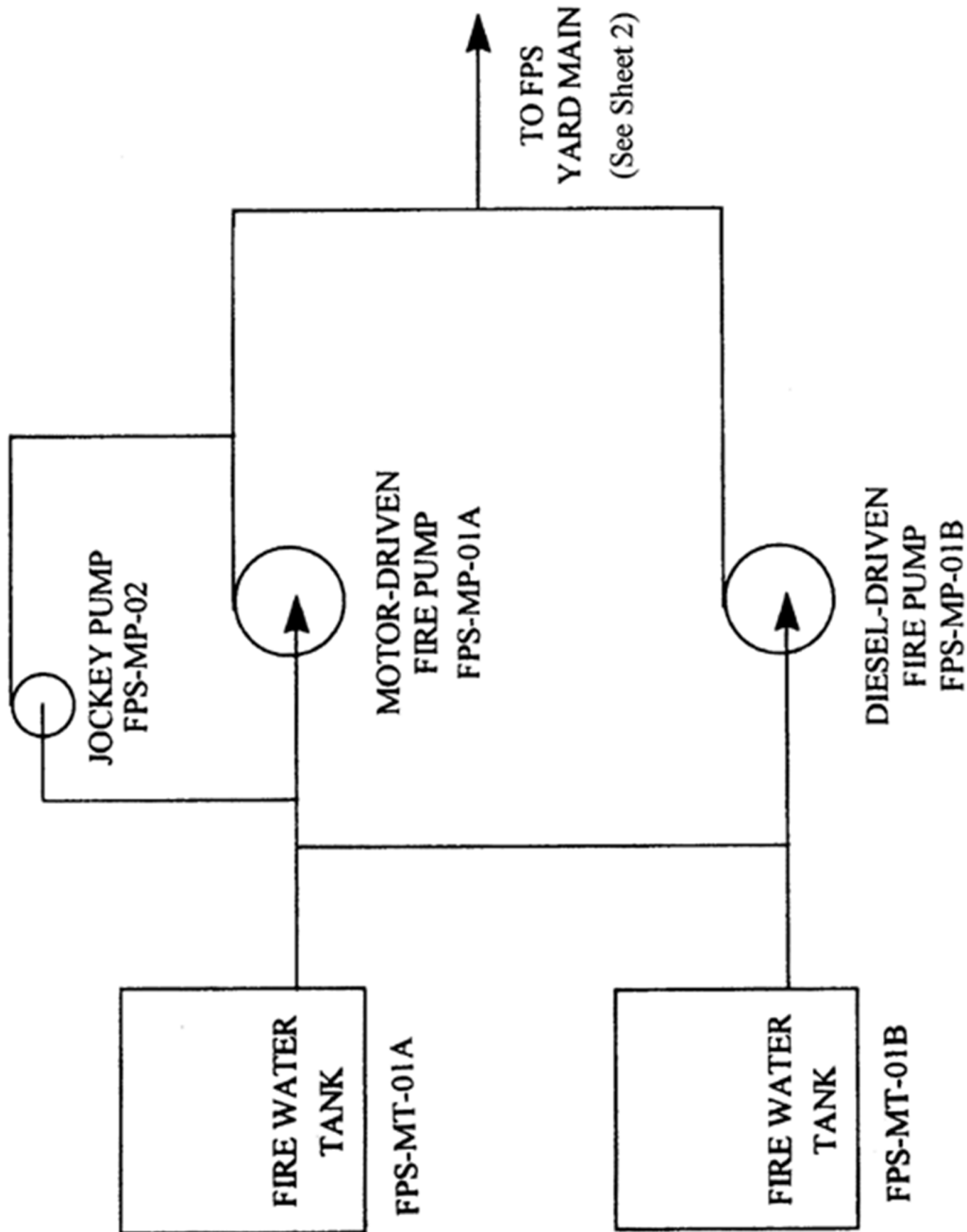


Figure 2.3.4-1 (Sheet 1 of 2)
Fire Protection System

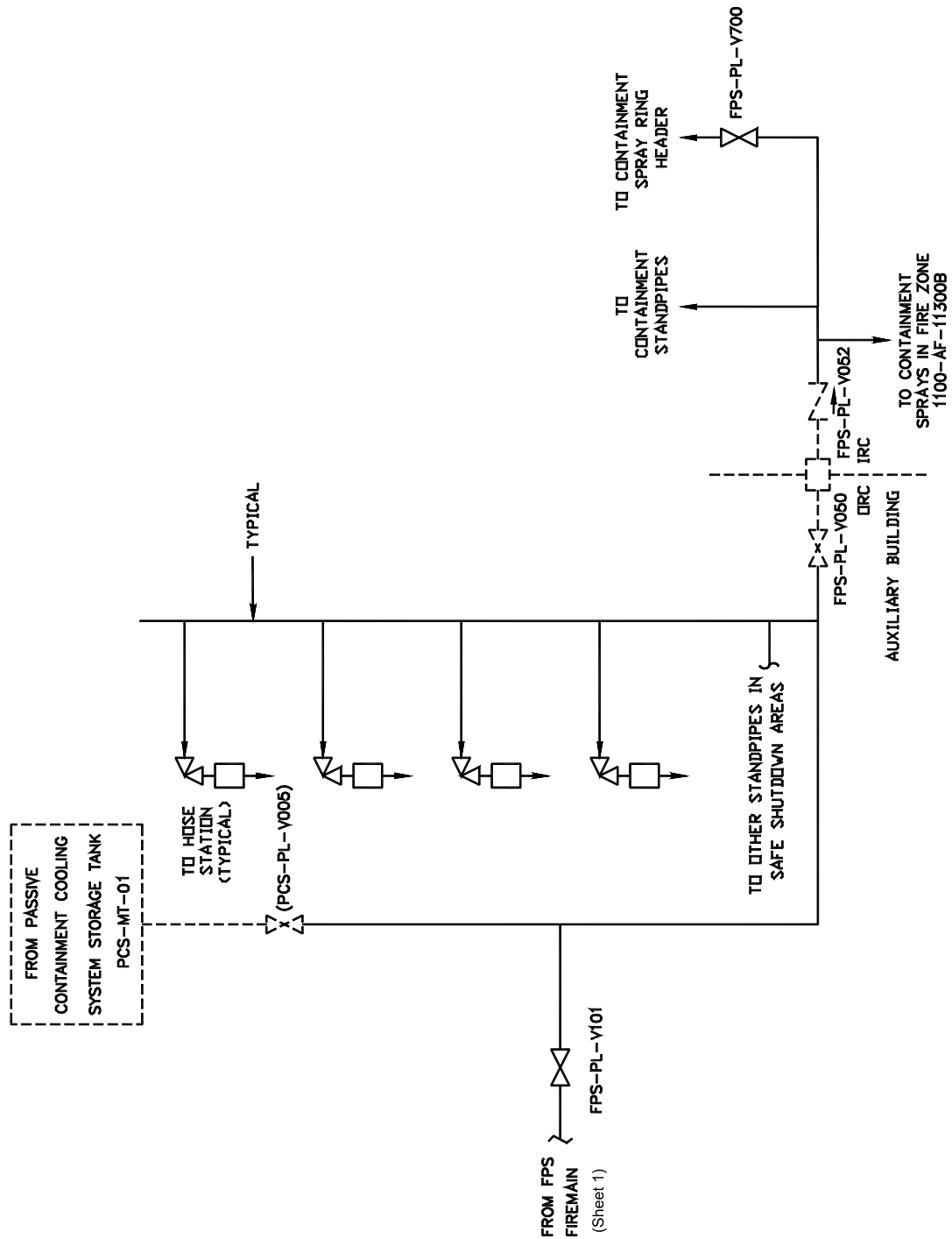


Figure 2.3.4-1 (Sheet 2 of 2)
Fire Protection System

2.3.5 Mechanical Handling System**Design Description**

The mechanical handling system (MHS) provides for lifting heavy loads. The MHS equipment can be operated during shutdown and refueling.

The component locations of the MHS are as shown in Table 2.3.5-3.

1. The functional arrangement of the MHS is as described in the Design Description of this Section 2.3.5.
2. The seismic Category I equipment identified in Table 2.3.5-1 can withstand seismic design basis loads without loss of safety function.
3. The MHS components listed below are single failure proof:
 - a) Polar crane
 - b) Cask handling crane
 - c) Equipment hatch hoist
 - d) Maintenance hatch hoist
4. The cask handling crane cannot move over the spent fuel pool.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.5-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the MHS.

| Table 2.3.5-1 | | | | |
|-------------------------|-----------|----------------|-------------------------------------|--|
| Equipment Name | Tag No. | Seismic Cat. I | Class 1E/ Qual. for Harsh Envir. | Safety Function |
| Containment Polar Crane | MHS-MH-01 | Yes | No/No | Avoid uncontrolled lowering of heavy load. |
| Cask Handling Crane | MHS-MH-02 | Yes | No/No | Avoid uncontrolled lowering of heavy load. |
| Equipment Hatch Hoist | MHS-MH-05 | Yes | No/No | Avoid uncontrolled lowering of heavy load. |
| Maintenance Hatch Hoist | MHS-MH-06 | Yes | No/No | Avoid uncontrolled lowering of heavy load. |

| Table 2.3.5-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the MHS is as described in the Design Description of this Section 2.3.5. | Inspection of the as-built system will be performed. | The as-built MHS conforms with the functional arrangement as described in the Design Description of this Section 2.3.5. |
| 2. The seismic Category I equipment identified in Table 2.3.5-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.3.5-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.3.5-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3.a) The polar crane is single failure proof. | i) Validation of double design factors is provided for hooks where used as load bearing components. Validation of redundant factors is provided for load bearing components such as: <ul style="list-style-type: none"> • Hoisting ropes • Sheaves • Equalizer assembly • Holding brakes ii) Testing of the polar crane is performed. iii) Testing of the polar crane is performed. | i) A report exists and concludes that the polar crane is single failure proof. A certificate of conformance from the vendor exists and concludes that the polar crane is single failure proof. ii) The polar crane shall be static-load tested to 125% of the rated load. iii) The polar crane shall lift a test load that is 100% of the rated load. Then it shall lower, stop, and hold the test load. |

| Table 2.3.5-2 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 3.b) The cask handling crane is single failure proof. | i) Validation of double design factors is provided for hooks where used as load bearing components. Validation of redundant factors is provided for load bearing components such as: <ul style="list-style-type: none"> • Hoisting ropes • Sheaves • Equalizer assembly • Holding brakes ii) Testing of the cask handling crane is performed. iii) Testing of the cask handling crane is performed. | i) A report exists and concludes that the cask handling crane is single failure proof. A certificate of conformance from the vendor exists and concludes that the cask handling crane is single failure proof. ii) The cask handling crane shall be static load tested to 125% of the rated load. iii) The cask handling crane shall lift a test load that is 100% of the rated load. Then it shall lower, stop, and hold the test load. |
| 3.c) The equipment hatch hoist is single failure proof. | i) Validation of double design factors is provided for hooks where used as load bearing components. Validation of redundant factors is provided for load bearing components such as: <ul style="list-style-type: none"> • Hoisting ropes • Sheaves • Equalizer assembly • Holding brakes ii) Testing of the equipment hatch hoist is performed. | i) A report exists and concludes that the equipment hatch hoist is single failure proof. A certificate of conformance from the vendor exists and concludes that the equipment hatch hoist is single failure proof. ii) The equipment hatch hoist holding mechanism shall stop and hold the hatch. |

| Table 2.3.5-2 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 3.d) The maintenance hatch hoist is single failure proof. | i) Validation of double design factors is provided for hooks where used as load bearing components. Validation of redundant factors is provided for load bearing components such as: <ul style="list-style-type: none"> • Hoisting ropes • Sheaves • Equalizer assembly • Holding brakes ii) Testing of the maintenance hatch hoist is performed. | i) A report exists and concludes that the maintenance hatch hoist is single failure proof. A certificate of conformance from the vendor exists and concludes that the maintenance hatch hoist is single failure proof. ii) The maintenance hatch hoist holding mechanism shall stop and hold the hatch. |
| 4. The cask handling crane cannot move over the spent fuel pool. | Testing of the cask handling crane is performed. | The cask handling crane does not move over the spent fuel pool. |

| Table 2.3.5-3 | | |
|-------------------------|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Containment Polar Crane | MHS-MH-01 | Containment |
| Cask Handling Crane | MHS-MH-02 | Auxiliary Building |
| Equipment Hatch Hoist | MHS-MH-05 | Containment |
| Maintenance Hatch Hoist | MHS-MH-06 | Containment |

2.3.6 Normal Residual Heat Removal System**Design Description**

The normal residual heat removal system (RNS) removes heat from the core and reactor coolant system (RCS) and provides RCS low temperature over-pressure (LTOP) protection at reduced RCS pressure and temperature conditions after shutdown. The RNS also provides a means for cooling the in-containment refueling water storage tank (IRWST) during normal plant operation.

The RNS is as shown in Figure 2.3.6-1 and the RNS component locations are as shown in Table 2.3.6-5.

1. The functional arrangement of the RNS is as described in the Design Description of this Section 2.3.6.
2.
 - a) The components identified in Table 2.3.6-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.3.6-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.3.6-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.3.6-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.3.6-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.3.6-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.3.6-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.3.6-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.
6. Each of the as-built lines identified in Table 2.3.6-2 as designed for leak before break (LBB) meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line.
7.
 - a) The Class 1E equipment identified in Table 2.3.6-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.3.6-1 are powered from their respective Class 1E division.

- c) Separation is provided between RNS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
8. The RNS provides the following safety-related functions:
- a) The RNS preserves containment integrity by isolation of the RNS lines penetrating the containment.
 - b) The RNS provides a flow path for long-term, post-accident makeup to the RCS.
9. The RNS provides the following nonsafety-related functions:
- a) The RNS provides low temperature overpressure protection (LTOP) for the RCS during shutdown operations.
 - b) The RNS provides heat removal from the reactor coolant during shutdown operations.
 - c) The RNS provides low pressure makeup flow from the SFS cask loading pit to the RCS for scenarios following actuation of the automatic depressurization system (ADS).
 - d) The RNS provides heat removal from the in-containment refueling water storage tank.
10. Safety-related displays identified in Table 2.3.6-1 can be retrieved in the main control room (MCR).
11. a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.3.6-1 to perform active functions.
- b) The valves identified in Table 2.3.6-1 as having protection and safety monitoring system (PMS) control perform active safety functions after receiving a signal from the PMS.
12. a) The motor-operated and check valves identified in Table 2.3.6-1 perform an active safety-related function to change position as indicated in the table.
- b) After loss of motive power, the remotely operated valves identified in Table 2.3.6-1 assume the indicated loss of motive power position.
13. Controls exist in the MCR to cause the pumps identified in Table 2.3.6-3 to perform the listed function.
14. Displays of the RNS parameters identified in Table 2.3.6-3 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.6-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the RNS.

| Table 2.3.6-1 | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| RNS Pump A (Pressure Boundary) | RNS-MP-01A | Yes | Yes | - | -/- | - | - | No | - |
| RNS Pump B (Pressure Boundary) | RNS-MP-01B | Yes | Yes | - | -/- | - | - | No | - |
| RNS Heat Exchanger A (Tube Side) | RNS-ME-01A | Yes | Yes | - | -/- | - | - | - | - |
| RNS Heat Exchanger B (Tube Side) | RNS-ME-01B | Yes | Yes | - | -/- | - | - | - | - |
| RCS Inner Hot Leg Suction Motor-operated Isolation Valve | RNS-PL-V001A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RCS Inner Hot Leg Suction Motor-operated Isolation Valve | RNS-PL-V001B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RCS Outer Hot Leg Suction Motor-operated Isolation Valve | RNS-PL-V002A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RCS Outer Hot Leg Suction Motor-operated Isolation Valve | RNS-PL-V002B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.3.6-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| RCS Pressure Boundary Thermal Relief Check Valve | RNS-PL-V003A | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RCS Pressure Boundary Thermal Relief Check Valve | RNS-PL-V003B | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Discharge Motor-operated Containment Isolation Valve | RNS-PL-V011 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RNS Discharge Containment Isolation Test Connection | RNS-PL-V012 | Yes | Yes | No | -/- | No | No | Transfer Open | - |
| RNS Discharge Header Containment Isolation Check Valve | RNS-PL-V013 | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Discharge RCS Pressure Boundary Check Valve | RNS-PL-V015A | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.6-1 (cont.) | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| RNS Discharge RCS Pressure Boundary Check Valve | RNS-PL-V015B | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Discharge RCS Pressure Boundary Check Valve | RNS-PL-V017A | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Discharge RCS Pressure Boundary Check Valve | RNS-PL-V017B | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Hot Leg Suction Pressure Relief Valve | RNS-PL-V021 | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Suction Header Motor-operated Containment Isolation Valve | RNS-PL-V022 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RNS Suction from IRWST Motor-operated Isolation Valve | RNS-PL-V023 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | As Is |
| RNS Discharge to IRWST Motor-operated Isolation Valve | RNS-PL-V024 | Yes | Yes | Yes | -/- | No | No | No | As Is |

Note: Dash (-) indicates not applicable.

| Table 2.3.6-1 (cont.) | | | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-------------|-----------------------------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| RNS Discharge Header Relief Valve | RNS-PL-V045 | Yes | Yes | No | -/- | No | - | Transfer Open/ Transfer Closed | - |
| RNS Suction from Cask Loading Pit Motor-operated Isolation Valve | RNS-PL-V055 | Yes | Yes | Yes | No/No | No | No | No | As Is |
| RNS Suction from Cask Loading Pit Check Valve | RNS-PL-V056 | Yes | Yes | No | -/- | No | - | No | - |
| RNS Pump Miniflow Air-Operated Isolation Valve | RNS-PL-V057A | Yes | Yes | Yes | No/No | No | No | No | Open |
| RNS Pump Miniflow Air-Operated Isolation Valve | RNS-PL-V057B | Yes | Yes | Yes | No/No | No | No | No | Open |
| RNS Return from Chemical and Volume Control System (CVS) Containment Isolation Valve | RNS-PL-V061 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes | Transfer Closed | Closed |

Note: Dash (-) indicates not applicable.

| Table 2.3.6-2 | | | | |
|--|--|-----------------------|-------------------|---|
| Line Name | Line No. | ASME Code Section III | Leak Before Break | Functional Capability Required |
| RNS Suction Lines, from the RCS Hot Leg Connection to the RCS Side of Valves RNS PL-V001A and RNS-PL-V001B | RNS-L001 RNS-L002A RNS-L002B | Yes | Yes | No |
| RNS Suction Lines, from the RCS Pressure Boundary Valves, RNS-PL-V001A and RNS-PL-V001B, to the RNS pumps | RNS-L004A RNS-L004B RNS-L005 RNS-L006 RNS-L007A RNS-L007B RNS-L009A RNS-L009B | Yes | No | Yes Yes Yes No No No No No |
| RNS Suction Line from CVS | RNS-L061 | Yes | No | No |
| RNS Suction Line from IRWST | RNS-L029 | Yes | No | No |
| RNS Suction Line LTOP Relief | RNS-L040 | Yes | No | Yes |
| RNS Discharge Lines, from the RNS Pumps to the RNS Heat Exchangers RNS-ME-01A and RNS-ME-01B | RNS-L011A RNS-L011B | Yes | No | Yes |
| RNS Discharge Lines, from RNS Heat Exchanger RNS-ME-01A to Containment Isolation Valve RNS-PL-V011 | RNS-L012A RNS-L014 | Yes | No | Yes |
| RNS Discharge Line, from RNS Heat Exchanger RNS-ME-01B to Common Discharge Header RNS-DBC-L014 | RNS-L012B | Yes | No | Yes |
| RNS Discharge Lines, Containment Isolation Valve RNS-PL-V011 to Containment Isolation Valve RNS-PL-V013 | RNS-L016 | Yes | No | Yes |

| Table 2.3.6-2 (cont.) | | | | |
|--|------------------------------------|-----------------------|-------------------|--------------------------------|
| Line Name | Line No. | ASME Code Section III | Leak Before Break | Functional Capability Required |
| RNS Suction Line from Cask Loading Pit | RNS-L065 | Yes | No | No |
| RNS Discharge Lines, from Containment Isolation Valve RNS-PL-V013 to RCS Pressure Boundary Isolation Valves RNS-PL-V015A and RNS-PL-V015B | RNS-L017 RNS-L018A RNS-L018B | Yes | No | Yes |
| RNS Discharge Lines, from Direct Vessel Injection (DVI) Line RNS-BBC-L018A to Passive Core Cooling System (PXS) IRWST Return Isolation Valve RNS-PL-V024 | RNS-L020 | Yes | No | No |
| RNS Discharge Lines, from RCS Pressure Boundary Isolation Valves RNS-PL-V015A and RNS-PL-V015B to Reactor Vessel DVI Nozzles | RNS-L019A RNS-L019B | Yes | No | Yes |
| RNS Heat Exchanger Bypass | RNS-L008A RNS-L008B | Yes | No | No |
| RNS Suction from Spent Fuel Pool | RNS-L052 | Yes | No | No |
| RNS Pump Miniflow Return | RNS-L030A RNS-L030B | Yes | No | No |
| RNS Discharge to Spent Fuel Pool | RNS-L051 | Yes | No | No |
| RNS Discharge to CVS Purification | RNS-L021 | Yes | No | No |

| Table 2.3.6-3 | | | |
|--|--------------|---------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| RNS Pump 1A (Motor) | RNS-MP-01A | Yes (Run Status) | Start |
| RNS Pump 1B (Motor) | RNS-MP-01B | Yes (Run Status) | Start |
| RNS Flow Sensor | RNS-01A | Yes | - |
| RNS Flow Sensor | RNS-01B | Yes | - |
| RNS Suction from Cask Loading Pit Isolation Valve (Position Indicator) | RNS-PL-V055 | Yes | - |
| RNS Pump Miniflow Isolation Valve (Position Indicator) | RNS-PL-V057A | Yes | - |
| RNS Pump Miniflow Isolation Valve (Position Indicator) | RNS-PL-V057B | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.6-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the RNS is as described in the Design Description of this Section 2.3.6. | Inspection of the as-built system will be performed. | The as-built RNS conforms with the functional arrangement described in the Design Description of this Section 2.3.6. |
| 2.a) The components identified in Table 2.3.6-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.3.6-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.3.6-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.3.6-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.3.6-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.3.6-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.3.6-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.3.6-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.3.6-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.b) The piping identified in Table 2.3.6-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.3.6-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5.a) The seismic Category I equipment identified in Table 2.3.6-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.3.6-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.3.6-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 5.b) Each of the lines identified in Table 2.3.6-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.3.6-2 for which functional capability is required meets the requirements for functional capability. |
| 6. Each of the as-built lines identified in Table 2.3.6-2 as designed for LBB meets the LBB criteria, or an evaluation is performed of the protection from the dynamic effects of a rupture of the line. | Inspection will be performed for the existence of an LBB evaluation report or an evaluation report on the protection from dynamic effects of a pipe break. Tier 1 Material, Section 3.3, Nuclear Island Buildings, contains the design descriptions and inspections, tests, analyses, and acceptance criteria for protection from the dynamic effects of pipe rupture. | An LBB evaluation report exists and concludes that the LBB acceptance criteria are met by the as-built RNS piping and piping materials, or a pipe break evaluation report exists and concludes that protection from the dynamic effects of a line break is provided. |

| Table 2.3.6-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.a) The Class 1E equipment identified in Tables 2.3.6-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.3.6-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.3.6-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |
| 7.b) The Class 1E components identified in Table 2.3.6-1 are powered from their respective Class 1E division. | Testing will be performed on the RNS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.3.6-1 when the assigned Class 1E division is provided the test signal. |
| 7.c) Separation is provided between RNS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 8.a) The RNS preserves containment integrity by isolation of the RNS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, item 7. | See Tier 1 Material, Table 2.2.1-3, item 7. |
| 8.b) The RNS provides a flow path for long-term, post-accident makeup to the RCS. | See item 1 in this table. | See item 1 in this table. |
| 9.a) The RNS provides LTOP for the RCS during shutdown operations. | i) Inspections will be conducted on the low temperature overpressure protection relief valve to confirm that the capacity of the vendor code plate rating is greater than or equal to system relief requirements. | i) The rated capacity recorded on the valve vendor code plate is not less than the flow required to provide low-temperature overpressure protection for the RCS, as determined by the LTOPS evaluation based on the pressure-temperature curves developed for the as-procured reactor vessel material. |

| Table 2.3.6-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | ii) Testing and analysis in accordance with the ASME Code Section III will be performed to determine set pressure. | ii) A report exists and concludes that the relief valve opens at a pressure not greater than the set pressure required to provide low-temperature overpressure protection for the RCS, as determined by the LTOPS evaluation based on the pressure-temperature curves developed for the as-procured reactor vessel material. |
| 9.b) The RNS provides heat removal from the reactor coolant during shutdown operations. | <p>i) Inspection will be performed for the existence of a report that determines the heat removal capability of the RNS heat exchangers.</p> <p>ii) Testing will be performed to confirm that the RNS can provide flow through the RNS heat exchangers when the pump suction is aligned to the RCS hot leg and the discharge is aligned to both PXS DVI lines with the RCS at atmospheric pressure.</p> <p>iii) Inspection will be performed of the reactor coolant loop piping.</p> <p>iv) Inspection will be performed of the RNS pump suction piping.</p> <p>v) Inspection will be performed of the RNS pump suction nozzle connection to the RCS hot leg.</p> | <p>i) A report exists and concludes that the product of the overall heat transfer coefficient and the effective heat transfer area, UA, of each RNS heat exchanger is greater than or equal to 2.2 million Btu/hr-°F.</p> <p>ii) Each RNS pump provides at least 1400 gpm net flow to the RCS when the hot leg water level is at an elevation 15.5 inches \pm 2 inches above the bottom of the hot leg.</p> <p>iii) The RCS cold legs piping centerline is 17.5 inches \pm 2 inches above the hot legs piping centerline.</p> <p>iv) The RNS pump suction piping from the hot leg to the pump suction piping low point does not form a local high point (defined as an upward slope with a vertical rise greater than 3 inches).</p> <p>v) The RNS suction line connection to the RCS is constructed from 20-inch Schedule 140 pipe.</p> |

| Table 2.3.6-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 9.c) The RNS provides low pressure makeup flow from the cask loading pit to the RCS for scenarios following actuation of the ADS. | Testing will be performed to confirm that the RNS can provide low pressure makeup flow from the cask loading pit to the RCS when the pump suction is aligned to the cask loading pit and the discharge is aligned to both PXS DVI lines with RCS at atmospheric pressure. | Each RNS pump provides at least 1100 gpm net flow to the RCS when the water level above the bottom of the cask loading pit is 1 foot \pm 6 inches. |
| 9.d) The RNS provides heat removal from the in-containment refueling water storage tank (IRWST). | Testing will be performed to confirm that the RNS can provide flow through the RNS heat exchangers when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST. | Two operating RNS pumps provide at least 2000 gpm to the IRWST. |
| 10. Safety-related displays identified in Table 2.3.6-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.3.6-1 can be retrieved in the MCR. |
| 11.a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.3.6-1 to perform active functions. | Stroke testing will be performed on the remotely operated valves identified in Table 2.3.6-1 using the controls in the MCR. | Controls in the MCR operate to cause those remotely operated valves identified in Table 2.3.6-1 to perform active functions. |
| 11.b) The valves identified in Table 2.3.6-1 as having PMS control perform active safety functions after receiving a signal from the PMS. | Testing will be performed using real or simulated signals into the PMS. | The valves identified in Table 2.3.6-1 as having PMS control perform the active function identified in the table after receiving a signal from the PMS. |

| Table 2.3.6-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 12.a) The motor-operated and check valves identified in Table 2.3.6-1 perform an active safety-related function to change position as indicated in the table. | i) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions. ii) Inspection will be performed for the existence of a report verifying that the as-built motor-operated valves are bounded by the tested conditions. iii) Tests of the motor-operated valves will be performed under preoperational flow, differential pressure and temperature conditions. iv) Exercise testing of the check valves active safety functions identified in Table 2.3.6-1 will be performed under preoperational test pressure, temperature and fluid flow conditions. | i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.3.6-1 under design conditions. ii) A report exists and concludes that the as-built motor-operated valves are bounded by the tested conditions. iii) Each motor-operated valve changes position as indicated in Table 2.3.6-1 under preoperational test conditions. iv) Each check valve changes position as indicated in Table 2.3.6-1. |
| 12.b) After loss of motive power, the remotely operated valves identified in Table 2.3.6-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | Upon loss of motive power, each remotely operated valve identified in Table 2.3.6-1 assumes the indicated loss of motive power position. |
| 13. Controls exist in the MCR to cause the pumps identified in Table 2.3.6-3 to perform the listed function. | Testing will be performed to actuate the pumps identified in Table 2.3.6-3 using controls in the MCR. | Controls in the MCR cause pumps identified in Table 2.3.6-3 to perform the listed action. |
| 14. Displays of the RNS parameters identified in Table 2.3.6-3 can be retrieved in the MCR. | Inspection will be performed for retrievability in the MCR of the displays identified in Table 2.3.6-3. | Displays of the RNS parameters identified in Table 2.3.6-3 are retrieved in the MCR. |

| Table 2.3.6-5 | | |
|-----------------------|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| RNS Pump A | RNS-MP-01A | Auxiliary Building |
| RNS Pump B | RNS-MP-01B | Auxiliary Building |
| RNS Heat Exchanger A | RNS-ME-01A | Auxiliary Building |
| RNS Heat Exchanger B | RNS-ME-01B | Auxiliary Building |

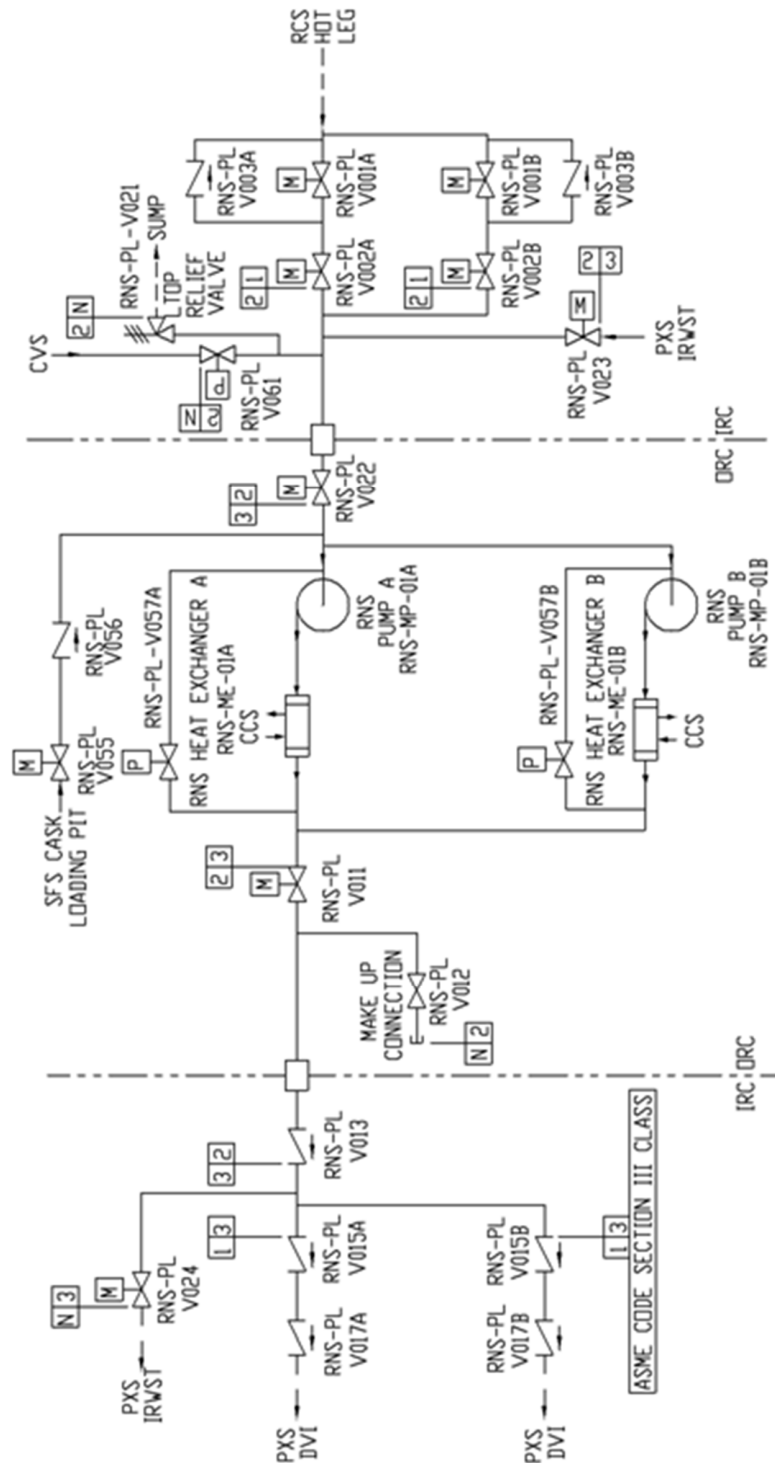


Figure 2.3.6-1
Normal Residual Heat Removal System

2.3.7 Spent Fuel Pool Cooling System

Design Description

The spent fuel pool cooling system (SFS) removes decay heat from spent fuel by transferring heat from the water in the spent fuel pool to the component cooling water system during normal modes of operation. The SFS purifies the water in the spent fuel pool, fuel transfer canal, and in-containment refueling water storage tank during normal modes of operation. Following events such as earthquakes, or fires, if the normal heat removal method is not available, decay heat is removed from spent fuel by boiling water in the pool. In the event of long-term station blackout, makeup water is supplied to the spent fuel pool from onsite storage tanks.

The SFS is as shown in Figure 2.3.7-1 and the component locations of the SFS are as shown in Table 2.3.7-5.

1. The functional arrangement of the SFS is as described in the Design Description of this Section 2.3.7.
2.
 - a) The components identified in Table 2.3.7-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping lines identified in Table 2.3.7-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
3. Pressure boundary welds in piping lines identified in Table 2.3.7-2 as ASME Code Section III meet ASME Code Section III requirements.
4. The piping lines identified in Table 2.3.7-2 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
5. The seismic Category I components identified in Table 2.3.7-1 can withstand seismic design basis loads without loss of safety function.
6.
 - a) The Class 1E components identified in Table 2.3.7-1 are powered from their respective Class 1E division.
 - b) Separation is provided between SFS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
7. The SFS performs the following safety-related functions:
 - a) The SFS preserves containment integrity by isolating the SFS piping lines penetrating the containment.
 - b) The SFS provides spent fuel cooling for 7 days by boiling the spent fuel pool water and makeup water from on-site water storage tanks.
 - c) The SFS provides check valves in the drain line from the refueling cavity to prevent flooding of the refueling cavity during containment flooding.

8. The SFS provides the nonsafety-related function of removing spent fuel decay heat using pumped flow through a heat exchanger.
9. Safety-related displays identified in Table 2.3.7-1 can be retrieved in the main control room (MCR).
10. Controls exist in the MCR to cause the pumps identified in Table 2.3.7-3 to perform their listed functions.
11. Displays of the SFS parameters identified in Table 2.3.7-3 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.7-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the SFS.

| Table 2.3.7-1 | | | | | | | | | |
|--|-------------|-----------------------|---------------|-------------------------|--------------------------------|------------------------|-------------|-----------------|-------------------------------|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat 1 | Remotely Operated Valve | Class 1E/Qual for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Spent Fuel Pool Level Sensor | SFS-019A | No | Yes | - | Yes/No | Yes | - | - | - |
| Spent Fuel Pool Level Sensor | SFS-019B | No | Yes | - | Yes/No | Yes | - | - | - |
| Spent Fuel Pool Level Sensor | SFS-019C | No | Yes | - | Yes/No | Yes | - | - | - |
| Refueling Cavity Drain to SGS Compartment Isolation Valve | SFS-PL-V031 | Yes | Yes | No | -/- | Yes | - | - | - |
| Refueling Cavity to SFS Pump Suction Isolation Valve | SFS-PL-V032 | Yes | Yes | No | -/- | No | - | - | - |
| Refueling Cavity Drain to Containment Sump Isolation Valve | SFS-PL-V033 | Yes | Yes | No | -/- | Yes | - | - | - |
| IRWST to SFS Pump Suction Line Isolation Valve | SFS-PL-V039 | Yes | Yes | No | -/- | No | - | - | - |
| Fuel Transfer Canal to SFS Pump Suction Iso. Valve | SFS-PL-V040 | Yes | Yes | No | -/- | No | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.7-1 (cont.) | | | | | | | | | |
|---|-------------|-----------------------|---------------|-------------------------|---------------------------------|------------------------|-------------|----------------------------------|-------------------------------|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat 1 | Remotely Operated Valve | Class 1E/ Qual for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Cask Loading Pit to SFS Pump Suction Isolation Valve | SFS-PL-V041 | Yes | Yes | No | -/- | No | - | - | - |
| Cask Loading Pit to SFS Pump Suction Isolation Valve | SFS-PL-V042 | Yes | Yes | No | -/- | No | - | Transfer Closed | - |
| SFS Pump Discharge Line to Cask Loading Pit Isolation Valve | SFS-PL-V045 | Yes | Yes | No | -/- | No | - | Transfer Closed | - |
| Cask Loading Pit to WLS Isolation Valve | SFS-PL-V049 | Yes | Yes | No | -/- | No | - | Transfer Closed | - |
| Spent Fuel Pool to Cask Washdown Pit Isolation Valve | SFS-PL-V066 | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Cask Washdown Pit Drain Isolation Valve | SFS-PL-V068 | Yes | Yes | No | -/- | No | - | Transfer Open | - |
| Refueling Cavity Drain Line Check Valve | SFS-PL-V071 | Yes | Yes | No | -/- | No | - | Transfer Open Transfer Closed | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.7-1 (cont.) | | | | | | | | | |
|---|-------------|-----------------------|---------------|-------------------------|---------------------------------|------------------------|-------------|----------------------------------|-------------------------------|
| Component Name | Tag No. | ASME Code Section III | Seismic Cat 1 | Remotely Operated Valve | Class 1E/ Qual for Harsh Envir. | Safety-Related Display | Control PMS | Active Function | Loss of Motive Power Position |
| Refueling Cavity Drain Line Check Valve | SFS-PL-V072 | Yes | Yes | No | -/- | No | - | Transfer Open Transfer Closed | - |
| SFS Containment Floodup Isolation Valve | SFS-PL-V075 | Yes | Yes | No | -/- | Yes | - | - | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.7-2 | | |
|--|-------------|-----------------------|
| Piping Line Name | Line Number | ASME Code Section III |
| Spent Fuel Pool to RNS Pump Suction | L014 | Yes |
| Cask Loading Pit to RNS Pump Suction | L015 | Yes |
| Refueling Cavity Drain | L033 | Yes |
| PXS IRWST to SFS Pump Suction | L035 | Yes |
| Refueling Cavity Skimmer to SFS Pump Suction | L036 | Yes |
| Refueling Cavity Drain | L037 | Yes |
| Refueling Cavity Drain | L044 | Yes |
| Fuel Transfer Canal Drain | L047 | Yes |
| Cask Washdown Pit Drain | L068 | Yes |
| Cask Loading Pit Drain | L043 | Yes |
| Cask Pit Transfer Branch Line | L045 | Yes |
| Refueling Cavity Drain | L030 | Yes |
| Refueling Cavity Drain | L040 | Yes |
| Spent Fuel Pool Drain | L066 | Yes |
| Cask Loading Pit to WLS | L067 | Yes |
| RNS Return to Spent Fuel Pool | L100 | Yes |
| SFS Containment Floodup Line | L120 | Yes |

| Table 2.3.7-3 | | | |
|------------------------------------|------------|---------------------|------------------|
| Component Name | Tag No. | Display | Control Function |
| SFS Pump 1A | SFS-MP-01A | Yes (Run Status) | Start |
| SFS Pump 1B | SFS-MP-01B | Yes (Run Status) | Start |
| SFS Flow Sensor | SFS-13A | Yes | - |
| SFS Flow Sensor | SFS-13B | Yes | - |
| Spent Fuel Pool Temperature Sensor | SFS-018 | Yes | - |
| Cask Loading Pit Level Sensor | SFS-022 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.7-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the SFS is as described in the Design Description of this Section 2.3.7. | Inspection of the as-built system will be performed. | The as-built SFS conforms with the functional arrangement as described in the Design Description of this Section 2.3.7. |
| 2.a) The components identified in Table 2.3.7-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the ASME as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.3.7-1 as ASME Code Section III. |
| 2.b) The piping lines identified in Table 2.3.7-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping lines as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping lines identified in Table 2.3.7-2 as ASME Code Section III. |
| 3. Pressure boundary welds in piping lines identified in Table 2.3.7-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4. The piping lines identified in Table 2.3.7-2 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the piping lines required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping lines identified in Table 2.3.7-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.3.7-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5. The seismic Category I components identified in Table 2.3.7-1 can withstand seismic design basis loads without loss of safety functions. | i) Inspection will be performed to verify that the seismic Category I components identified in Table 2.3.7-1 are located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I components identified in Table 2.3.7-1 are located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 6.a) The Class 1E components identified in Table 2.3.7-1 are powered from their respective Class 1E division. | Testing will be performed on the SFS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E components identified in Table 2.3.7-1 when the assigned Class 1E division is provided the test signal. |
| 6.b) Separation is provided between SFS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 7.a) The SFS preserves containment integrity by isolation of the SFS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |

| Table 2.3.7-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.b) The SFS provides spent fuel cooling for 7 days by boiling the spent fuel pool water and makeup water from on-site storage tanks. | <p>i) Inspection will be performed to verify that the spent fuel pool includes a sufficient volume of water.</p> <p>ii) Inspection will be performed to verify the cask washdown pit includes sufficient volume of water.</p> <p>iii) A safety-related flow path exists from the cask washdown pit to the spent fuel pool.</p> <p>iv) See Tier 1 Material Table 2.2.2-3, item 7.f for inspection, testing, and acceptance criteria for the makeup water supply from the passive containment cooling system (PCS) water storage tank to the spent fuel pool.</p> <p>v) Inspection will be performed to verify that the passive containment cooling system water storage tank includes a sufficient volume of water.</p> <p>vi) See Tier 1 Material Table 2.2.2-3, items 8.a and 8.b for inspection, testing, and acceptance criteria to verify that the passive containment cooling system ancillary water storage tank includes a sufficient volume of water.</p> | <p>i) The volume of the spent fuel pool and fuel transfer canal above the fuel and to the elevation 6 feet below the operating deck is greater than or equal to 129,500 gallons.</p> <p>ii) The water volume of the cask washdown pit is greater than or equal to 30,900 gallons.</p> <p>iii) See item 1 of this table.</p> <p>iv) See Tier 1 Material Table 2.2.2-3, item 7.f for inspection, testing, and acceptance criteria for the makeup water supply from the PCS water storage tank to the spent fuel pool.</p> <p>v) See Tier 1 Material Table 2.2.2-3, item 7.f for the volume of the passive containment cooling system water storage tank.</p> <p>vi) See Tier 1 Material Table 2.2.2-3, items 8.a and 8.b for inspection, testing, and acceptance criteria for the volume of the passive containment cooling system ancillary water storage tank.</p> |
| 7c) The SFS provides check valves in the drain line from the refueling cavity to prevent flooding of the refueling cavity during containment flooding. | Exercise testing of the check valves with active safety-functions identified in Table 2.3.7-1 will be performed under pre-operational test pressure, temperature and flow conditions. | Each check valve changes position as indicated on Table 2.3.7-1. |

| Table 2.3.7-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8. The SFS provides the nonsafety-related function of removing spent fuel decay heat using pumped flow through a heat exchanger. | i) Inspection will be performed for the existence of a report that determines the heat removal capability of the SFS heat exchangers. ii) Testing will be performed to confirm that each SFS pump provides flow through its heat exchanger when taking suction from the SFP and returning flow to the SFP. | i) A report exists and concludes that the heat transfer characteristic, UA, of each SFS heat exchanger is greater than or equal to 2.2 million Btu/hr-°F. ii) Each SFS pump produces at least 900 gpm through its heat exchanger. |
| 9. Safety-related displays identified in Table 2.3.7-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.3.7-1 can be retrieved in the MCR. |
| 10. Controls exist in the MCR to cause the pumps identified in Table 2.3.7-3 to perform their listed functions. | Testing will be performed to actuate the pumps identified in Table 2.3.7-3 using controls in the MCR. | Controls in the MCR cause pumps identified in Table 2.3.7-3 to perform the listed functions. |
| 11. Displays of the SFS parameters identified in Table 2.3.7-3 can be retrieved in the MCR. | Inspection will be performed for retrievability in the MCR of the displays identified in Table 2.3.7-3. | Displays of the SFS parameters identified in Table 2.3.7-3 are retrieved in the MCR. |

| Table 2.3.7-5 | | |
|-----------------------|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| SFS Pump A | SFS-MP-01A | Auxiliary Building |
| SFS Pump B | SFS-MP-01B | Auxiliary Building |
| SFS Heat Exchanger A | SFS-ME-01A | Auxiliary Building |
| SFS Heat Exchanger B | SFS-ME-01B | Auxiliary Building |

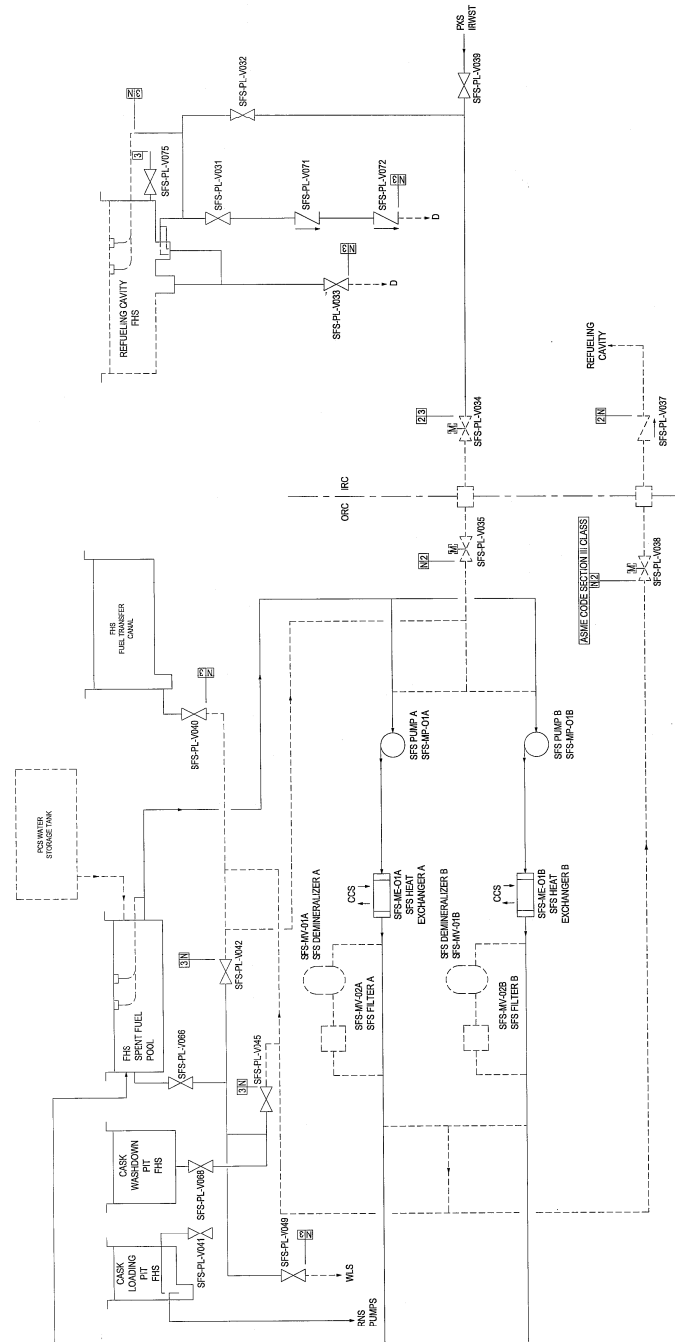


Figure 2.3.7-1
Spent Fuel Pool Cooling System

2.3.8 Service Water System**Design Description**

The service water system (SWS) transfers heat from the component cooling water heat exchangers to the atmosphere. The SWS operates during normal modes of plant operation, including startup, power operation (full and partial loads), cooldown, shutdown, and refueling.

The SWS is as shown in Figure 2.3.8-1 and the component locations of the SWS are as shown Table 2.3.8-3.

1. The functional arrangement of the SWS is as described in the Design Description of this Section 2.3.8.
2. The SWS provides the nonsafety-related function of transferring heat from the component cooling water system (CCS) to the surrounding atmosphere to support plant shutdown and spent fuel pool cooling.
3. Controls exist in the main control room (MCR) to cause the components identified in Table 2.3.8-1 to perform the listed function.
4. Displays of the parameters identified in Table 2.3.8-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.8-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the SWS.

| Table 2.3.8-1 | | | |
|---|--------------|-------------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Service Water Pump A (Motor) | SWS-MP-01A | Yes (Run Status) | Start |
| Service Water Pump B (Motor) | SWS-MP-01B | Yes (Run Status) | Start |
| Service Water Cooling Tower Fan A (Motor) | SWS-MA-01A | Yes (Run Status) | Start |
| Service Water Cooling Tower Fan B (Motor) | SWS-MA-01B | Yes (Run Status) | Start |
| Service Water Pump 1A Flow Sensor | SWS-004A | Yes | - |
| Service Water Pump 1B Flow Sensor | SWS-004B | Yes | - |
| Service Water Pump A Discharge Valve | SWS-PL-V002A | Yes (Valve Position) | Open |
| Service Water Pump B Discharge Valve | SWS-PL-V002B | Yes (Valve Position) | Open |
| Service Water Pump A Discharge Temperature Sensor | SWS-005A | Yes | - |
| Service Water Pump B Discharge Temperature Sensor | SWS-005B | Yes | - |
| Service Water Cooling Tower Basin Level | SWS-009 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.8-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the SWS is as described in the Design Description of this Section 2.3.8. | Inspection of the as-built system will be performed. | The as-built SWS conforms with the functional arrangement as described in the Design Description of this Section 2.3.8. |
| 2. The SWS provides the nonsafety-related function of transferring heat from the component cooling water system to the surrounding atmosphere to support plant shutdown and spent fuel pool cooling. | i) Testing will be performed to confirm that the SWS can provide cooling water to the CCS heat exchangers. ii) Inspection will be performed for the existence of a report that determines the heat transfer capability of each cooling tower cell. iii) Testing will be performed to confirm that the SWS cooling tower basin has adequate reserve volume. | i) Each SWS pump can provide at least 10,000 gpm of cooling water through its CCS heat exchanger. ii) A report exists and concludes that the heat transfer rate of each cooling tower cell is greater than or equal to 170 million Btu/hr at a 80.1°F ambient wet bulb temperature and a cold water temperature of 90°F. iii) The SWS tower basin contains a usable volume of at least 230,000 gallons at the basin low level alarm setpoint. |
| 3. Controls exist in the MCR to cause the components identified in Table 2.3.8-1 to perform the listed function. | Testing will be performed on the components in Table 2.3.8-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.3.8-1 to perform the listed functions. |
| 4. Displays of the parameters identified in Table 2.3.8-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.3.8-1 can be retrieved in the MCR. |

| Table 2.3.8-3 | | |
|-----------------------------|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Service Water Pump A | SWS-MP-01A | Turbine Building or yard |
| Service Water Pump B | SWS-MP-01B | Turbine Building or yard |
| Service Water Cooling Tower | SWS-ME-01 | Yard |

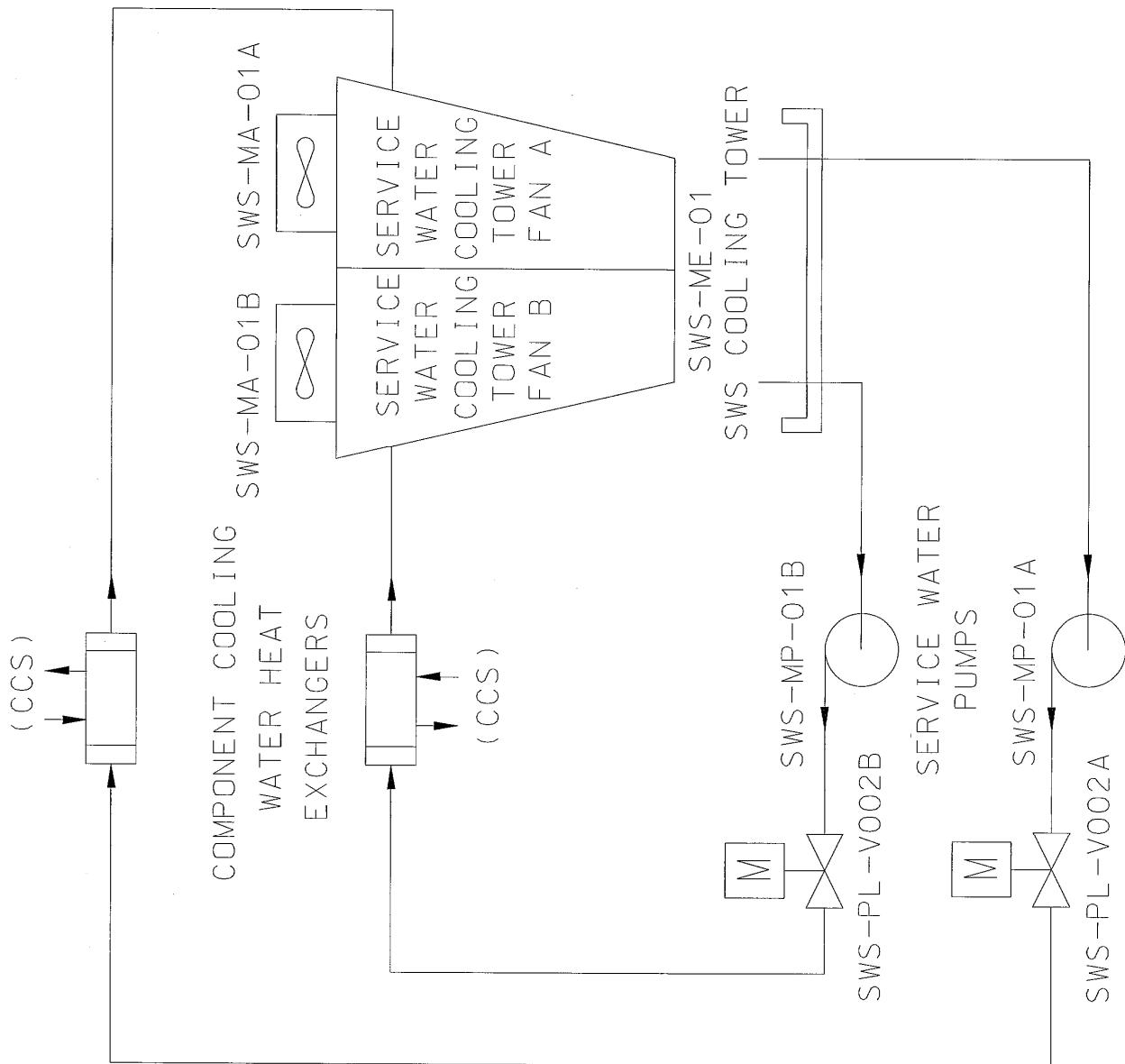


Figure 2.3.8-1
Service Water System

2.3.9 Containment Hydrogen Control System**Design Description**

The containment hydrogen control system (VLS) limits hydrogen gas concentration in containment during accidents.

The VLS has catalytic hydrogen recombiners (VLS-MY-E01A and VLS-MY-E01B) that are located inside containment. The VLS has hydrogen igniters located as shown on Table 2.3.9-2.

1. The functional arrangement of the VLS is as described in the Design Description of this Section 2.3.9.
2.
 - a) The hydrogen monitors identified in Table 2.3.9-1 are powered by the non-Class 1E dc and UPS system.
 - b) The components identified in Table 2.3.9-2 are powered from their respective non-Class 1E power group.
3. The VLS provides the non-safety related function to control the containment hydrogen concentration for beyond design basis accidents.
4.
 - a) Controls exist in the MCR to cause the components identified in Table 2.3.9-2 to perform the listed function.
 - b) The components identified in Table 2.3.9-2 perform the listed function after receiving a manual signal from the diverse actuation system (DAS).
5. Displays of the parameters identified in Table 2.3.9-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.9-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the VLS.

| Table 2.3.9-1 | | |
|------------------------------|---------|---------|
| Equipment | Tag No. | Display |
| Containment Hydrogen Monitor | VLS-001 | Yes |
| Containment Hydrogen Monitor | VLS-002 | Yes |
| Containment Hydrogen Monitor | VLS-003 | Yes |

| Table 2.3.9-2 | | | | | |
|---------------------|------------|----------|--------------------|--|----------|
| Equipment Name | Tag Number | Function | Power Group Number | Location | Room No. |
| Hydrogen Igniter 01 | VLS-EH-01 | Energize | 1 | Tunnel connection loop compartments | 11204 |
| Hydrogen Igniter 02 | VLS-EH-02 | Energize | 2 | Tunnel connection loop compartments | 11204 |
| Hydrogen Igniter 03 | VLS-EH-03 | Energize | 1 | Tunnel connection loop compartments | 11204 |
| Hydrogen Igniter 04 | VLS-EH-04 | Energize | 2 | Tunnel connection loop compartments | 11204 |
| Hydrogen Igniter 05 | VLS-EH-05 | Energize | 1 | Loop compartment 02 | 11402 |
| Hydrogen Igniter 06 | VLS-EH-06 | Energize | 2 | Loop compartment 02 | 11502 |
| Hydrogen Igniter 07 | VLS-EH-07 | Energize | 2 | Loop compartment 02 | 11402 |
| Hydrogen Igniter 08 | VLS-EH-08 | Energize | 1 | Loop compartment 02 | 11502 |
| Hydrogen Igniter 09 | VLS-EH-09 | Energize | 1 | In-containment refueling water storage tank (IRWST) | 11305 |
| Hydrogen Igniter 10 | VLS-EH-10 | Energize | 2 | IRWST | 11305 |
| Hydrogen Igniter 11 | VLS-EH-11 | Energize | 2 | Loop compartment 01 | 11401 |
| Hydrogen Igniter 12 | VLS-EH-12 | Energize | 1 | Loop compartment 01 | 11501 |
| Hydrogen Igniter 13 | VLS-EH-13 | Energize | 1 | Loop compartment 01 | 11401 |
| Hydrogen Igniter 14 | VLS-EH-14 | Energize | 2 | Loop compartment 01 | 11501 |
| Hydrogen Igniter 15 | VLS-EH-15 | Energize | 2 | IRWST | 11305 |
| Hydrogen Igniter 16 | VLS-EH-16 | Energize | 1 | IRWST | 11305 |
| Hydrogen Igniter 17 | VLS-EH-17 | Energize | 2 | Northeast valve room | 11207 |
| Hydrogen Igniter 18 | VLS-EH-18 | Energize | 1 | Northeast accumulator room | 11207 |
| Hydrogen Igniter 19 | VLS-EH-19 | Energize | 2 | East valve room | 11208 |
| Hydrogen Igniter 20 | VLS-EH-20 | Energize | 2 | Southeast accumulator room | 11206 |
| Hydrogen Igniter 21 | VLS-EH-21 | Energize | 1 | Southeast valve room | 11206 |
| Hydrogen Igniter 22 | VLS-EH-22 | Energize | 1 | Lower compartment area (core makeup tank [CMT] and valve area) | 11400 |
| Hydrogen Igniter 23 | VLS-EH-23 | Energize | 2 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 24 | VLS-EH-24 | Energize | 2 | Lower compartment area (CMT and valve area) | 11400 |

| Table 2.3.9-2 (cont.) | | | | | |
|-----------------------|------------|----------|--------------------|---|----------|
| Equipment Name | Tag Number | Function | Power Group Number | Location | Room No. |
| Hydrogen Igniter 25 | VLS-EH-25 | Energize | 2 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 26 | VLS-EH-26 | Energize | 2 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 27 | VLS-EH-27 | Energize | 1 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 28 | VLS-EH-28 | Energize | 1 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 29 | VLS-EH-29 | Energize | 1 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 30 | VLS-EH-30 | Energize | 2 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 31 | VLS-EH-31 | Energize | 1 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 32 | VLS-EH-32 | Energize | 1 | Lower compartment area (CMT and valve area) | 11400 |
| Hydrogen Igniter 33 | VLS-EH-33 | Energize | 2 | North CVS equipment room | 11209 |
| Hydrogen Igniter 34 | VLS-EH-34 | Energize | 1 | North CVS equipment room | 11209 |
| Hydrogen Igniter 35 | VLS-EH-35 | Energize | 1 | IRWST | 11305 |
| Hydrogen Igniter 36 | VLS-EH-36 | Energize | 2 | IRWST | 11305 |
| Hydrogen Igniter 37 | VLS-EH-37 | Energize | 1 | IRWST | 11305 |
| Hydrogen Igniter 38 | VLS-EH-38 | Energize | 2 | IRWST | 11305 |
| Hydrogen Igniter 39 | VLS-EH-39 | Energize | 1 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 40 | VLS-EH-40 | Energize | 2 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 41 | VLS-EH-41 | Energize | 2 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 42 | VLS-EH-42 | Energize | 1 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 43 | VLS-EH-43 | Energize | 1 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 44 | VLS-EH-44 | Energize | 1 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 45 | VLS-EH-45 | Energize | 2 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 46 | VLS-EH-46 | Energize | 2 | Upper compartment lower region | 11500 |

| Table 2.3.9-2 (cont.) | | | | | |
|-----------------------|------------|----------|--------------------|--------------------------------|----------|
| Equipment Name | Tag Number | Function | Power Group Number | Location | Room No. |
| Hydrogen Igniter 47 | VLS-EH-47 | Energize | 1 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 48 | VLS-EH-48 | Energize | 2 | Upper compartment lower region | 11500 |
| Hydrogen Igniter 49 | VLS-EH-49 | Energize | 1 | Pressurizer compartment | 11503 |
| Hydrogen Igniter 50 | VLS-EH-50 | Energize | 2 | Pressurizer compartment | 11503 |
| Hydrogen Igniter 51 | VLS-EH-51 | Energize | 1 | Upper compartment mid-region | 11500 |
| Hydrogen Igniter 52 | VLS-EH-52 | Energize | 2 | Upper compartment mid-region | 11500 |
| Hydrogen Igniter 53 | VLS-EH-53 | Energize | 2 | Upper compartment mid-region | 11500 |
| Hydrogen Igniter 54 | VLS-EH-54 | Energize | 1 | Upper compartment mid-region | 11500 |
| Hydrogen Igniter 55 | VLS-EH-55 | Energize | 1 | Refueling cavity | 11504 |
| Hydrogen Igniter 56 | VLS-EH-56 | Energize | 2 | Refueling cavity | 11504 |
| Hydrogen Igniter 57 | VLS-EH-57 | Energize | 2 | Refueling cavity | 11504 |
| Hydrogen Igniter 58 | VLS-EH-58 | Energize | 1 | Refueling cavity | 11504 |
| Hydrogen Igniter 59 | VLS-EH-59 | Energize | 2 | Pressurizer compartment | 11503 |
| Hydrogen Igniter 60 | VLS-EH-60 | Energize | 1 | Pressurizer compartment | 11503 |
| Hydrogen Igniter 61 | VLS-EH-61 | Energize | 1 | Upper compartment-upper region | 11500 |
| Hydrogen Igniter 62 | VLS-EH-62 | Energize | 2 | Upper compartment-upper region | 11500 |
| Hydrogen Igniter 63 | VLS-EH-63 | Energize | 1 | Upper compartment-upper region | 11500 |
| Hydrogen Igniter 64 | VLS-EH-64 | Energize | 2 | Upper compartment-upper region | 11500 |

| Table 2.3.9-3 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VLS is as described in the Design Description of this Section 2.3.9. | Inspection of the as-built system will be performed. | The as-built VLS conforms with the functional arrangement as described in the Design Description of this Section 2.3.9. |
| 2.a) The hydrogen monitors identified in Table 2.3.9-1 are powered by the non-Class 1E dc and UPS system. | Testing will be performed by providing a simulated test signal in each power group of the non-Class 1E dc and UPS system. | A simulated test signal exists at the hydrogen monitors identified in Table 2.3.9-1 when the non-Class 1E dc and UPS system is provided the test signal. |
| 2.b) The components identified in Table 2.3.9-2 are powered from their respective non-Class 1E power group. | Testing will be performed by providing a simulated test signal in each non-Class 1E power group. | A simulated test signal exists at the equipment identified in Table 2.3.9-2 when the assigned non-Class 1E power group is provided the test signal. |
| 3. The VLS provides the nonsafety-related function to control the containment hydrogen concentration for beyond design basis accidents. | i) Inspection for the number of igniters will be performed. ii) Operability testing will be performed on the igniters. iii) An inspection of the as-built containment internal structures will be performed. iv) An inspection will be performed of the as-built IRWST vents that are located in the roof of the IRWST along the side of the IRWST next to the containment shell. | i) At least 64 hydrogen igniters are provided inside containment at the locations specified in Table 2.3.9-2. ii) The surface temperature of the igniter exceeds 1700°F. iii) The minimum distance between the primary openings through the ceilings of the passive core cooling system valve/accumulator rooms (11206, 11207) and the containment shell is at least 19 feet. Primary openings are those that constitute 98% of the opening area. Other openings through the ceilings of these rooms must be at least 3 feet from the containment shell. iv) The discharge from each of these IRWST vents is oriented generally away from the containment shell. |
| 4.a) Controls exist in the MCR to cause the components identified in Table 2.3.9-2 to perform the listed function. | Testing will be performed on the igniters using the controls in the MCR. | Controls in the MCR operate to energize the igniters. |

| Table 2.3.9-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.b) The components identified in Table 2.3.9-2 perform the listed function after receiving manual a signal from DAS. | Testing will be performed on the igniters using the DAS controls. | The igniters energize after receiving a signal from DAS. |
| 5. Displays of the parameters identified in Table 2.3.9-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.3.9-1 in the MCR. | Displays identified in Table 2.3.9-1 can be retrieved in the MCR. |

2.3.10 Liquid Radwaste System**Design Description**

The liquid radwaste system (WLS) receives, stores, processes, samples and monitors the discharge of radioactive wastewater.

The WLS has components which receive and store radioactive or potentially radioactive liquid waste. These are the reactor coolant drain tank, the containment sump, the effluent holdup tanks and the waste holdup tanks. The WLS components store and process the waste during normal operation and during anticipated operational occurrences. Monitoring of the liquid waste is performed prior to discharge.

The WLS is as shown in Figure 2.3.10-1 and the component locations of the WLS are as shown in Table 2.3.10-5.

1. The functional arrangement of the WLS is as described in the Design Description of this Section 2.3.10.
2.
 - a) The components identified in Table 2.3.10-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.3.10-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.3.10-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.3.10-2 as ASME Code Section III meet ASME Code Section III requirements.
4.
 - a) The components identified in Table 2.3.10-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
 - b) The piping identified in Table 2.3.10-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5.
 - a) The seismic Category I equipment identified in Table 2.3.10-1 can withstand seismic design basis loads without loss of safety function.
 - b) Each of the lines identified in Table 2.3.10-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.

6. The WLS provides the following safety-related functions:
 - a) The WLS preserves containment integrity by isolation of the WLS lines penetrating the containment.
 - b) Check valves in drain lines to the containment sump limit cross flooding of compartments.
7. The WLS provides the nonsafety-related functions of:
 - a) Detecting leaks within containment to the containment sump.
 - b) Controlling releases of radioactive materials in liquid effluents.
8. Controls exist in the main control room (MCR) to cause the remotely operated valve identified in Table 2.3.10-3 to perform its active function.
9. The check valves identified in Table 2.3.10-1 perform an active safety-related function to change position as indicated in the table.
10. Displays of the parameters identified in Table 2.3.10-3 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.10-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the WLS.

| Table 2.3.10-1 | | | | | | | |
|--|--------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|-----------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Active Function |
| WLS Containment Sump Level Sensor | WLS-034 | No | Yes | No | No/No | No | - |
| WLS Containment Sump Level Sensor | WLS-035 | No | Yes | No | No/No | No | - |
| WLS Containment Sump Level Sensor | WLS-036 | No | Yes | No | No/No | No | - |
| WLS Drain from Passive Core Cooling System (PXS) Compartment A (Room 11206) Check Valve | WLS-PL-V071B | Yes | Yes | No | -/- | No | Transfer Closed |
| WLS Drain from PXS Compartment A (Room 11206) Check Valve | WLS-PL-V072B | Yes | Yes | No | -/- | No | Transfer Closed |
| WLS Drain from PXS Compartment B (Room 11207) Check Valve | WLS-PL-V071C | Yes | Yes | No | -/- | No | Transfer Closed |
| WLS Drain from PXS Compartment B (Room 11207) Check Valve | WLS-PL-V072C | Yes | Yes | No | -/- | No | Transfer Closed |
| WLS Drain from Chemical and Volume Control System (CVS) Compartment (Room 11209) Check Valve | WLS-PL-V071A | Yes | Yes | No | -/- | No | Transfer Closed |
| WLS Drain from CVS Compartment (Room 11209) Check Valve | WLS-PL-V072A | Yes | Yes | No | -/- | No | Transfer Closed |

Note: Dash (-) indicates not applicable.

| Table 2.3.10-2 | | | |
|----------------------------------|-------------|------------------|--------------------------------|
| Line Name | Line No. | ASME Section III | Functional Capability Required |
| WLS Drain from PXS Compartment A | WLS-PL-L062 | Yes | Yes |
| WLS Drain from PXS Compartment B | WLS-PL-L063 | Yes | Yes |
| WLS Drain from CVS Compartment | WLS-PL-L061 | Yes | Yes |

| Table 2.3.10-3 | | | |
|--|--------------|---------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| WLS Effluent Discharge Isolation Valve | WLS-PL-V223 | - | Close |
| Reactor Coolant Drain Tank Level | WLS-JE-LT002 | Yes | - |
| Letdown Flow from CVS to WLS | WLS-JE-FT020 | Yes | - |

| Table 2.3.10-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the WLS is as described in the Design Description of this Section 2.3.10. | Inspection of the as-built system will be performed. | The as-built WLS conforms with the functional arrangement as described in the Design Description of this Section 2.3.10. |
| 2.a) The components identified in Table 2.3.10-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design report exists for the as built components identified in Table 2.3.10-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.3.10-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built piping identified in Table 2.3.10-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.3.10-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.3.10-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.3.10-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.3.10-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.3.10-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.3.10-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.3.10-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.a) The seismic Category I equipment identified in Table 2.3.10-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.3.10-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.3.10-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 5.b) Each of the lines identified in Table 2.3.10-2 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability. | Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability. | A report exists and concludes that each of the as-built lines identified in Table 2.3.10-2 for which functional capability is required meets the requirements for functional capability. |
| 6.a) The WLS preserves containment integrity by isolation of the WLS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 6.b) Check valves in drain lines to the containment sump limit cross flooding of compartments. | Refer to item 9 in this table. | Refer to item 9 in this table. |

| Table 2.3.10-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 7.a) The WLS provides the nonsafety-related function of detecting leaks within containment to the containment sump. | i) Inspection will be performed for retrievability of the displays of containment sump level channels WLS-034, WLS-035, and WLS-036 in the MCR. ii) Testing will be performed by adding water to the sump and observing display of sump level. | i) Nonsafety-related displays of WLS containment sump level channels WLS-034, WLS-035, and WLS-036 can be retrieved in the MCR. ii) A report exists and concludes that sump level channels WLS-034, WLS-035, and WLS-036 can detect a change of 1.75 ± 0.1 inches. |
| 7.b) The WLS provides the nonsafety-related function of controlling releases of radioactive materials in liquid effluents. | Tests will be performed to confirm that a simulated high radiation signal from the discharge radiation monitor, WLS-RE-229, causes the discharge isolation valve WLS-PL-V223 to close. | A simulated high radiation signal causes the discharge control isolation valve WLS-PL-V223 to close. |
| 8. Controls exist in the MCR to cause the remotely operated valve identified in Table 2.3.10-3 to perform its active function. | Stroke testing will be performed on the remotely operated valve listed in Table 2.3.10-3 using controls in the MCR. | Controls in the MCR operate to cause the remotely operated valve to perform its active function. |
| 9. The check valves identified in Table 2.3.10-1 perform an active safety-related function to change position as indicated in the table. | Exercise testing of the check valves with active safety functions identified in Table 2.3.10-1 will be performed under pre-operational test pressure, temperature and flow conditions. | Each check valve changes position as indicated on Table 2.3.10-1. |
| 10. Displays of the parameters identified in Table 2.3.10-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.3.10-3 in the MCR. | Displays identified in Table 2.3.10-3 can be retrieved in the MCR. |

| Table 2.3.10-5 | | |
|--------------------------------|---|--------------------|
| Component Name | Tag No. | Component Location |
| WLS Reactor Coolant Drain Tank | WLS-MT-01 | Containment |
| WLS Containment Sump | WLS-MT-02 | Containment |
| WLS Degasifier Column | WLS-MV-01 | Auxiliary Building |
| WLS Effluent Holdup Tanks | WLS-MT-05A WLS-MT-05B | Auxiliary Building |
| WLS Waste Holdup Tanks | WLS-MT-06A WLS-MT-06B | Auxiliary Building |
| WLS Waste Pre-Filter | WLS-MV-06 | Auxiliary Building |
| WLS Ion Exchangers | WLS-MV-03 WLS-MV-04A WLS-MV-04B WLS-MV-04C | Auxiliary Building |
| WLS Waste After-Filter | WLS-MV-07 | Auxiliary Building |
| WLS Monitor Tanks | WLS-MT-07A WLS-MT-07B WLS-MT-07C | Auxiliary Building |
| | WLS-MT-07D WLS-MT-07E WLS-MT-07F | Radwaste Building |

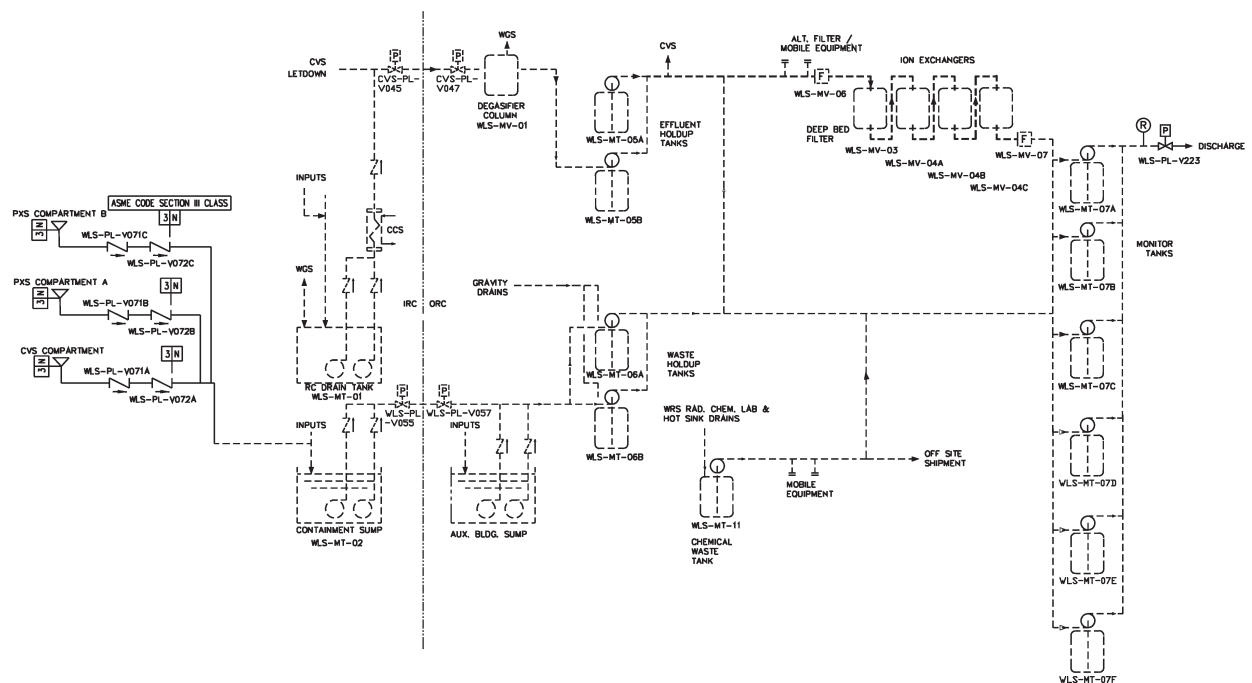


Figure 2.3.10-1
Liquid Radwaste System

2.3.11 Gaseous Radwaste System**Design Description**

The gaseous radwaste system (WGS) receives, processes, and discharges the radioactive waste gases received within acceptable off-site release limits during normal modes of plant operation including power generation, shutdown and refueling.

The WGS is as shown in Figure 2.3.11-1 and the component locations of the WGS are as shown in Table 2.3.11-3.

1. The functional arrangement of the WGS is as described in the Design Description of this Section 2.3.11.
2. The equipment identified in Table 2.3.11-1 can withstand the appropriate seismic design basis loads without loss of its structural integrity function.
3. The WGS provides the nonsafety-related functions of:
 - a) Processing radioactive gases prior to discharge.
 - b) Controlling the releases of radioactive materials in gaseous effluents.
 - c) The WGS is purged with nitrogen on indication of high oxygen levels in the system.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.11-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the WGS.

| Table 2.3.11-1 | | |
|----------------------------------|-------------|--------------------|
| Equipment Name | Tag No. | Seismic Category I |
| WGS Activated Carbon Delay Bed A | WGS-MV-02A | No ⁽¹⁾ |
| WGS Activated Carbon Delay Bed B | WGS-MV-02B | No ⁽¹⁾ |
| WGS Discharge Isolation Valve | WGS-PL-V051 | No |

Note:

1. The WGS activated carbon delay beds (WGS-MV-02A and B) are designed to one-half SSE.

| Table 2.3.11-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the WGS is as described in the Design Description of this Section 2.3.11. | Inspection of the as-built system will be performed. | The as-built WGS conforms with the functional arrangement as described in the Design Description of this Section 2.3.11. |
| 2. The equipment identified as having seismic design requirements in Table 2.3.11-1 can withstand seismic design basis loads without loss of its structural integrity function. | i) Inspection will be performed to verify that the equipment identified as having seismic design requirements in Table 2.3.11-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismically designed equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The equipment identified as having seismic design requirements in Table 2.3.11-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismically designed equipment can withstand appropriate seismic design basis loads without loss of its structural integrity function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3.a) The WGS provides the nonsafety-related function of processing radioactive gases prior to discharge. | Inspection will be performed to verify the contained volume of each of the activated carbon delay beds, WGS-MV02A and WGS-MV02B. | A report exists and concludes that the contained volume in each of the activated carbon delay beds, WGS-MV02A and WGS-MV02B, is at least 80 ft ³ . |
| 3.b) The WGS provides the nonsafety-related function of controlling the releases of radioactive materials in gaseous effluents. | Tests will be performed to confirm that the presence of a simulated high radiation signal from the discharge radiation monitor, WGS-017, causes the discharge control isolation valve WGS-PL-V051 to close. | A simulated high radiation signal causes the discharge control isolation valve WGS-PL-V051 to close. |
| 3.c) The WGS is purged with nitrogen on indication of high oxygen levels in the system. | Tests will be performed to confirm that the presence of a simulated high oxygen level signal from the oxygen monitors (WGS-025A, -025B) causes the nitrogen purge valve (WGS-PL-V002) to open and the WLS degasifier vacuum pumps (WLS-MP-03A, -03B) to stop. | A simulated high oxygen level signal causes the nitrogen purge valve (WGS-PL-V002) to open and the WLS degasifier vacuum pumps (WLS-MP-03A, -03B) to stop. |

| Table 2.3.11-3 | | |
|----------------------------------|----------------|---------------------------|
| Equipment Name | Tag No. | Component Location |
| WGS Gas Cooler | WGS-ME-01 | Auxiliary Building |
| WGS Moisture Separator | WGS-MV-03 | Auxiliary Building |
| WGS Activated Carbon Delay Bed A | WGS-MV-02A | Auxiliary Building |
| WGS Activated Carbon Delay Bed B | WGS-MV-02B | Auxiliary Building |

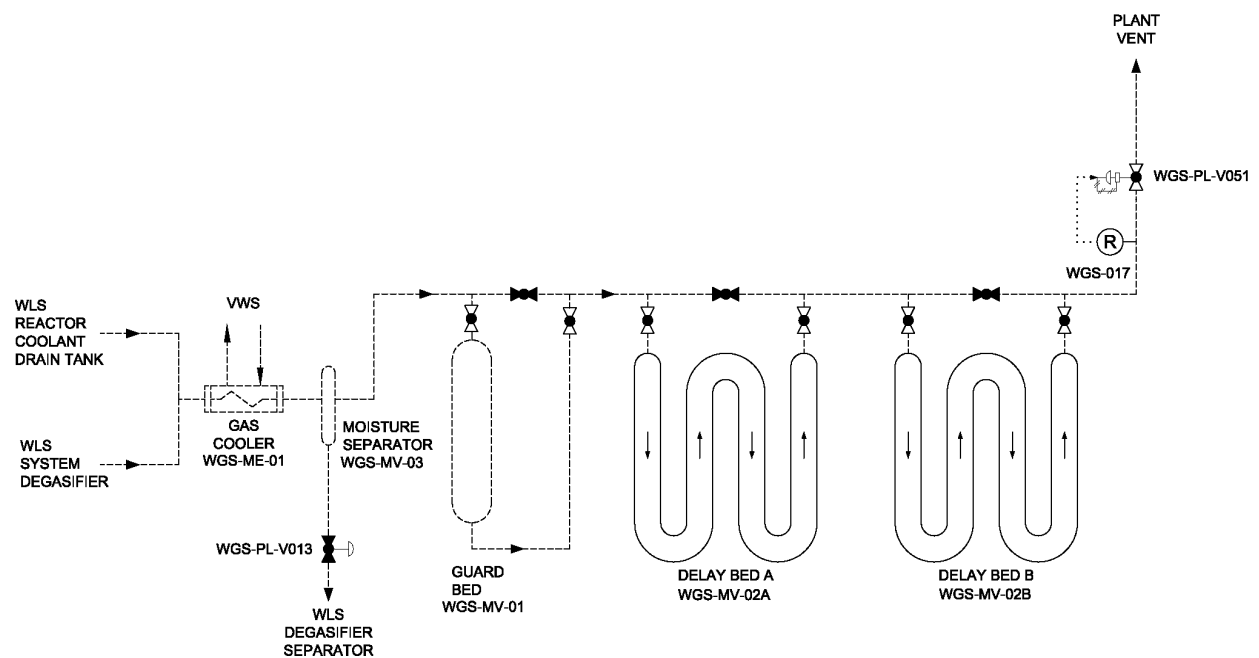


Figure 2.3.11-1
Gaseous Radwaste System

2.3.12 Solid Radwaste System**Design Description**

The solid radwaste system (WSS) receives, collects, and stores the solid radioactive wastes received prior to their processing and packaging by mobile equipment for shipment off-site.

The component locations of the WSS are as shown in Table 2.3.12-2.

1. The functional arrangement of the WSS is as described in the Design Description of this Section 2.3.12.
2. The WSS provides the nonsafety-related function of storing radioactive spent resins prior to processing or shipment.

| Table 2.3.12-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the WSS is as described in the Design Description of this Section 2.3.12. | Inspection of the as-built system will be performed. | The as-built WSS conforms with the functional arrangement as described in the Design Description of this Section 2.3.12. |
| 2. The WSS provides the nonsafety-related function of storing radioactive solids prior to processing or shipment. | Inspection will be performed to verify that the volume of each of the spent resin tanks, WSS-MV01A and WSS-MV01B, is at least 250 ft ³ . | A report exists and concludes that the volume of each of the spent resin tanks, WSS-MV01A and WSS-MV01B, is at least 250 ft ³ . |

| Table 2.3.12-2 | | |
|------------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| WSS Spent Resin Tank A | WSS-MV-01A | Auxiliary Building |
| WSS Spent Resin Tank B | WSS-MV-01B | Auxiliary Building |

2.3.13 Primary Sampling System

The primary sampling system collects samples of fluids in the reactor coolant system (RCS) and the containment atmosphere during normal operations.

The PSS is as shown in Figure 2.3.13-1. The PSS Grab Sampling Unit (PSS-MS-01) is located in the Auxiliary Building.

1. The functional arrangement of the PSS is as described in the Design Description of this Section 2.3.13.
2. The components identified in Table 2.3.13-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
3. Pressure boundary welds in components identified in Table 2.3.13-1 as ASME Code Section III meet ASME Code Section III requirements.
4. The components identified in Table 2.3.13-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
5. The seismic Category I equipment identified in Table 2.3.13-1 can withstand seismic design basis loads without loss of safety function.
6.
 - a) The Class 1E equipment identified in Table 2.3.13-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of their safety function, for the time required to perform the safety function.
 - b) The Class 1E components identified in Table 2.3.13-1 are powered from their respective Class 1E division.
 - c) Separation is provided between PSS Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions.
7. The PSS provides the safety-related function of preserving containment integrity by isolation of the PSS lines penetrating the containment.
8. The PSS provides the nonsafety-related function of providing the capability of obtaining reactor coolant and containment atmosphere samples.
9. Safety-related displays identified in Table 2.3.13-1 can be retrieved in the MCR.
10.
 - a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.3.13-1 to perform active functions.
 - b) The valves identified in Table 2.3.13-1 as having protection and safety monitoring system (PMS) control perform an active function after receiving a signal from the PMS.

11. a) Deleted.

b) After loss of motive power, the remotely operated valves identified in Table 2.3.13-1 assume the indicated loss of motive power position.

12. Controls exist in the MCR to cause the valves identified in Table 2.3.13-2 to perform the listed function.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.13-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the PSS.

| Table 2.3.13-1 | | | | | | | | | |
|---|--------------|-----------------------|----------------|-------------------------|----------------------------------|------------------------|-----------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS | Active Function | Loss of Motive Power Position |
| Containment Air Sample Containment Isolation Valve Inside Reactor Containment (IRC) | PSS-PL-V008 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Liquid Sample Line Containment Isolation Valve IRC | PSS-PL-V010A | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Liquid Sample Line Containment Isolation Valve IRC | PSS-PL-V010B | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Liquid Sample Line Containment Isolation Valve Outside Reactor Containment (ORC) | PSS-PL-V011A | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Liquid Sample Line Containment Isolation Valve ORC | PS-PL-V011B | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Sample Return Line Containment Isolation Valve ORC | PSS-PL-V023 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Sample Return Containment Isolation Valve IRC | PSS-PL-V024 | Yes | Yes | Yes | Yes/Yes | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |
| Air Sample Line Containment Isolation Valve ORC | PSS-PL-V046 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | Closed |

Note: A dash (-) indicates not applicable.

| Table 2.3.13-2 | | |
|----------------------------------|--------------|-------------------------------|
| Equipment Name | Tag No. | Control Function |
| Hot Leg 1 Sample Isolation Valve | PSS-PL-V001A | Transfer Open/Transfer Closed |
| Hot Leg 2 Sample Isolation Valve | PSS-PL-V001B | Transfer Open/Transfer Closed |

| Table 2.3.13-3 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the PSS is as described in the Design Description of this Section 2.3.13. | Inspection of the as-built system will be performed. | The as-built PSS conforms with the functional arrangement as described in the Design Description of this Section 2.3.13. |
| 2. The components identified in Table 2.3.13-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.3.13-1 as ASME Code Section III. |
| 3. Pressure boundary welds in components identified in Table 2.3.13-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 4. The components identified in Table 2.3.13-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested. | A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.3.13-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 5. The seismic Category I equipment identified in Table 2.3.13-1 can withstand seismic design basis loads without loss of its safety function. | i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.3.13-1 are located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.3.13-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |

| Table 2.3.13-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6.a) The Class 1E equipment identified in Tables 2.3.13-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of their safety function, for the time required to perform the safety function. | <p>i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.</p> <p>ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.</p> | <p>i) A report exists and concludes that the Class 1E equipment identified in Table 2.3.13-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform the safety function.</p> <p>ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.3.13-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p> |
| 6.b) The Class 1E components identified in Table 2.3.13-1 are powered from their respective Class 1E division. | Testing will be performed on the PSS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.3.13-1 when the assigned Class 1E division is provided the test signal. |
| 6.c) Separation is provided between PSS Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 7. The PSS provides the safety-related function of preserving containment integrity by isolation of the PSS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, item 7. | See Tier 1 Material, Table 2.2.1-3, item 7. |
| 8. The PSS provides the nonsafety-related function of providing the capability of obtaining reactor coolant and containment atmosphere samples. | Testing will be performed to obtain samples of the reactor coolant and containment atmosphere. | A sample is drawn from the reactor coolant and the containment atmosphere. |
| 9. Safety-related displays identified in Table 2.3.13-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | The safety-related displays identified in Table 2.3.13-1 can be retrieved in the MCR. |

| Table 2.3.13-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 10.a) Controls exist in the MCR to cause those remotely operated valves identified in Table 2.3.13-1 to perform active functions. | Stroke testing will be performed on the remotely operated valves identified in Table 2.3.13-1 using the controls in the MCR. | Controls in the MCR operate to cause those remotely operated valves identified in Table 2.3.13-1 to perform active functions. |
| 10.b) The valves identified in Table 2.3.13-1 as having PMS control perform an active function after receiving a signal from the PMS. | Testing will be performed on remotely operated valves listed in Table 2.3.13-1 using real or simulated signals into the PMS. | The remotely operated valves identified in Table 2.3.13-1 as having PMS control perform the active function identified in the table after receiving a signal from the PMS. |
| 11.a) Deleted. | | |
| 11.b) After loss of motive power, the remotely operated valves identified in Table 2.3.13-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | After loss of motive power, each remotely operated valve identified in Table 2.3.13-1 assumes the indicated loss of motive power position. |
| 12. Controls exist in the MCR to cause the valves identified in Table 2.3.13-2 to perform the listed function. | Testing will be performed on the components in Table 2.3.13-2 using controls in the MCR. | Controls in the MCR cause valves identified in Table 2.3.13-2 to perform the listed functions. |

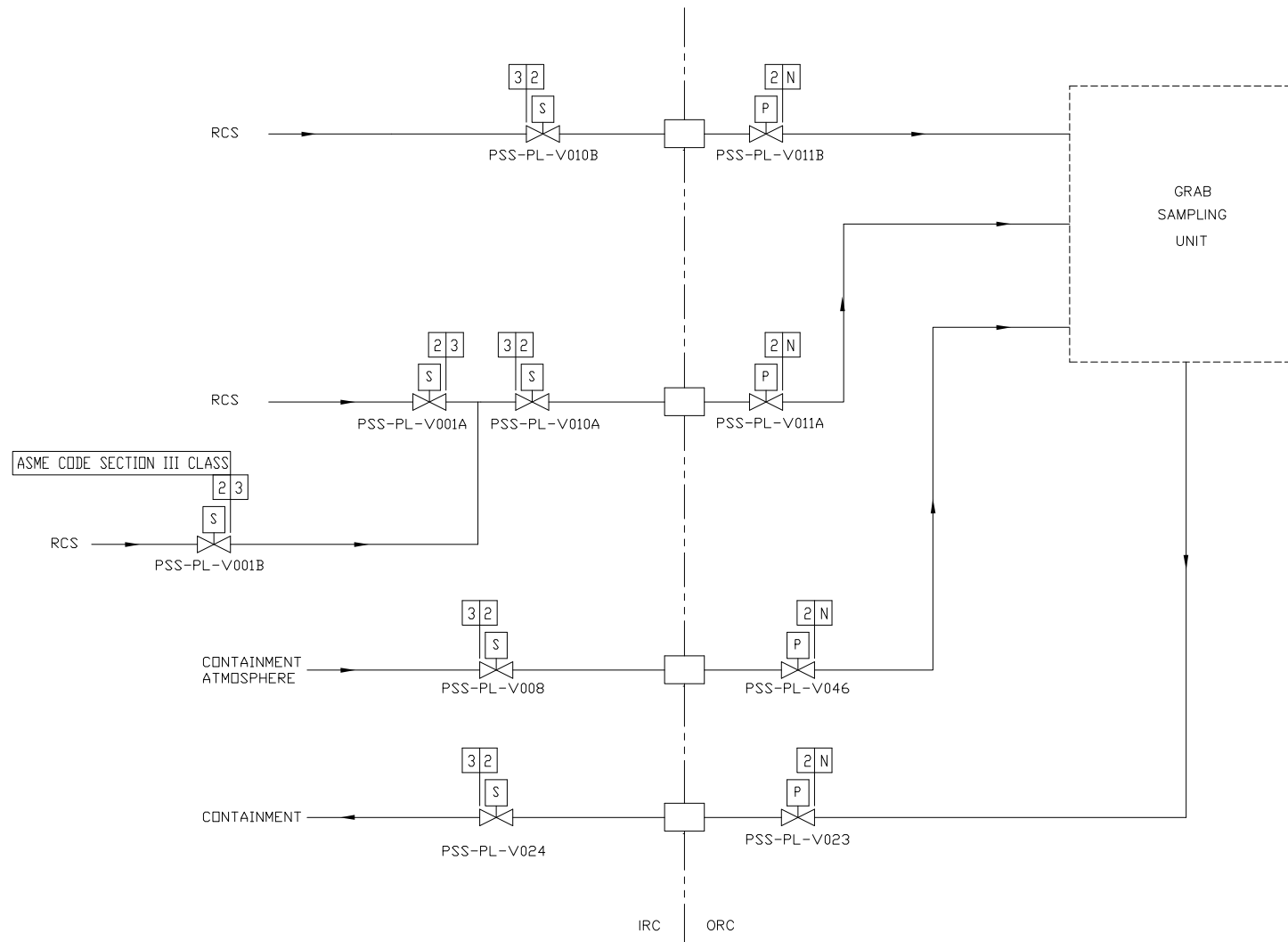


Figure 2.3.13-1
Primary Sampling System

2.3.14 Demineralized Water Transfer and Storage System

Design Description

The demineralized water transfer and storage system (DWS) receives water from the demineralized water treatment system (DTS), and provides a reservoir of demineralized water to supply the condensate storage tank and for distribution throughout the plant. Demineralized water is processed in the DWS to remove dissolved oxygen. In addition to supplying water for makeup of systems which require pure water, the demineralized water is used to sluice spent radioactive resins from the ion exchange vessels in the chemical and volume control system (CVS), the spent fuel pool cooling system (SFS), and the liquid radwaste system (WLS) to the solid radwaste system (WSS).

The component locations of the DWS are as shown in Table 2.3.14-3.

1. The functional arrangement of the DWS is as described in the Design Description of this Section 2.3.14.
2. The DWS provides the safety-related function of preserving containment integrity by isolation of the DWS lines penetrating the containment.
3. The DWS condensate storage tank (CST) provides the nonsafety-related function of water supply to the FWS startup feedwater pumps.
4. Displays of the parameters identified in Table 2.3.14-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.14-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the DWS.

| Table 2.3.14-1 | | | |
|-------------------------------------|---------|---------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Condensate Storage Tank Water Level | DWS-006 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.14-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the DWS is as described in the Design Description of this Section 2.3.14. | Inspection of the as-built system will be performed. | The as-built DWS conforms with the functional arrangement as described in the Design Description of this Section 2.3.14. |
| 2. The DWS provides the safety-related function of preserving containment integrity by isolation of the DWS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 3. The DWS CST provides the nonsafety-related function of water supply to the FWS startup feedwater pumps. | Inspection of the DWS CST will be performed. | The volume of the CST between the tank overflow and the startup feedwater pumps supply connection is greater than or equal to 325,000 gallons. |
| 4. Displays of the parameters identified in Table 2.3.14-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.3.14-1 can be retrieved in the MCR. |

| Table 2.3.14-3 | | |
|---|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Demineralizer Water Storage Tank Degasification System Package | DWS-MS-01 | Annex Building |
| Condensate Storage Tank Degasification System Package | DWS-MS-02 | Turbine Building |
| Demineralized Water Storage Tank | DWS-MT-01 | Yard |
| Condensate Storage Tank | DWS-MT-02 | Yard |

2.3.15 Compressed and Instrument Air System

Design Description

The compressed and instrument air system (CAS) consists of three subsystems: instrument air, service air, and high-pressure air. The instrument air subsystem supplies compressed air for air-operated valves and dampers. The service air subsystem supplies compressed air at outlets throughout the plant to power air-operated tools and is used as a motive force for air-powered pumps. The service air subsystem is also utilized as a supply source for breathing air. The high-pressure air subsystem supplies air to the main control room emergency habitability system (VES), the generator breaker package, and fire fighting apparatus recharge station.

The CAS is required for normal operation and startup of the plant.

The component locations of the CAS are as shown in Table 2.3.15-3.

1. The functional arrangement of the CAS is as described in the Design Description of this Section 2.3.15.
2. The CAS provides the safety-related function of preserving containment integrity by isolation of the CAS lines penetrating the containment.
3. Displays of the parameters identified in Table 2.3.15-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.15-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the CAS.

| Table 2.3.15-1 | | | |
|-------------------------|---------|---------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Instrument Air Pressure | CAS-011 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.3.15-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the CAS is as described in the Design Description of this Section 2.3.15. | Inspection of the as-built system will be performed. | The as-built CAS conforms with the functional arrangement as described in the Design Description of this Section 2.3.15. |
| 2. The CAS provides the safety-related function of preserving containment integrity by isolation of the CAS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. |
| 3. Displays of the parameters identified in Table 2.3.15-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.3.15-1 can be retrieved in the MCR. |

| Table 2.3.15-3 | | |
|---|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Instrument Air Compressor Package A | CAS-MS-01A | Turbine Building |
| Instrument Air Compressor Package B | CAS-MS-01B | Turbine Building |
| Instrument Air Dryer Package A | CAS-MS-02A | Turbine Building |
| Instrument Air Dryer Package B | CAS-MS-02B | Turbine Building |
| Service Air Compressor Package A | CAS-MS-03A | Turbine Building |
| Service Air Compressor Package B | CAS-MS-03B | Turbine Building |
| Service Air Dryer Package A | CAS-MS-04A | Turbine Building |
| Service Air Dryer Package B | CAS-MS-04B | Turbine Building |
| High Pressure Air Compressor and Filter Package | CAS-MS-05 | Turbine Building |
| Instrument Air Receiver A | CAS-MT-01A | Turbine Building |
| Instrument Air Receiver B | CAS-MT-01B | Turbine Building |
| Service Air Receiver | CAS-MT-02 | Turbine Building |

2.3.16 Potable Water System

No entry for this system.

2.3.17 Waste Water System

No entry for this system.

2.3.18 Plant Gas System

No entry. Covered in Section 3.3, Buildings.

2.3.19 Communication System**Design Description**

The communication system (EFS) provides intraplant communications during normal, maintenance, transient, fire, and accident conditions, including loss of offsite power.

1. a) The EFS has handsets, amplifiers, loudspeakers, and siren tone generators connected as a telephone/page system.
b) The EFS has sound-powered equipment connected as a system.
2. The EFS provides the following nonsafety-related functions:
 - a) The EFS telephone/page system provides intraplant, station-to-station communications and area broadcasting between the main control room (MCR) and the locations listed in Table 2.3.19-1.
 - b) The EFS provides sound-powered communications between the MCR, the remote shutdown workstation (RSW), the Division A, B, C, D dc equipment rooms (Rooms 12201/12203/12205/12207), the Division A, B, C, D I&C rooms (Rooms 12301/12302/12304/12305), and the diesel generator building (Rooms 60310/60320) without external power.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3.19-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the EFS.

| Table 2.3.19-1 | |
|--|-------------------------|
| Telephone/Page System Equipment | Location |
| Fuel Handling Area | 12562 |
| Division A, B, C, D dc Equipment Rooms | 12201/12203/12205/12207 |
| Division A, B, C, D I&C Rooms | 12301/12302/12304/12305 |
| Maintenance Floor Staging Area | 12351 |
| Containment Maintenance Floor | 11300 |
| Containment Operating Deck | 11500 |

| Table 2.3.19-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1.a) The EFS has handsets, amplifiers, loudspeakers, and siren tone generators connected as a telephone/page system. | Inspection of the as-built system will be performed. | The as-built EFS has handsets, amplifiers, loudspeakers, and siren tone generators connected as a telephone/page system. |
| 1.b) The EFS has sound-powered equipment connected as a system. | Inspection of the as-built system will be performed. | The as-built EFS has sound-powered equipment connected as a system. |
| 2.a) The EFS telephone/page system provides intraplant, station-to-station communications and area broadcasting between the MCR and the locations listed in Table 2.3.19-1. | An inspection and test will be performed on the telephone/page communication equipment. | Telephone/page equipment is installed and voice transmission and reception from the MCR are accomplished. |
| 2.b) EFS provides sound-powered communications between the MCR, the RSW, the Division A, B, C, D dc equipment rooms (Rooms 12201/12203/12205/12207), the Division A, B, C, D I&C rooms (Rooms 12301/12302/12304/12305), and the diesel generator building (Rooms 60310/60320) without external power. | An inspection and test will be performed of the sound-powered communication equipment. | Sound-powered equipment is installed and voice transmission and reception are accomplished. |

2.3.20 Turbine Building Closed Cooling Water System

No entry for this system.

2.3.21 Secondary Sampling System

No entry for this system.

2.3.22 Containment Leak Rate Test System

No entry. Covered in Section 2.2.1, Containment System.

2.3.23 This section intentionally blank

2.3.24 Demineralized Water Treatment System

No entry for this system.

2.3.25 Gravity and Roof Drain Collection System

No entry for this system.

2.3.26 This section intentionally blank

2.3.27 Sanitary Drainage System

No entry for this system.

2.3.28 Turbine Island Vents, Drains, and Relief System

No entry for this system.

2.3.29 Radioactive Waste Drain System**Design Description**

The radioactive waste drain system (WRS) collects radioactive and potentially radioactive liquid wastes from equipment and floor drains during normal operation, startup, shutdown, and refueling. The liquid wastes are then transferred to appropriate processing and disposal systems.

Nonradioactive wastes are collected by the waste water system (WWS). The WRS is as shown in Figure 2.3.29-1.

1. The functional arrangement of the WRS is as described in the Design Description of this Section 2.3.29.
2. The WRS collects liquid wastes from the equipment and floor drainage of the radioactive portions of the auxiliary building, annex building, and radwaste building and directs these wastes to a WRS sump or WLS waste holdup tanks located in the auxiliary building.
3. The WRS collects chemical wastes from the auxiliary building chemical laboratory drains and the decontamination solution drains in the annex building and directs these wastes to the chemical waste tank of the liquid radwaste system.
4. The WWS stops the discharge from the turbine building sump upon detection of high radiation in the discharge stream to the oil separator.

| Table 2.3.29-1 Inspection, Tests, Analyses and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspection, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the WRS is as described in the Design Description of this Section 2.3.29. | Inspection of the as-built system will be performed. | The as-built WRS conforms with the functional arrangement as described in the Design Description of this Section 2.3.29. |
| 2. The WRS collects liquid wastes from the equipment and floor drainage of the radioactive portions of the auxiliary building, annex building, and radwaste building and directs these wastes to a WRS sump or WLS waste holdup tanks located in the auxiliary building. | A test is performed by pouring water into the equipment and floor drains in the radioactive portions of the auxiliary building, annex building, and radwaste building. | The water poured into these drains is collected either in the auxiliary building radioactive drains sump or the WLS waste holdup tanks. |
| 3. The WRS collects chemical wastes from the auxiliary building chemical laboratory drains and the decontamination solution drains in the annex building and directs these wastes to the chemical waste tank of the liquid radwaste system. | A test is performed by pouring water into the auxiliary building chemical laboratory and the decontamination solution drains in the annex building. | The water poured into these drains is collected in the chemical waste tank of the liquid radwaste system. |
| 4. The WWS stops the discharge from the turbine building sump upon detection of high radiation in the discharge stream to the oil separator. | Tests will be performed to confirm that a simulated high radiation signal from the turbine building sump discharge radiation monitor, WWS-021 causes the sump pumps (WWS-MP-01A and B) to stop operating, stopping the spread of radiation outside of the turbine building. | A simulated high radiation signal causes the turbine building sump pumps (WWS-MP-01A and B) to stop operating, stopping the spread of radiation outside of the turbine building. |

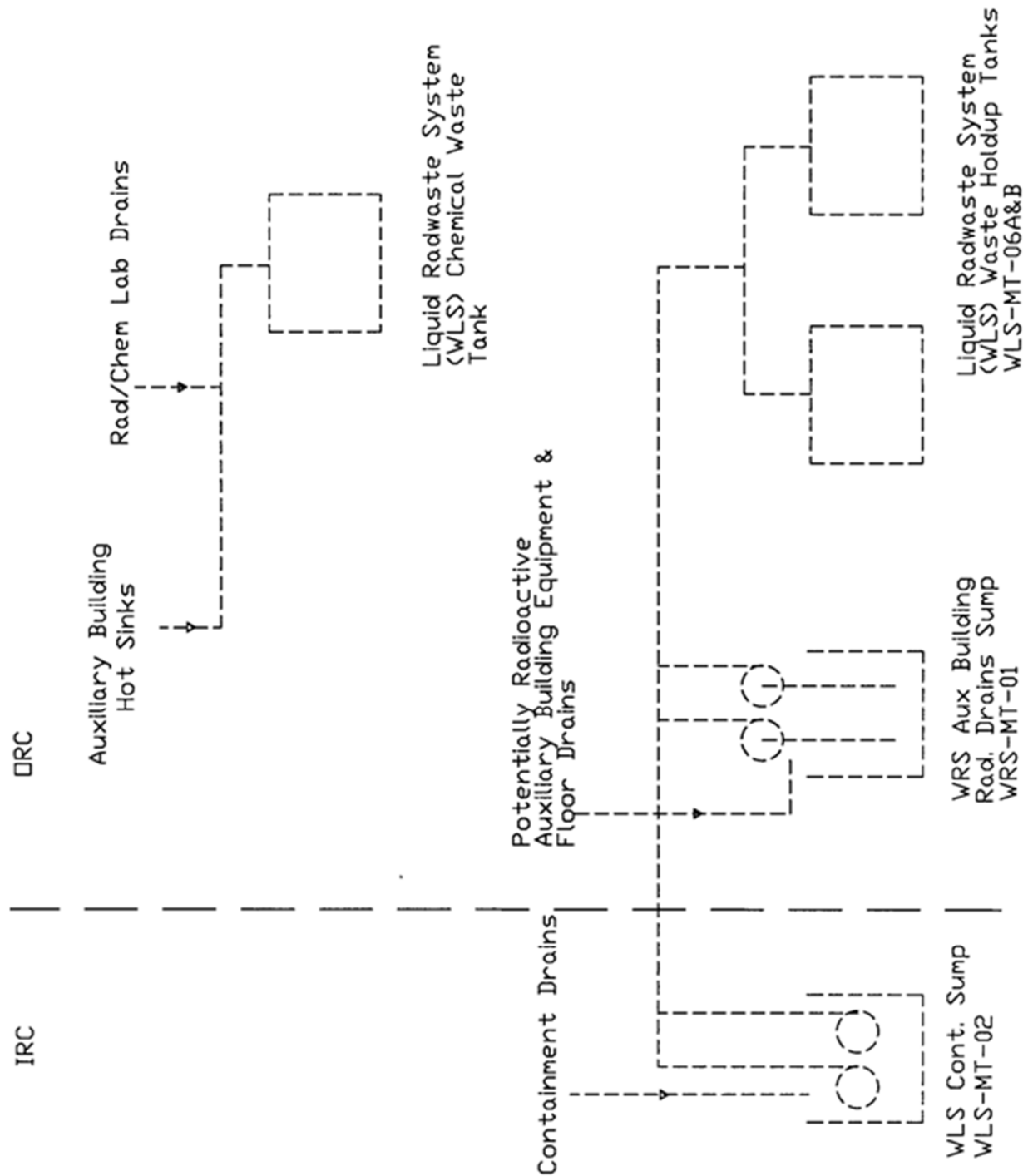


Figure 2.3.29-1
Radioactive Waste Drain System

2.4 Steam and Power Conversion Systems**2.4.1 Main and Startup Feedwater System**

See Section 2.2.4 for information on the main feedwater system.

Design Description

The startup feedwater system supplies feedwater to the steam generators during plant startup, hot standby and shutdown conditions, and during transients in the event of main feedwater system unavailability.

1. The functional arrangement of the startup feedwater system is as described in the Design Description of this Section 2.4.1.
2. The FWS provides the following nonsafety-related functions:

The FWS provides startup feedwater flow from the condensate storage tank (CST) to the steam generator system (SGS) for heat removal from the RCS.

3. Controls exist in the main control room (MCR) to cause the components identified in Table 2.4.1-1 to perform the listed function.
4. Displays of the parameters identified in Table 2.4.1-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.1-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the FWS.

| Table 2.4.1-1 | | | |
|--|--------------|-------------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Startup Feedwater Pump A (Motor) | FWS-MP-03A | Yes (Run Status) | Start |
| Startup Feedwater Pump B (Motor) | FWS-MP-03B | Yes (Run Status) | Start |
| Startup Feedwater Pump A Isolation Valve | FWS-PL-V013A | Yes (Valve Position) | Open |
| Startup Feedwater Pump B Isolation Valve | FWS-PL-V013B | Yes (Valve Position) | Open |

| Table 2.4.1-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the startup feedwater system is as described in the Design Description of this Section 2.4.1. | Inspection of the as-built system will be performed. | The as-built startup feedwater system conforms with the functional arrangement as described in the Design Description of this Section 2.4.1. |
| 2. The FWS provides startup feedwater flow from the CST to the SGS for heat removal from the RCS. | Testing will be performed to confirm that each of the startup feedwater pumps can provide water from the CST to both steam generators. | Each FWS startup feedwater pump provides a flow rate greater than or equal to 260 gpm to each steam generator system at a steam generator secondary side pressure of at least 1106 psia. |
| 3. Controls exist in the MCR to cause the components identified in Table 2.4.1-1 to perform the listed function. | Testing will be performed on the components in Table 2.4.1-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.4.1-1 to perform the listed functions. |
| 4. Displays of the parameters identified in Table 2.4.1-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.4.1-1 can be retrieved in the MCR. |

| Table 2.4.1-3 | | |
|--------------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Startup Feedwater Pump A | FWS-MP-03A | Turbine Building |
| Startup Feedwater Pump B | FWS-MP-03B | Turbine Building |

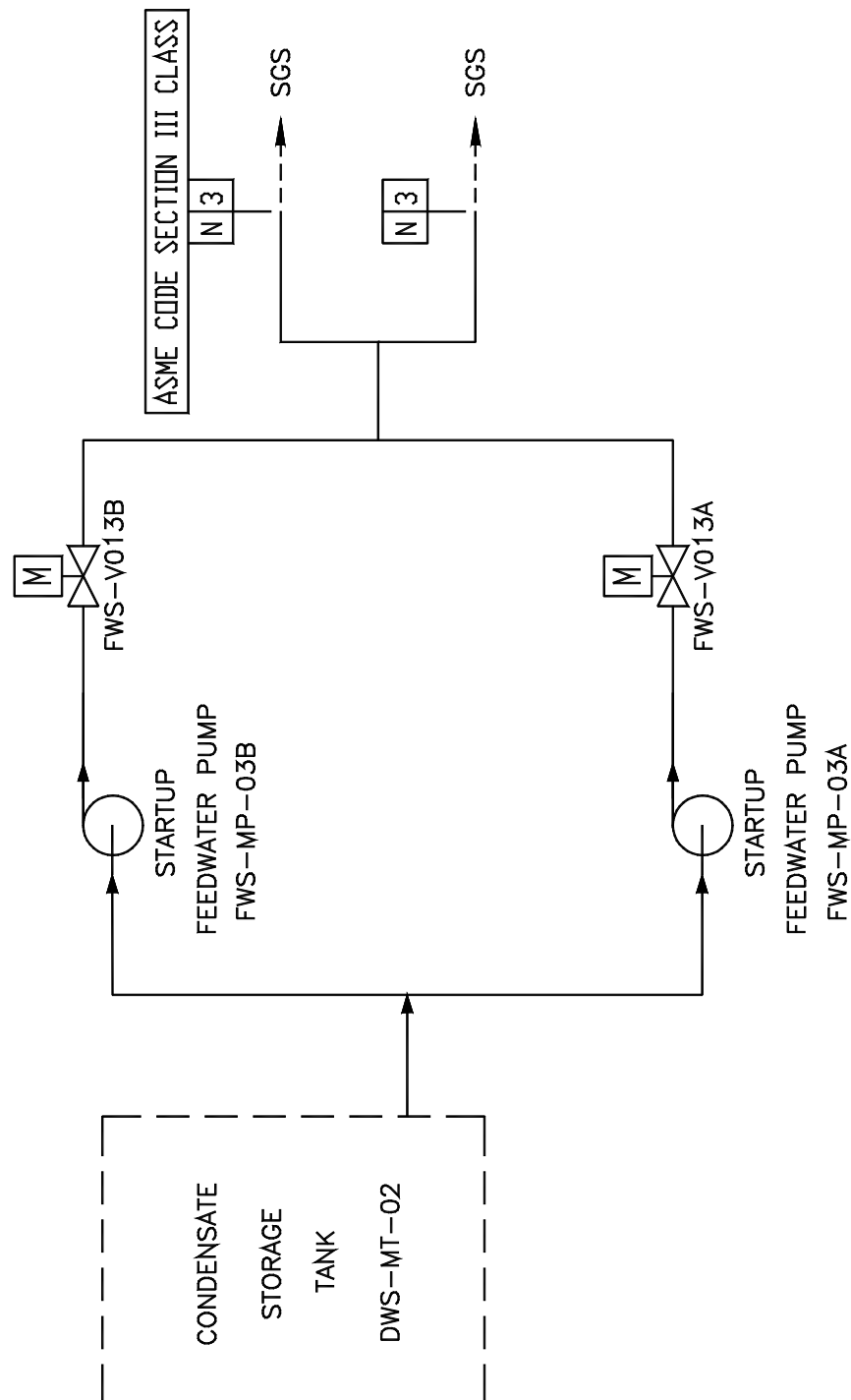


Figure 2.4.1-1
Main and Startup Feedwater System

2.4.2 Main Turbine System**Design Description**

The main turbine system (MTS) is designed for electric power production consistent with the capability of the reactor and the reactor coolant system.

The component locations of the MTS are as shown in Table 2.4.2-2.

1. The functional arrangement of the MTS is as described in the Design Description of this Section 2.4.2.
2.
 - a) Controls exist in the MCR to trip the main turbine-generator.
 - b) The main turbine-generator trips after receiving a signal from the PMS.
 - c) The main turbine-generator trips after receiving a signal from the DAS.
3. The overspeed trips for the AP1000 turbine are set for 110% and 111% ($\pm 1\%$ each). Each trip is initiated electrically in separate systems. The trip signals from the two turbine electrical overspeed protection trip systems are isolated from, and independent of, each other.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.2-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the MTS.

| Table 2.4.2-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Test, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the MTS is as described in the Design Description of this Section 2.4.2. | Inspection of the as-built system will be performed. | The as-built MTS conforms with the functional arrangement as described in the Design Description of this Section 2.4.2. |
| 2.a) Controls exist in the MCR to trip the main turbine-generator. | Testing will be performed on the main turbine-generator using controls in the MCR. | Controls in the MCR operate to trip the main turbine-generator. |
| 2.b) The main turbine-generator trips after receiving a signal from the PMS. | Testing will be performed using real or simulated signals into the PMS. | The main turbine-generator trips after receiving a signal from the PMS. |
| 2.c) The main turbine-generator trips after receiving a signal from the DAS. | Testing will be performed using real or simulated signals into the DAS. | The main turbine-generator trips after receiving a signal from the DAS. |
| 3) The trip signals from the two turbine electrical overspeed protection trip systems are isolated from, and independent of, each other. | i) The system design will be reviewed. ii) Testing of the as-built system will be performed using simulated signals from the turbine speed sensors. iii) Inspection will be performed for the existence of a report verifying that the two turbine electrical overspeed protection systems have diverse hardware and software/firmware. | i) The system design review shows that the trip signals of the two electrical overspeed protection trip systems are isolated from, and independent of, each other. ii) The main turbine-generator trips after overspeed signals are received from the speed sensors of the 110% emergency electrical overspeed trip system, and the main turbine-generator trips after overspeed signals are received from the speed sensors of the 111% backup electrical overspeed trip system. iii) A report exists and concludes that the two electrical overspeed protection systems have diverse hardware and software/firmware. |

| Table 2.4.2-2 | | |
|--|------------|--------------------|
| Component Name | Tag No. | Component Location |
| HP Turbine | MTS-MG-01 | Turbine Building |
| LP Turbine A | MTS-MG-02A | Turbine Building |
| LP Turbine B | MTS-MG-02B | Turbine Building |
| LP Turbine C | MTS-MG-02C | Turbine Building |
| Gland Steam Condenser | GSS-ME-01 | Turbine Building |
| Gland Condenser Vapor Exhauster 1A | GSS-MA-01A | Turbine Building |
| Gland Condenser Vapor Exhauster 1B | GSS-MA-01B | Turbine Building |
| Electrical Overspeed Trip Device | -- | Turbine Building |
| Emergency Electrical Overspeed Trip Device | -- | Turbine Building |

2.4.3 Main Steam System

No entry. Covered in Section 2.2.4, Steam Generator System.

2.4.4 Steam Generator Blowdown System

No entry. Containment isolation function covered in Section 2.2.1, Containment System and 2.2.4, Steam Generator System.

No entry. Steam generator isolation function covered in Section 2.2.4, Steam Generator System.

2.4.5 Condenser Air Removal System

No entry. Covered in Section 3.5, Radiation Monitoring.
(Note: Monitor is TDS-RE001.)

2.4.6 Condensate System

Design Description

The condensate system (CDS) provides feedwater at the required temperature, pressure, and flow rate to the deaerator. Condensate is pumped from the main condenser hotwell by the condensate pumps and passes through the low-pressure feedwater heaters to the deaerator. The circulating water system (CWS) removes heat from the condenser and is site specific starting from the interface at the locations where the CWS piping enters and exits the turbine building.

The CDS operates during plant startup and power operations (full and part loads).

The component locations of the CDS are as shown in Table 2.4.6-3.

1. The functional arrangement of the CDS is as described in the Design Description of this Section 2.4.6.
2. Displays of the parameters identified in Table 2.4.6-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.6-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the CDS.

| Table 2.4.6-1 | | |
|------------------------|----------|---------|
| Equipment Name | Tag No. | Display |
| Condenser Backpressure | CDS-056A | Yes |
| Condenser Backpressure | CDS-056B | Yes |
| Condenser Backpressure | CDS-056C | Yes |

| Table 2.4.6-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the CDS is as described in the Design Description of this Section 2.4.6. | Inspection of the as-built system will be performed. | The as-built CDS conforms with the functional arrangement as described in the Design Description of Section 2.4.6. |
| 2. Displays of the parameters identified in Table 2.4.6-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.4.6-1 can be retrieved in the MCR. |

| Table 2.4.6-3 | |
|---|--------------------|
| Component Name | Component Location |
| Low Pressure Feedwater Heaters | Turbine Building |
| Deaerator Feedwater Heater and Storage Tank | Turbine Building |
| Main Condenser Shell A | Turbine Building |
| Main Condenser Shell B | Turbine Building |
| Main Condenser Shell C | Turbine Building |
| Condensate Pump A | Turbine Building |
| Condensate Pump B | Turbine Building |
| Condensate Pump C | Turbine Building |

2.4.7 Circulating Water System

No entry for this system.

2.4.8 Auxiliary Steam Supply System

No entry for this system.

2.4.9 Condenser Tube Cleaning System

No entry for this system.

2.4.10 Turbine Island Chemical Feed System

No entry for this system.

2.4.11 Condensate Polishing System

No entry for this system.

2.4.12 Gland Seal System

No entry. Covered in Section 2.4.2, Main Turbine System.

2.4.13 Generator Hydrogen and CO₂ System

No entry for this system.

2.4.14 Heater Drain System

No entry for this system.

2.4.15 Hydrogen Seal Oil System

No entry for this system.

2.4.16 Main Turbine and Generator Lube Oil System

No entry for this system.

2.5 Instrumentation and Control Systems**2.5.1 Diverse Actuation System****Design Description**

The diverse actuation system (DAS) initiates reactor trip, actuates selected functions, and provides plant information to the operator.

The component locations of the DAS are as shown in Table 2.5.1-5.

1. The functional arrangement of the DAS is as described in the Design Description of this Section 2.5.1.
2. The DAS provides the following nonsafety-related functions:
 - a) The DAS provides an automatic reactor trip on low wide-range steam generator water level, or on low pressurizer water level, or on high hot leg temperature, separate from the PMS.
 - b) The DAS provides automatic actuation of selected functions, as identified in Table 2.5.1-1, separate from the PMS.
 - c) The DAS provides manual initiation of reactor trip and selected functions, as identified in Table 2.5.1-2, separate from the PMS. These manual initiation functions are implemented in a manner that bypasses the control room multiplexers, if any; the PMS cabinets; and the signal processing equipment of the DAS.
 - d) The DAS provides main control room (MCR) displays of selected plant parameters, as identified in Table 2.5.1-3, separate from the PMS.
3. The DAS has the following features:
 - a) The signal processing hardware of the DAS uses input modules, output modules, and microprocessor or special purpose logic processor boards that are different than those used in the PMS.
 - b) The display hardware of the DAS uses a different display device than that used in the PMS.
 - c) Software diversity between DAS and PMS will be achieved through the use of different algorithms, logic, program architecture, executable operating system, and executable software/logic.
 - d) The DAS has electrical surge withstand capability (SWC), and can withstand the electromagnetic interference (EMI), radio frequency (RFI), and electrostatic discharge (ESD) conditions that exist where the DAS equipment is located in the plant.
 - e) The sensors identified on Table 2.5.1-3 are used for DAS input and are separate from those being used by the PMS and plant control system.

- f) The DAS is powered by non-Class 1E uninterruptible power supplies that are independent and separate from the power supplies which power the PMS.
 - g) The DAS signal processing cabinets are provided with the capability for channel testing without actuating the controlled components.
 - h) The DAS equipment can withstand the room ambient temperature and humidity conditions that will exist at the plant locations in which the DAS equipment is installed at the times for which the DAS is designed to be operational.
4. The DAS hardware and any software are developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:
- a) Development phase for hardware and any software
 - b) System test phase
 - c) Installation phase

The planned design process also provides for the use of commercial off-the-shelf hardware and software.

5. The DAS manual actuation of ADS, IRWST injection, and containment recirculation can be executed correctly and reliably.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.1-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the DAS.

Table 2.5.1-1
Functions Automatically Actuated by the DAS

1. Reactor and Turbine Trip on Low Wide-range Steam Generator Water Level or Low Pressurizer Water Level or High Hot Leg Temperature
2. Passive Residual Heat Removal (PRHR) Actuation and In-containment Refueling Water Storage Tank (IRWST) Gutter Isolation on Low Wide-range Steam Generator Water Level or on High Hot Leg Temperature
3. Core Makeup Tank (CMT) Actuation and Trip All Reactor Coolant Pumps on Low Wide-Range Steam Generator Water Level or Low Pressurizer Water Level
4. Isolation of Selected Containment Penetrations and Initiation of Passive Containment Cooling System (PCS) on High Containment Temperature

Table 2.5.1-2
Functions Manually Actuated by the DAS

1. Reactor and Turbine Trip
2. PRHR Actuation and IRWST Gutter Isolation
3. CMT Actuation and Trip All Reactor Coolant Pumps
4. First-stage Automatic Depressurization System (ADS) Valve Actuation
5. Second-stage ADS Valve Actuation
6. Third-stage ADS Valve Actuation
7. Fourth-stage ADS Valve Actuation
8. PCS Actuation
9. Isolation of Selected Containment Penetrations
10. Containment Hydrogen Igniter Actuation
11. IRWST Injection Actuation
12. Containment Recirculation Actuation
13. Actuate IRWST Drain to Containment

| Table 2.5.1-3 DAS Sensors and Displays | |
|--|------------|
| Equipment Name | Tag Number |
| Reactor Coolant System (RCS) Hot Leg Temperature | RCS-300A |
| RCS Hot Leg Temperature | RCS-300B |
| Steam Generator 1 Wide-range Level | SGS-044 |
| Steam Generator 1 Wide-range Level | SGS-045 |
| Steam Generator 2 Wide-range Level | SGS-046 |
| Steam Generator 2 Wide-range Level | SGS-047 |
| Pressurizer Water Level | RCS-305A |
| Pressurizer Water Level | RCS-305B |
| Containment Temperature | VCS-053A |
| Containment Temperature | VCS-053B |
| Core Exit Temperature | IIS-009 |
| Core Exit Temperature | IIS-013 |
| Core Exit Temperature | IIS-030 |
| Core Exit Temperature | IIS-034 |
| Rod Control Motor Generator Voltage | PLS-ET001 |
| Rod Control Motor Generator Voltage | PLS-ET002 |

| Table 2.5.1-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the DAS is as described in the Design Description of this Section 2.5.1. | Inspection of the as-built system will be performed. | The as-built DAS conforms with the functional arrangement as described in the Design Description of this Section 2.5.1. |
| 2.a) The DAS provides an automatic reactor trip on low wide-range steam generator water level, or on low pressurizer water level, or on high hot leg temperature, separate from the PMS. | Electrical power to the PMS equipment will be disconnected and an operational test of the as-built DAS will be performed using real or simulated test signals. | The field breakers of the control rod motor-generator sets open after the test signal reaches the specified limit. |
| 2.b) The DAS provides automatic actuation of selected functions, as identified in Table 2.5.1-1, separate from the PMS. | Electrical power to the PMS equipment will be disconnected and an operational test of the as-built DAS will be performed using real or simulated test signals. | Appropriate DAS output signals are generated after the test signal reaches the specified limit. |
| 2.c) The DAS provides manual initiation of reactor trip, and selected functions, as identified in Table 2.5.1-2, separate from the PMS. These manual initiation functions are implemented in a manner that bypasses the control room multiplexers, if any; the PMS cabinets; and the signal processing equipment of the DAS. | Electrical power to the control room multiplexers, if any, and PMS equipment will be disconnected and the outputs from the DAS signal processing equipment will be disabled. While in this configuration, an operational test of the as-built system will be performed using the DAS manual actuation controls. | i) The field breakers of the control rod motor-generator sets open after reactor and turbine trip manual initiation controls are actuated. ii) DAS output signals are generated for the selected functions, as identified in Table 2.5.1-2, after manual initiation controls are actuated. |
| 2.d) The DAS provides MCR displays of selected plant parameters, as identified in Table 2.5.1-3, separate from the PMS. | Electrical power to the PMS equipment will be disconnected and inspection will be performed for retrievability of the selected plant parameters in the MCR. | The selected plant parameters can be retrieved in the MCR. |

| Table 2.5.1-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 3.a) The signal processing hardware of the DAS uses input modules, output modules, and microprocessor or special purpose logic processor boards that are different than those used in the PMS. | Inspection of the as-built DAS and PMS signal processing hardware will be performed. | The DAS signal processing equipment uses input modules, output modules, and micro-processor or special purpose logic processor boards that are different than those used in the PMS. The difference may be a different design, use of different component types, or different manufacturers. |
| 3.b) The display hardware of the DAS uses a different display device than that used in the PMS. | Inspection of the as-built DAS and PMS display hardware will be performed. | The DAS display hardware is different than the display hardware used in the PMS. The difference may be a different design, use of different component types, or different manufacturers. |
| 3.c) Software diversity between the DAS and PMS will be achieved through the use of different algorithms, logic, program architecture, executable operating system, and executable software/logic. | Inspection of the DAS and PMS design documentation will be performed. | Any DAS algorithms, logic, program architecture, executable operating systems, and executable software/logic are different than those used in the PMS. |
| 3.d) The DAS has electrical surge withstand capability (SWC), and can withstand the electromagnetic interference (EMI), radio frequency (RFI), and electrostatic discharge (ESD) conditions that exist where the DAS equipment is located in the plant. | Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment. | A report exists and concludes that the DAS equipment can withstand the SWC, EMI, RFI and ESD conditions that exist where the DAS equipment is located in the plant. |
| 3.e) The sensors identified on Table 2.5.1-3 are used for DAS input and are separate from those being used by the PMS and plant control system. | Inspection of the as-built system will be performed. | The sensors identified on Table 2.5.1-3 are used by DAS and are separate from those being used by the PMS and plant control system. |
| 3.f) The DAS is powered by non-Class 1E uninterruptible power supplies that are independent and separate from the power supplies which power the PMS. | Electrical power to the PMS equipment will be disconnected. While in this configuration, a test will be performed by providing simulated test signals in the non-Class 1E uninterruptible power supplies. | A simulated test signal exists at the DAS equipment when the assigned non-Class 1E uninterruptible power supply is provided the test signal. |

| Table 2.5.1-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 3.g) The DAS signal processing cabinets are provided with the capability for channel testing without actuating the controlled components. | Channel tests will be performed on the as built system. | The capability exists for testing individual DAS channels without propagating an actuation signal to a DAS controlled component. |
| 3.h) The DAS equipment can withstand the room ambient temperature and humidity conditions that will exist at the plant locations in which the DAS equipment is installed at the times for which the DAS is designed to be operational. | Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment. | A report exists and concludes that the DAS equipment can withstand the room ambient temperature and humidity conditions that will exist at the plant locations in which the DAS equipment is installed at the times for which the DAS is designed to be operational. |
| <p>4. The DAS hardware and any software are developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:</p> <p>a) Development phase for hardware and any software</p> <p>b) System test phase</p> <p>c) Installation phase</p> <p>The planned design process also provides for the use of commercial off-the-shelf hardware and software.</p> | Inspection will be performed of the process used to design the hardware and any software. | <p>A report exists and concludes that the process defines the organizational responsibilities, activities, and configuration management controls for the following:</p> <p>a) Documentation and review of hardware and any software.</p> <p>b) Performance of tests and the documentation of test results during the system test phase.</p> <p>c) Performance of tests and inspections during the installation phase.</p> <p>The process also defines requirements for the use of commercial off-the-shelf hardware and software.</p> |
| 5. The DAS manual actuation of ADS, IRWST injection, and containment recirculation can be executed correctly and reliably. | See Tier 1 Material, Table 3.2-1, item 1. | See Tier 1 Material, Table 3.2-1, item 1. |

| Table 2.5.1-5 | | |
|---------------------------------|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| DAS Processor Cabinet 1 | DAS-JD-001 | Annex Building |
| DAS Processor Cabinet 2 | DAS-JD-002 | Annex Building |
| DAS Squib Valve Control Cabinet | DAS-JD-003 | Auxiliary Building |
| DAS Instrument Cabinet | DAS-JD-004 | Auxiliary Building |

2.5.2 Protection and Safety Monitoring System**Design Description**

The protection and safety monitoring system (PMS) initiates reactor trip and actuation of engineered safety features in response to plant conditions monitored by process instrumentation and provides safety-related displays. The PMS has the equipment identified in Table 2.5.2-1. The PMS has four divisions of Reactor Trip and Engineered Safety Features Actuation, and two divisions of safety-related post-accident parameter displays. The functional arrangement of the PMS is depicted in Figure 2.5.2-1 and the component locations of the PMS are as shown in Table 2.5.2-9.

1. The functional arrangement of the PMS is as described in the Design Description of this Section 2.5.2.
2. The seismic Category I equipment, identified in Table 2.5.2-1, can withstand seismic design basis loads without loss of safety function.
3. The Class 1E equipment, identified in Table 2.5.2-1, has electrical surge withstand capability (SWC), and can withstand the electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
4. The Class 1E equipment, identified in Table 2.5.2-1, can withstand the room ambient temperature, humidity, pressure, and mechanical vibration conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
5.
 - a) The Class 1E equipment, identified in Table 2.5.2-1, is powered from its respective Class 1E division.
 - b) Separation is provided between PMS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
6. The PMS provides the following safety-related functions:
 - a) The PMS initiates an automatic reactor trip, as identified in Table 2.5.2-2, when plant process signals reach specified limits.
 - b) The PMS initiates automatic actuation of engineered safety features, as identified in Table 2.5.2-3, when plant process signals reach specified limits.
 - c) The PMS provides manual initiation of reactor trip and selected engineered safety features as identified in Table 2.5.2-4.
7. The PMS provides the following nonsafety-related functions:
 - a) The PMS provides process signals to the plant control system (PLS) through isolation devices.

- b) The PMS provides process signals to the data display and processing system (DDS) through isolation devices.
 - c) Data communication between safety and nonsafety systems does not inhibit the performance of the safety function.
 - d) The PMS ensures that the automatic safety function and the Class 1E manual controls both have priority over the non-Class 1E soft controls.
 - e) The PMS receives signals from non-safety equipment that provides interlocks for PMS test functions through isolation devices.
8. The PMS, in conjunction with the operator workstations, provides the following functions:
- a) The PMS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.2-5. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved in the main control room (MCR). The fixed position controls listed with a "Yes" in the "Control" column are provided in the MCR.
 - b) The PMS provides for the transfer of control capability from the MCR to the remote shutdown workstation (RSW) using multiple transfer switches. Each individual transfer switch is associated with only a single safety-related group or with nonsafety-related control capability.
 - c) Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.
9. a) The PMS automatically removes blocks of reactor trip and engineered safety features actuation when the plant approaches conditions for which the associated function is designed to provide protection. These blocks are identified in Table 2.5.2-6.
- b) The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR.
 - c) The PMS does not allow simultaneous bypass of two redundant channels.
 - d) The PMS provides the interlock functions identified in Table 2.5.2-7.
10. Setpoints are determined using a methodology which accounts for loop inaccuracies, response testing, and maintenance or replacement of instrumentation.
11. The PMS hardware and software is developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:
- a) Design requirements phase, may be referred to as conceptual or project definition phase (Complete)
 - b) System definition phase

- c) Hardware and software development phase, consisting of hardware and software design and implementation
 - d) System integration and test phase
 - e) Installation phase
12. The PMS software is designed, tested, installed, and maintained using a process which incorporates a graded approach according to the relative importance of the software to safety and specifies requirements for:
- a) Software management including documentation requirements, standards, review requirements, and procedures for problem reporting and corrective action.
 - b) Software configuration management including historical records of software and control of software changes.
 - c) Verification and validation including requirements for reviewer independence.
13. The use of commercial grade hardware and software items in the PMS is accomplished through a process that specifies requirements for:
- a) Review of supplier design control, configuration management, problem reporting, and change control.
 - b) Review of product performance.
 - c) Receipt acceptance of the commercial grade item.
 - d) Final acceptance based on equipment qualification and software validation in the integrated system.
14. The Component Interface Module (CIM) is developed using a planned design process which provides for specific design documentation and reviews.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.2-8 specifies the inspections, tests, analyses, and associated acceptance criteria for the PMS.

| Table 2.5.2-1 PMS Equipment Name and Classification | | | |
|--|-----------------------|-----------------|-------------------------------|
| Equipment Name | Seismic Cat. I | Class 1E | Qual. for Harsh Envir. |
| PMS Cabinets, Division A | Yes | Yes | No |
| PMS Cabinets, Division B | Yes | Yes | No |
| PMS Cabinets, Division C | Yes | Yes | No |
| PMS Cabinets, Division D | Yes | Yes | No |
| Reactor Trip Switchgear, Division A | Yes | Yes | No |
| Reactor Trip Switchgear, Division B | Yes | Yes | No |
| Reactor Trip Switchgear, Division C | Yes | Yes | No |
| Reactor Trip Switchgear, Division D | Yes | Yes | No |
| MCR/RSW Transfer Panels | Yes | Yes | No |
| MCR Safety-related Display, Division B | Yes | Yes | No |
| MCR Safety-related Display, Division C | Yes | Yes | No |
| MCR Safety-related Controls | Yes | Yes | No |

Table 2.5.2-2
PMS Automatic Reactor Trips

| |
|---|
| Source Range High Neutron Flux Reactor Trip Intermediate Range High Neutron Flux Reactor Trip Power Range High Neutron Flux (Low Setpoint) Trip Power Range High Neutron Flux (High Setpoint) Trip Power Range High Positive Flux Rate Trip Reactor Coolant Pump High Bearing Water Temperature Trip Overtemperature Delta-T Trip Overpower Delta-T Trip Pressurizer Low Pressure Trip Pressurizer High Pressure Trip Pressurizer High Water Level Trip Low Reactor Coolant Flow Trip Low Reactor Coolant Pump Speed Trip Low Steam Generator Water Level Trip High-2 Steam Generator Water Level Trip Automatic or Manual Safeguards Actuation Trip Automatic or Manual Depressurization System Actuation Trip Automatic or Manual Core Makeup Tank (CMT) Injection Trip Passive Residual Heat Removal (PRHR) Actuation Reactor Trip |
|---|

| Table 2.5.2-3 PMS Automatically Actuated Engineered Safety Features | |
|--|--|
| Safeguards Actuation | |
| Containment Isolation | |
| Automatic Depressurization System (ADS) Actuation | |
| Main Feedwater Isolation | |
| Reactor Coolant Pump Trip | |
| CMT Injection | |
| Turbine Trip (Isolated signal to nonsafety equipment) | |
| Steam Line Isolation | |
| Steam Generator Relief Isolation | |
| Steam Generator Blowdown Isolation | |
| Passive Containment Cooling Actuation | |
| Startup Feedwater Isolation | |
| Passive Residual Heat Removal (PRHR) Heat Exchanger Alignment | |
| Block of Boron Dilution | |
| Chemical and Volume Control System (CVS) Makeup Line Isolation | |
| Steam Dump Block (Isolated signal to nonsafety equipment) | |
| MCR Isolation and Air Supply Initiation | |
| Auxiliary Spray and Letdown Purification Line Isolation | |
| Containment Air Filtration System Isolation | |
| Normal Residual Heat Removal Isolation | |
| Refueling Cavity Isolation | |
| In-Containment Refueling Water Storage Tank (IRWST) Injection | |
| IRWST Containment Recirculation | |
| CVS Letdown Isolation | |
| Pressurizer Heater Block (Isolated signal to nonsafety equipment) | |
| Containment Vacuum Relief | |

Table 2.5.2-4
PMS Manually Actuated Functions

| |
|--|
| Reactor Trip Safeguards Actuation Containment Isolation Depressurization System Stages 1, 2, and 3 Actuation Depressurization System Stage 4 Actuation Feedwater Isolation Core Makeup Tank Injection Actuation Steam Line Isolation Passive Containment Cooling Actuation Passive Residual Heat Removal Heat Exchanger Alignment IRWST Injection Containment Recirculation Actuation Control Room Isolation and Air Supply Initiation Steam Generator Relief Isolation Chemical and Volume Control System Isolation Normal Residual Heat Removal System Isolation Containment Vacuum Relief |
|--|

| Table 2.5.2-5 Minimum Inventory of Displays, Alerts, and Fixed Position Controls in the MCR | | | |
|--|----------------|----------------|----------------------------|
| Description | Control | Display | Alert⁽¹⁾ |
| Neutron Flux | - | Yes | Yes |
| Neutron Flux Doubling ⁽²⁾ | - | No | Yes |
| Startup Rate | - | Yes | Yes |
| Reactor Coolant System (RCS) Pressure | - | Yes | Yes |
| Wide-range Hot Leg Temperature | - | Yes | No |
| Wide-range Cold Leg Temperature | - | Yes | Yes |
| RCS Cooldown Rate Compared to the Limit Based on RCS Pressure | - | Yes | Yes |
| Wide-range Cold Leg Temperature Compared to the Limit Based on RCS Pressure | - | Yes | Yes |
| Change of RCS Temperature by more than 5°F in the last 10 minutes | - | No | Yes |
| Containment Water Level | - | Yes | Yes |
| Containment Pressure | - | Yes | Yes |
| Pressurizer Water Level | - | Yes | Yes |
| Pressurizer Water Level Trend | - | Yes | No |
| Pressurizer Reference Leg Temperature | - | Yes | No |
| Reactor Vessel-Hot Leg Water Level | - | Yes | Yes |
| Pressurizer Pressure | - | Yes | No |
| Core Exit Temperature | - | Yes | Yes |
| RCS Subcooling | - | Yes | Yes |
| RCS Cold Overpressure Limit | - | Yes | Yes |
| IRWST Water Level | - | Yes | Yes |
| PRHR Flow | - | Yes | Yes |
| PRHR Outlet Temperature | - | Yes | Yes |

Note: Dash (-) indicates not applicable.

1. These parameters are used to generate visual alerts that identify challenges to the critical safety functions. For the main control room, the visual alerts are embedded in the safety-related displays as visual signals.

| Table 2.5.2-5 (cont.) Minimum Inventory of Displays, Alerts, and Fixed Position Controls in the MCR | | | |
|--|----------------|----------------|----------------------------|
| Description | Control | Display | Alert⁽¹⁾ |
| Passive Containment Cooling System (PCS) Storage Tank Water Level | - | Yes | No |
| PCS Cooling Flow | - | Yes | No |
| IRWST to Normal Residual Heat Removal System (RNS) Suction Valve Status ⁽²⁾ | - | Yes | Yes |
| Remotely Operated Containment Isolation Valve Status ⁽²⁾ | - | Yes | No |
| Containment Area High-range Radiation Level | - | Yes | Yes |
| Containment Pressure (Extended Range) | - | Yes | No |
| CMT Level | - | Yes | No |
| Manual Reactor Trip (also initiates turbine trip) | Yes | - | - |
| Manual Safeguards Actuation | Yes | - | - |
| Manual CMT Actuation | Yes | - | - |
| Manual MCR Emergency Habitability System Actuation | Yes | - | - |
| Manual ADS Stages 1, 2, and 3 Actuation | Yes | - | - |
| Manual ADS Stage 4 Actuation | Yes | - | - |
| Manual PRHR Actuation | Yes | - | - |
| Manual Containment Cooling Actuation | Yes | - | - |
| Manual IRWST Injection Actuation | Yes | - | - |
| Manual Containment Recirculation Actuation | Yes | - | - |
| Manual Containment Isolation | Yes | - | - |
| Manual Main Steam Line Isolation | Yes | - | - |
| Manual Feedwater Isolation | Yes | - | - |
| Manual Containment Hydrogen Igniter (Nonsafety-related) | Yes | - | - |
| Manual Containment Vacuum Relief | Yes | | |

Note: Dash (-) indicates not applicable.

2. These instruments are not required after 24 hours.

**Table 2.5.2-6
PMS Blocks**

Reactor Trip Functions:

Source Range High Neutron Flux Reactor Trip
Intermediate Range High Neutron Flux Reactor Trip
Power Range High Neutron Flux (Low Setpoint) Trip
Pressurizer Low Pressure Trip
Pressurizer High Water Level Trip
Low Reactor Coolant Flow Trip
Low Reactor Coolant Pump Speed Trip
High Steam Generator Water Level Trip

Engineered Safety Features:

Automatic Safeguards
Containment Isolation
Main Feedwater Isolation
Reactor Coolant Pump Trip
Core Makeup Tank Injection
Steam Line Isolation
Startup Feedwater Isolation
Block of Boron Dilution
Chemical and Volume Control System Isolation
Chemical and Volume Control System Letdown Isolation
Steam Dump Block
Auxiliary Spray and Letdown Purification Line Isolation
Passive Residual Heat Removal Heat Exchanger Alignment
Normal Residual Heat Removal System Isolation

**Table 2.5.2-7
PMS Interlocks**

RNS Suction Valves
PRHR Heat Exchanger Inlet Isolation Valve
CMT Cold Leg Balance Line Isolation Valves
Containment Vacuum Relief Isolation Valves

| Table 2.5.2-8 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the PMS is as described in the Design Description of this Section 2.5.2. | Inspection of the as-built system will be performed. | The as-built PMS conforms with the functional arrangement as described in the Design Description of this Section 2.5.2. |
| 2. The seismic Category I equipment, identified in Table 2.5.2-1, can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.5.2-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.5.2-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3. The Class 1E equipment, identified in Table 2.5.2-1, has electrical surge withstand capability (SWC), and can withstand the electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment. | A report exists and concludes that the Class 1E equipment identified in Table 2.5.2-1 can withstand the SWC, EMI, RFI, and ESD conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4. The Class 1E equipment, identified in Table 2.5.2-1, can withstand the room ambient temperature, humidity, pressure, and mechanical vibration conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | Type tests, analyses, or a combination of type tests and analyses will be performed on the Class 1E equipment identified in Table 2.5.2-1. | A report exists and concludes that the Class 1E equipment identified in Table 2.5.2-1 can withstand the room ambient temperature, humidity, pressure, and mechanical vibration conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. |
| 5.a) The Class 1E equipment, identified in Table 2.5.2-1, is powered from its respective Class 1E division. | Tests will be performed by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.5.2-1 when the assigned Class 1E division is provided the test signal. |
| 5.b) Separation is provided between PMS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, items 7.d and 7.e. | See Tier 1 Material, Table 3.3-6, items 7.d and 7.e. |
| 6.a) The PMS initiates an automatic reactor trip, as identified in Table 2.5.2-2, when plant process signals reach specified limits. | An operational test of the as-built PMS will be performed using real or simulated test signals. | i) The reactor trip switchgear opens after the test signal reaches the specified limit. This only needs to be verified for one automatic reactor trip function. ii) PMS output signals to the reactor trip switchgear are generated after the test signal reaches the specified limit. This needs to be verified for each automatic reactor trip function. |
| 6.b) The PMS initiates automatic actuation of engineered safety features, as identified in Table 2.5.2-3, when plant process signals reach specified limits. | An operational test of the as-built PMS will be performed using real or simulated test signals. | Appropriate PMS output signals are generated after the test signal reaches the specified limit. These output signals remain following removal of the test signal. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis, and acceptance criteria. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6.c) The PMS provides manual initiation of reactor trip and selected engineered safety features as identified in Table 2.5.2-4. | An operational test of the as-built PMS will be performed using the PMS manual actuation controls. | i) The reactor trip switchgear opens after manual reactor trip controls are actuated. ii) PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated. |
| 7.a) The PMS provides process signals to the PLS through isolation devices. | Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed. | A report exists and concludes that the isolation devices prevent credible faults from propagating into the PMS. |
| 7.b) The PMS provides process signals to the DDS through isolation devices. | Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed. | A report exists and concludes that the isolation devices prevent credible faults from propagating into the PMS. |
| 7.c) Data communication between safety and nonsafety systems does not inhibit the performance of the safety function. | Type tests, analyses, or a combination of type tests and analyses of the PMS gateways will be performed. | A report exists and concludes that data communication between safety and nonsafety systems does not inhibit the performance of the safety function. |
| 7.d) The PMS ensures that the automatic safety function and the Class 1E manual controls both have priority over the non-Class 1E soft controls. | Type tests, analyses, or a combination of type tests and analyses of the PMS manual control circuits and algorithms will be performed. | A report exists and concludes that the automatic safety function and the Class 1E manual controls both have priority over the non-Class 1E soft controls. |
| 7.e) The PMS receives signals from non-safety equipment that provides interlocks for PMS test functions through isolation devices. | Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed. | A report exists and concludes that the isolation devices prevent credible faults from propagating into the PMS. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>8.a) The PMS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.2-5. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved in the MCR. The fixed position controls listed with a "Yes" in the "Control" column are provided in the MCR.</p> | <p>i) An inspection will be performed for retrievability of plant parameters in the MCR.</p> <p>ii) An inspection and test will be performed to verify that the plant parameters are used to generate visual alerts that identify challenges to critical safety functions.</p> <p>iii) An operational test of the as-built system will be performed using each MCR fixed position control.</p> | <p>i) The plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Display" column, can be retrieved in the MCR.</p> <p>ii) The plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Alert" column are used to generate visual alerts that identify challenges to critical safety functions. The visual alerts actuate in accordance with their correct logic and values.</p> <p>iii) For each test of an as-built fixed position control listed in Table 2.5.2-5 with a "Yes" in the "Control" column, an actuation signal is generated. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis and acceptance criteria.</p> |
| <p>8.b) The PMS provides for the transfer of control capability from the MCR to the RSW using multiple transfer switches. Each individual transfer switch is associated with only a single safety-related group or with nonsafety-related control capability.</p> | <p>i) An inspection will be performed to verify that a transfer switch exists for each safety-related division and the nonsafety-related control capability.</p> <p>ii) An operational test of the as-built system will be performed to demonstrate the transfer of control capability from the MCR to the RSW.</p> | <p>i) A transfer switch exists for each safety-related division and the nonsafety-related control capability.</p> <p>ii) Actuation of each transfer switch results in an alarm in the MCR and RSW, the activation of operator control capability from the RSW, and the deactivation of operator control capability from the MCR for the associated safety-related division and nonsafety-related control capability.</p> |
| <p>8.c) Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.</p> | <p>Inspection will be performed for retrievability of displays of the open/closed status of the reactor trip breakers in the MCR.</p> | <p>Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.</p> |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 9.a) The PMS automatically removes blocks of reactor trip and engineered safety features actuation when the plant approaches conditions for which the associated function is designed to provide protection. These blocks are identified in Table 2.5.2-6. | An operational test of the as-built PMS will be performed using real or simulated test signals. | The PMS blocks are automatically removed when the test signal reaches the specified limit. |
| 9.b) The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR. | An operational test of the as-built PMS will be performed. | The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR. |
| 9.c) The PMS does not allow simultaneous bypass of two redundant channels. | An operational test of the as-built PMS will be performed. With one channel in bypass, an attempt will be made to place a redundant channel in bypass. | The redundant channel cannot be placed in bypass. |
| 9.d) The PMS provides the interlock functions identified in Table 2.5.2-7. | An operational test of the as-built PMS will be performed using real or simulated test signals. | Appropriate PMS output signals are generated as the interlock conditions are changed. |
| 10. Setpoints are determined using a methodology which accounts for loop inaccuracies, response testing, and maintenance or replacement of instrumentation. | Inspection will be performed for a document that describes the methodology and input parameters used to determine the PMS setpoints. | A report exists and concludes that the PMS setpoints are determined using a methodology which accounts for loop inaccuracies, response testing, and maintenance or replacement of instrumentation. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>11. The PMS hardware and software is developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:</p> <ul style="list-style-type: none"> a) Not used b) System definition phase c) Hardware and software development phase, consisting of hardware and software design and implementation d) System integration and test phase e) Installation phase | <p>Inspection will be performed of the process used to design the hardware and software.</p> | <p>A report exists and concludes that the process defines the organizational responsibilities, activities, and configuration management controls for the following:</p> <ul style="list-style-type: none"> a) Not used. b) Specification of functional requirements. c) Documentation and review of hardware and software. d) Performance of system tests and the documentation of system test results, including a response time test performed under maximum CPU loading to demonstrate that the PMS can fulfill its response time criteria. e) Performance of installation tests and inspections. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>12. The PMS software is designed, tested, installed, and maintained using a process which incorporates a graded approach according to the relative importance of the software to safety and specifies requirements for:</p> <ul style="list-style-type: none"> a) Software management including documentation requirements, standards, review requirements, and procedures for problem reporting and corrective action. b) Software configuration management including historical records of software and control of software changes. c) Verification and validation including requirements for reviewer independence. | <p>Inspection will be performed of the process used to design, test, install, and maintain the PMS software.</p> | <p>A report exists and concludes that the process establishes a method for classifying the PMS software elements according to their relative importance to safety and specifies requirements for software assigned to each safety classification. The report also concludes that requirements are provided for the following software development functions:</p> <ul style="list-style-type: none"> a) Software management including documentation requirements, standards, review requirements, and procedures for problem reporting and corrective action. Software management requirements may be documented in the software quality assurance plan, software management plan, software development plan, software safety plan, and software operation and maintenance plan; or these requirements may be combined into a single software management plan. b) Software configuration management including historical records of software and control of software changes. Software configuration management requirements are provided in the software configuration management plan. c) Verification and validation including requirements for reviewer independence. Verification and validation requirements are provided in the verification and validation plan. |

| Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>13. The use of commercial grade computer hardware and software items in the PMS is accomplished through a process that specifies requirements for:</p> <ul style="list-style-type: none"> a) Review of supplier design control, configuration management, problem reporting, and change control. b) Review of product performance. c) Receipt acceptance of the commercial grade item. d) Acceptance based on equipment qualification and software validation in the integrated system. | <p>Inspection will be performed of the process defined to use commercial grade components in the application.</p> | <p>A report exists and concludes that the process has requirements for:</p> <ul style="list-style-type: none"> a) Review of supplier design control, configuration management, problem reporting, and change control. b) Review of product performance. c) Receipt acceptance of the commercial grade item. d) Acceptance based on equipment qualification and software validation in the integrated system. |
| <p>14. The Component Interface Module (CIM) is developed using a planned design process which provides for specific design documentation and reviews.</p> <p>{Design Acceptance Criteria}</p> | <p>An inspection and or an audit will be performed of the processes used to design the hardware, development software, qualification and testing.</p> | <p>A report exists and concludes that CIM meets the below listed life cycle stages.</p> <p>Life cycle stages:</p> <ul style="list-style-type: none"> a. Design requirements phase, may be referred to as conceptual or project definition phase b. System definition phase c. Hardware and software development phase, consisting of hardware and software design and implementation d. System integration and test phase e. Installation phase |

| Table 2.5.2-9 | |
|-------------------------------------|--------------------|
| Component Name | Component Location |
| PMS Cabinets, Division A | Auxiliary Building |
| PMS Cabinets, Division B | Auxiliary Building |
| PMS Cabinets, Division C | Auxiliary Building |
| PMS Cabinets, Division D | Auxiliary Building |
| Reactor Trip Switchgear, Division A | Auxiliary Building |
| Reactor Trip Switchgear, Division B | Auxiliary Building |
| Reactor Trip Switchgear, Division C | Auxiliary Building |
| Reactor Trip Switchgear, Division D | Auxiliary Building |
| MCR/RSW Transfer Panels | Auxiliary Building |
| MCR Safety-related Displays | Auxiliary Building |
| MCR Safety-related Controls | Auxiliary Building |

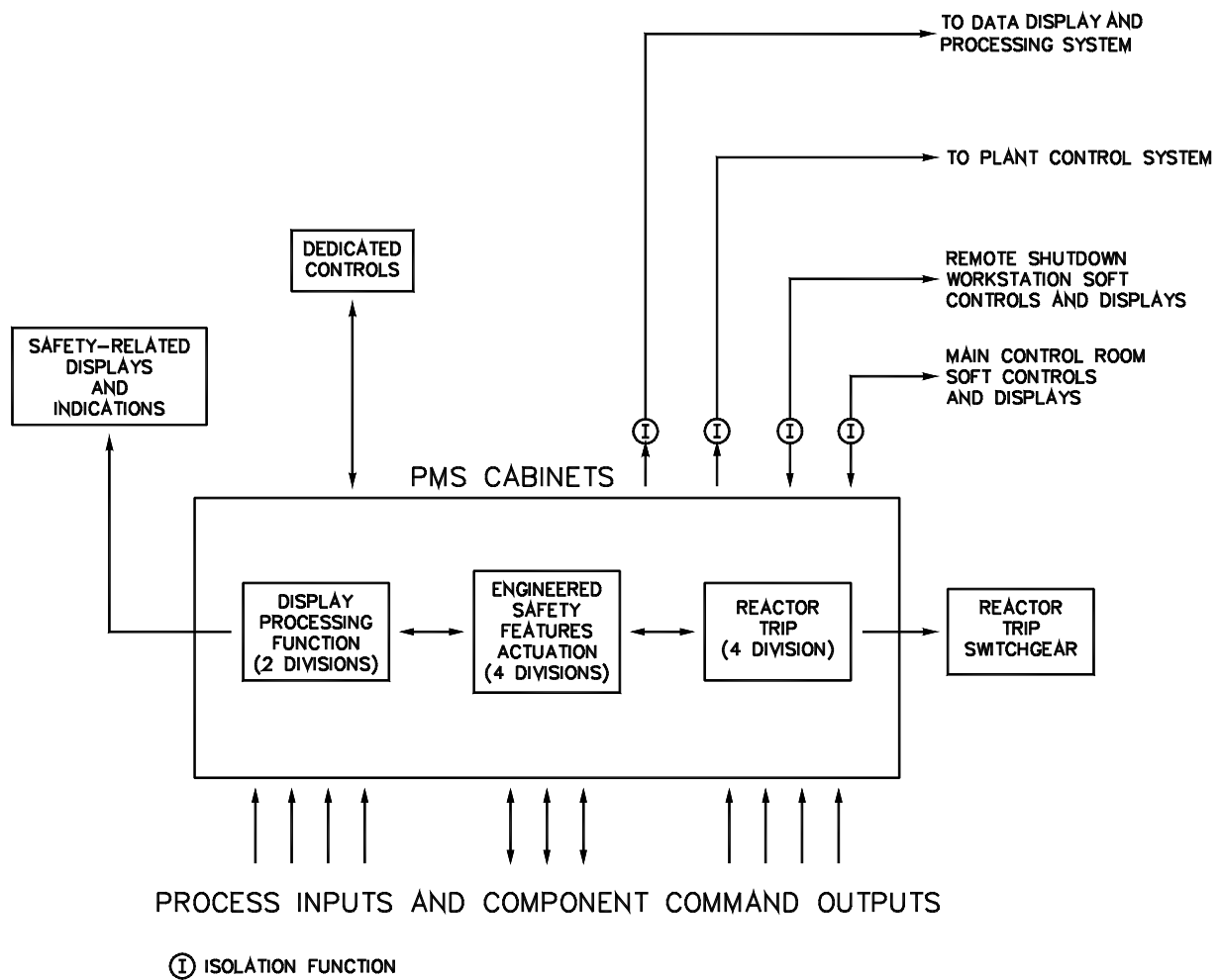


Figure 2.5.2-1
Protection and Safety Monitoring System

2.5.3 Plant Control System**Design Description**

The plant control system (PLS) provides for automatic and manual control of nonsafety-related plant components during normal and emergency plant operations. The PLS has distributed controllers and operator controls interconnected by computer data links or data highways.

1. The functional arrangement of the PLS is as described in the Design Description of this Section 2.5.3.
2. The PLS provides control interfaces for the control functions listed in Table 2.5.3-1.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.3-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the PLS.

Table 2.5.3-1
Control Functions Supported by the PLS

| | |
|----------------------------|------------------------------|
| 1. Reactor Power | 5. Steam Generator Feedwater |
| 2. Reactor Rod Position | 6. Steam Dump |
| 3. Pressurizer Pressure | 7. Rapid Power Reduction |
| 4. Pressurizer Water Level | |

Table 2.5.3-2
Inspections, Tests, Analyses, and Acceptance Criteria

| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
|---|--|---|
| 1. The functional arrangement of the PLS is as described in the Design Description of this Section 2.5.3. | Inspection of the as-built system will be performed. | The as-built PLS conforms with the functional arrangement as described in the Design Description of this Section 2.5.3. |
| 2. The PLS provides control interfaces for the control functions listed in Table 2.5.3-1. | An operational test of the system will be performed using simulated input signals. System outputs or component operations will be monitored to determine the operability of the control functions. | The PLS provides control interfaces for the control functions listed in Table 2.5.3-1. |

2.5.4 Data Display and Processing System**Design Description**

The data display and processing system (DDS) provides nonsafety-related alarms and displays, analysis of plant data, plant data logging and historical storage and retrieval, and operational support for plant personnel. The DDS has distributed computer processors and video display units to support the data processing and display functions.

1. The functional arrangement of the DDS is as described in the Design Description of this Section 2.5.4.
2. The DDS, in conjunction with the operator workstations, provides the following function:

The DDS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.4-1. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved at the remote shutdown workstation (RSW). The controls listed with a "Yes" in the "Control" column are provided at the RSW.

3. The DDS provides information pertinent to the status of the protection and safety monitoring system.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.4-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the DDS.

| Table 2.5.4-1 Minimum Inventory of Controls, Displays, and Alerts at the RSW | | | |
|---|----------------|----------------|----------------------------|
| Description | Control | Display | Alert⁽¹⁾ |
| Neutron Flux | - | Yes | Yes |
| Neutron Flux Doubling | - | No | Yes |
| Startup Rate | - | Yes | Yes |
| Reactor Coolant System (RCS) Pressure | - | Yes | Yes |
| Wide-range Hot Leg Temperature | - | Yes | No |
| Wide-range Cold Leg Temperature | - | Yes | Yes |
| RCS Cooldown Rate Compared to the Limit Based on RCS Pressure | - | Yes | Yes |
| Wide-range Cold Leg Temperature Compared to the Limit Based on RCS Pressure | - | Yes | Yes |
| Change of RCS Temperature by more than 5°F in the last 10 minutes | - | No | Yes |
| Containment Water Level | - | Yes | Yes |
| Containment Pressure | - | Yes | Yes |
| Pressurizer Water Level | - | Yes | Yes |
| Pressurizer Water Level Trend | - | Yes | No |
| Pressurizer Reference Leg Temperature | - | Yes | No |
| Reactor Vessel-Hot Leg Water Level | - | Yes | Yes |
| Pressurizer Pressure | - | Yes | No |
| Core Exit Temperature | - | Yes | Yes |
| RCS Subcooling | - | Yes | Yes |
| RCS Cold Overpressure Limit | - | Yes | Yes |
| In-containment Refueling Water Storage Tank (IRWST) Water Level | - | Yes | Yes |
| Passive Residual Heat Removal (PRHR) Flow | - | Yes | Yes |

Note: Dash (-) indicates not applicable.

1. These parameters are used to generate visual alerts that identify challenges to the critical safety functions. For the RSW, the visual alerts are embedded in the nonsafety-related displays as visual signals.

| Table 2.5.4-1 (cont.) Minimum Inventory of Controls, Displays, and Alerts at the RSW | | | |
|---|----------------|----------------|----------------------------|
| Description | Control | Display | Alert⁽¹⁾ |
| PRHR Outlet Temperature | - | Yes | Yes |
| Passive Containment Cooling System (PCS) Storage Tank Water Level | - | Yes | No |
| PCS Cooling Flow | - | Yes | No |
| IRWST to Normal Residual Heat Removal System (RNS) Suction Valve Status | - | Yes | Yes |
| Remotely Operated Containment Isolation Valve Status | - | Yes | No |
| Containment Area High-range Radiation Level | - | Yes | Yes |
| Containment Pressure (Extended Range) | - | Yes | No |
| Core Makeup Tank (CMT) Level | - | Yes | No |
| Manual Reactor Trip (also initiates turbine trip) | Yes | - | - |
| Manual Safeguards Actuation | Yes | - | - |
| Manual CMT Actuation | Yes | - | - |
| Manual Automatic Depressurization System (ADS) Stages 1, 2, and 3 Actuation | Yes | - | - |
| Manual ADS Stage 4 Actuation | Yes | - | - |
| Manual PRHR Actuation | Yes | - | - |
| Manual Containment Cooling Actuation | Yes | - | - |
| Manual IRWST Injection Actuation | Yes | - | - |
| Manual Containment Recirculation Actuation | Yes | - | - |
| Manual Containment Isolation | Yes | - | - |
| Manual Main Steam Line Isolation | Yes | - | - |
| Manual Feedwater Isolation | Yes | - | - |
| Manual Containment Hydrogen Igniter (Nonsafety-related) | Yes | - | - |

Note: Dash (-) indicates not applicable.

1. These parameters are used to generate visual alerts that identify challenges to the critical safety functions. For the RSW, the visual alerts are embedded in the nonsafety-related displays as visual signals.

| Table 2.5.4-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the DDS is as described in the Design Description of this Section 2.5.4. | Inspection of the as-built system will be performed. | The as-built DDS conforms with the functional arrangement as described in the Design Description of this Section 2.5.4. |
| 2. The DDS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.4-1. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved at the RSW. The controls listed with a "Yes" in the "Control" column are provided at the RSW. | i) An inspection will be performed for retrievability of plant parameters at the RSW. ii) An inspection and test will be performed to verify that the plant parameters are used to generate visual alerts that identify challenges to critical safety functions. iii) An operational test of the as-built system will be performed using each RSW control. | i) The plant parameters listed in Table 2.5.4-1 with a "Yes" in the "Display" column can be retrieved at the RSW. ii) The plant parameters listed in Table 2.5.4-1 with a "Yes" in the "Alert" column are used to generate visual alerts that identify challenges to critical safety functions. The visual alerts actuate in accordance with their logic and values. iii) For each test of a control listed in Table 2.5.4-1 with a "Yes" in the "Control" column, an actuation signal is generated. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis and acceptance criteria. |
| 3. The DDS provides information pertinent to the status of the protection and safety monitoring system. | Tests of the as-built system will be performed. | The as-built system provides displays of the bypassed and operable status of the protection and safety monitoring system. |

2.5.5 In-Core Instrumentation System**Design Description**

The in-core instrumentation system (IIS) provides safety-related core exit thermocouple signals to the protection and safety monitoring system (PMS). The IIS also provides nonsafety-related core exit thermocouple signals to the diverse actuation system (DAS). The core exit thermocouples are housed in the core instrument assemblies. Multiple core instrument assemblies are used to provide radial coverage of the core. At least three core instrument assemblies are provided in each core quadrant.

1. The functional arrangement of the IIS is as described in the Design Description of this Section 2.5.5.
2. The seismic Category I equipment identified in Table 2.5.5-1 can withstand seismic design basis loads without loss of safety function.
3.
 - a) The Class 1E equipment identified in Table 2.5.5-1 as being qualified for a harsh environment can withstand environmental conditions that would exist before, during, and following a design basis accident without loss of safety function, for the time required to perform the safety function.
 - b) The Class 1E cables between the Incore Thermocouple elements and the connector boxes located on the integrated head package have sheaths.
 - c) For cables other than those covered by 3.b, separation is provided between IIS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
4. Safety-related displays of the parameters identified in Table 2.5.5-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.5-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the IIS.

| Table 2.5.5-1 | | | | | |
|---|----------------|--------------------------|--------------------|------------------------|--------------------------------------|
| Equipment Name | Seismic Cat. I | ASME Code Classification | Class 1E | Qual. for Harsh Envir. | Safety-Related Display |
| Incore Thimble Assemblies (at least three assemblies in each core quadrant) | Yes | – | Yes ⁽¹⁾ | Yes ⁽¹⁾ | Core Exit Temperature ⁽¹⁾ |

Note: Dash (-) indicates not applicable.

1. Only applies to the safety-related assemblies. There are at least two safety-related assemblies in each core quadrant.

| Table 2.5.5-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the IIS is as described in the Design Description of this Section 2.5.5. | Inspection of the as-built system will be performed. | The as-built IIS conforms with the functional arrangement as described in the Design Description of this Section 2.5.5. |
| 2. The seismic Category I equipment identified in Table 2.5.5-1 can withstand seismic design basis dynamic loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.5.5-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.5.5-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3.a) The Class 1E equipment identified in Table 2.5.5-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function, for the time required to perform the safety function. | i) Type tests, analysis, or a combination of type tests and analysis will be performed on Class 1E equipment located in a harsh environment. ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.5.5-1 as being qualified for a harsh environment. This equipment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.5.5-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses. |

| Table 2.5.5-2 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 3.b) The Class 1E cables between the Incore Thermocouple elements and the connector boxes located on the integrated head package have sheaths. | Inspection of the as-built system will be performed. | The as-built Class 1E cables between the Incore Thermocouple elements and the connector boxes located on the integrated head package have sheaths. |
| 3.c) For cables other than those covered by 3.b, separation is provided between IIS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 4. Safety-related displays of the parameters identified in Table 2.5.5-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.5.5-1 can be retrieved in the MCR. |

2.5.6 Special Monitoring System

Design Description

The special monitoring system (SMS) monitors the reactor coolant system (RCS) for the occurrence of impacts characteristic of metallic loose parts. Metal impact monitoring sensors are provided to monitor the RCS at the upper and lower head region of the reactor pressure vessel, and at the reactor coolant inlet region of each steam generator.

1. The functional arrangement of the SMS is as described in the Design Description of this Section 2.5.6.
2. Data obtained from the metal impact monitoring sensors can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.6-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the SMS.

| Table 2.5.6-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the SMS is as described in the Design Description of this Section 2.5.6. | Inspection of the as-built system will be performed. | The as-built SMS conforms with the functional arrangement as described in the Design Description of this Section 2.5.6. |
| 2. Data obtained from the metal impact monitoring sensors can be retrieved in the MCR. | Inspection will be performed for retrievability of data from the metal impact monitoring sensors in the MCR. | Data obtained from the metal impact monitoring sensors can be retrieved in the MCR. |

2.5.7 Operation and Control Centers System**Design Description**

The operation and control centers system (OCS) is developed and implemented based upon a human factors engineering (HFE) program. The human system interface (HSI) scope includes the design of the OCS and each of the HSI resources. For the purposes of the HFE program, the OCS includes the main control room, remote shutdown workstation, the local control stations, and the associated workstations for each of these centers. Implementation of the HFE program involves the completion of the human factors engineering analyses and plans described in Tier 1 Material Section 3.2, Human Factors Engineering.

Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the OCS are provided in Table 3.2-1.

2.5.8 Radiation Monitoring System

No entry. Radiation monitoring function covered in Section 3.5, Radiation Monitoring.

2.5.9 Seismic Monitoring System**Design Description**

The seismic monitoring system (SJS) provides for the collection of seismic data in digital format, analysis of seismic data, notification of the operator if the ground motion exceeds a threshold value, and notification of the operator (after analysis of data) that a predetermined cumulative absolute velocity (CAV) has been exceeded. The SJS has at least four triaxial acceleration sensor units and a time-history analyzer and recording system. The time-history analyzer and recording system are located in the auxiliary building.

1. The functional arrangement of the SJS is as described in the Design Description of this Section 2.5.9.
2. The SJS can compute CAV and the 5 percent of critical damping response spectrum for frequencies between 1 and 10 Hertz.
3. The SJS has a dynamic range of 0.001g to 1.0g and a frequency range of 0.2 to 50 Hertz.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.9-1 specifies the inspections, tests, analyses, and associated acceptance criteria for SJS.

| Table 2.5.9-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the SJS is as described in the Design Description of this Section 2.5.9. | Inspection of the as-built system will be performed. | The as-built SJS conforms with the functional arrangement as described in the Design Description of this Section 2.5.9. |
| 2. The SJS can compute CAV and the 5 percent of critical damping response spectrum for frequencies between 1 and 10 Hz. | Type tests using simulated input signals, analyses, or a combination of type tests and analyses, of the SJS time-history analyzer and recording system will be performed. | A report exists and concludes that the SJS time-history analyzer and recording system can record data at a sampling rate of at least 200 samples per second, that the pre-event recording time is adjustable from less than or equal to 1.2 seconds to greater than or equal to 15.0 seconds, and that the initiation value is adjustable from less than or equal to 0.002g to greater than or equal to 0.02g. |
| 3. The SJS has a dynamic range of 0.001g to 1.0g and a frequency range of 0.2 to 50 Hertz. | Type tests, analyses, or a combination of type tests and analyses, of the SJS triaxial acceleration sensors will be performed. | A report exists and concludes that the SJS triaxial acceleration sensors have a dynamic range of at least 0.001g to 1.0g and a frequency range of at least 0.2 to 50 Hertz. |

2.5.10 Main Turbine Control and Diagnostic System

No entry. Covered in Section 2.4.2, Main Turbine System.

2.6 Electrical Power Systems**2.6.1 Main ac Power System****Design Description**

The main ac power system (ECS) provides electrical ac power to nonsafety-related loads and non-Class 1E power to the Class 1E battery chargers and regulating transformers during normal and off-normal conditions.

The ECS is as shown in Figures 2.6.1-1 and the component locations of the ECS are as shown in Table 2.6.1-5.

1. The functional arrangement of the ECS is as described in the Design Description of this Section 2.6.1.
2. The seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.
3.
 - a) The Class 1E breaker control power for the equipment identified in Table 2.6.1-1 are powered from their respective Class 1E division.
 - b) Separation is provided between ECS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
4. The ECS provides the following nonsafety-related functions:
 - a) The ECS provides the capability for distributing non-Class 1E ac power from onsite sources (ZOS) to nonsafety-related loads listed in Table 2.6.1-2.
 - b) The 6900 Vac circuit breakers in switchgear ECS-ES-1 and ECS-ES-2 open after receiving a signal from the onsite standby power system.
 - c) Each standby diesel generator 6900 Vac circuit breaker closes after receiving a signal from the onsite standby power system.
 - d) Each ancillary diesel generator unit is sized to supply power to long-term safety-related post-accident monitoring loads and control room lighting and ventilation through a regulating transformer; and for one passive containment cooling system (PCS) recirculation pump.
 - e) The ECS provides two loss-of-voltage signals to the onsite standby power system (ZOS), one for each diesel-backed 6900 Vac switchgear bus.
 - f) The ECS provides a reverse-power trip of the generator circuit breaker which is blocked for at least 15 seconds following a turbine trip.
5. Controls exist in the main control room (MCR) to cause the circuit breakers identified in Table 2.6.1-3 to perform the listed functions.

6. Displays of the parameters identified in Table 2.6.1-3 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.1-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the ECS.

| Table 2.6.1-1 | | | | |
|--|-----------|--------------------|-------------------------------------|------------------------|
| Equipment Name | Tag No. | Seismic Category I | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display |
| Reactor Coolant Pump (RCP) Circuit Breaker | ECS-ES-31 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-32 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-41 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-42 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-51 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-52 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-61 | Yes | Yes/No (Trip open only) | No |
| RCP Circuit Breaker | ECS-ES-62 | Yes | Yes/No (Trip open only) | No |

| Table 2.6.1-2 | |
|--|--------------|
| Load Description | Power Source |
| Load Center Transformers EK-11, EK-12, EK-13, EK-14 | ZOS-MG-02A |
| Diesel Oil Transfer Module Enclosure A Electric Unit Heater | ZOS-MG-02A |
| Diesel Oil Transfer Module Enclosure A Fan | ZOS-MG-02A |
| Class 1E Division A Regulating Transformer | ZOS-MG-02A |
| Class 1E Division C Regulating Transformer | ZOS-MG-02A |
| Diesel Generator Fuel Oil Transfer Pump 1A | ZOS-MG-02A |
| Diesel Generator Room A Building Standby Exhaust Fans 1A and 2A | ZOS-MG-02A |
| Diesel Generator Service Module A Air Handling Unit (AHU) 01A Fan | ZOS-MG-02A |
| Startup Feedwater Pump A | ZOS-MG-02A |
| Service Water Pump A | ZOS-MG-02A |
| Service Water Cooling Tower Fan A | ZOS-MG-02A |
| MCR/Control Support Area (CSA) AHU A Supply and Return Fans | ZOS-MG-02A |
| Divisions A/C Class 1E Electrical Room AHU A Supply and Return Fans | ZOS-MG-02A |
| Divisions B/D Class 1E Electrical Room AHU D Supply and Return Fans | ZOS-MG-02A |
| Air-cooled Chiller Pump 2 | ZOS-MG-02A |
| Component Cooling Water Pump 1A | ZOS-MG-02A |
| Air-cooled Chiller 2 | ZOS-MG-02A |
| Chemical and Volume Control System (CVS) Makeup Pump 1A | ZOS-MG-02A |
| CVS Pump Room Unit Cooler Fan A | ZOS-MG-02A |
| Normal Residual Heat Removal System (RNS) Pump 1A | ZOS-MG-02A |
| RNS Pump Room Unit Cooler Fan A | ZOS-MG-02A |
| Equipment Room AHU Supply and Return Fans VXS-MA-01A/02A | ZOS-MG-02A |
| Switchgear Room A AHU Supply and Return Fans VXS-MA-05A/06A | ZOS-MG-02A |
| Non-1E Battery Charger EDS1-DC-1 | ZOS-MG-02A |
| Non-1E Battery Room A Exhaust Fan | ZOS-MG-02A |
| Non-1E Battery Charger EDS3-DC-1 | ZOS-MG-02A |

| Table 2.6.1-2 (cont.) | |
|---|--------------|
| Load Description | Power Source |
| Class 1E Division A Battery Charger 1 (24-hour) | ZOS-MG-02A |
| Class 1E Division C Battery Charger 1 (24-hour) | ZOS-MG-02A |
| Class 1E Division C Battery Charger 2 (72-hour) | ZOS-MG-02A |
| Divisions A/C Class 1E Battery Room Exhaust Fan A | ZOS-MG-02A |
| Supplemental Air Filtration Unit Fan A | ZOS-MG-02A |
| Backup Group 4A Pressurizer Heaters | ZOS-MG-02A |
| Spent Fuel Cooling Pump 1A | ZOS-MG-02A |
| Load Center Transformers EK-21, EK-22, EK-23, EK-24 | ZOS-MG-02B |
| Diesel Oil Transfer Module Enclosure B Electric Unit Heater | ZOS-MG-02B |
| Diesel Oil Transfer Module Enclosure B Fan | ZOS-MG-02B |
| Class 1E Division B Regulating Transformer | ZOS-MG-02B |
| Class 1E Division D Regulating Transformer | ZOS-MG-02B |
| Diesel Generator Fuel Oil Transfer Pump 1B | ZOS-MG-02B |
| Diesel Generator Room B Building Standby Exhaust Fans 1B and 2B | ZOS-MG-02B |
| Diesel Generator Service Module B AHU 01B Fan | ZOS-MG-02B |
| Startup Feedwater Pump B | ZOS-MG-02B |
| Service Water Pump B | ZOS-MG-02B |
| Service Water Cooling Tower Fan B | ZOS-MG-02B |
| MCR/CSA AHU B Supply and Return Fans | ZOS-MG-02B |
| Divisions B/D Class 1E Electrical Room AHU B Supply and Return Fans | ZOS-MG-02B |
| Divisions A/C Class 1E Electrical Room AHU C Supply and Return Fans | ZOS-MG-02B |
| Air-cooled Chiller Pump 3 | ZOS-MG-02B |
| Component Cooling Water Pump 1B | ZOS-MG-02B |
| Air-cooled Chiller 3 | ZOS-MG-02B |
| CVS Makeup Pump 1B | ZOS-MG-02B |
| CVS Pump Room Unit Cooler Fan B | ZOS-MG-02B |
| RNS Pump 1B | ZOS-MG-02B |

| Table 2.6.1-2 (cont.) | |
|---|--------------|
| Load Description | Power Source |
| RNS Pump Room Unit Cooler Fan B | ZOS-MG-02B |
| Equipment Room B AHU Supply and Return Fans VXS-MA-01B/02B | ZOS-MG-02B |
| Switchgear Room B AHU Supply and Return Fans VXS-MA-05B/06B | ZOS-MG-02B |
| Non-1E Battery Charger EDS2-DC-1 | ZOS-MG-02B |
| Non-1E Battery Charger EDS4-DC-1 | ZOS-MG-02B |
| Non-1E Battery Room B Exhaust Fan | ZOS-MG-02B |
| Class 1E Division B Battery Charger 1 (24-hour) | ZOS-MG-02B |
| Class 1E Division B Battery Charger 2 (72-hour) | ZOS-MG-02B |
| Class 1E Division D Battery Charger 1 (24-hour) | ZOS-MG-02B |
| Divisions B/D Class 1E Battery Room Exhaust Fan B | ZOS-MG-02B |
| Supplemental Air Filtration Unit Fan B | ZOS-MG-02B |
| Backup Group 4B Pressurizer Heaters | ZOS-MG-02B |
| Spent Fuel Cooling Pump 1B | ZOS-MG-02B |

| Table 2.6.1-3 | | | |
|------------------------------------|-----------|---|-----------------------------|
| Equipment | Tag No. | Display | Control Function |
| 6900 V Switchgear Bus 1 | ECS-ES-1 | Yes (Bus voltage, breaker position for all breakers on bus) | Yes (Breaker open/close) |
| 6900 V Switchgear Bus 2 | ECS-ES-2 | Yes (Bus voltage, breaker position for all breakers on bus) | Yes (Breaker open/close) |
| Unit Auxiliary Transformer A | ZAS-ET-2A | Yes (Secondary Voltage) | No |
| Unit Auxiliary Transformer B | ZAS-ET-2B | Yes (Secondary Voltage) | No |
| Reserve Auxiliary Transformer A | ZAS-ET-4A | Yes (Secondary Voltage) | No |
| Reserve Auxiliary Transformer B | ZAS-ET-4B | Yes (Secondary Voltage) | No |

| Table 2.6.1-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the ECS is as described in the Design Description of this Section 2.6.1. | Inspection of the as-built system will be performed. | The as-built ECS conforms with the functional arrangement as described in the Design Description of this Section 2.6.1. |
| 2. The seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.6.1-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.6.1-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3.a) The Class 1E breaker control power for the equipment identified in Table 2.6.1-1 are powered from their respective Class 1E division. | Testing will be performed on the ECS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.6.1-1 when the assigned Class 1E division is provided the test signal. |
| 3.b) Separation is provided between ECS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 4.a) The ECS provides the capability for distributing non-Class 1E ac power from onsite sources (ZOS) to nonsafety-related loads listed in Table 2.6.1-2. | Tests will be performed using a test signal to confirm that an electrical path exists for each selected load listed in Table 2.6.1-2 from an ECS-ES-1 or ECS-ES-2 bus. Each test may be a single test or a series of over-lapping tests. | A test signal exists at the terminals of each selected load. |

| Table 2.6.1-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.b) The 6900 Vac circuit breakers in switchgear ECS-ES-1 and ECS-ES-2 open after receiving a signal from the onsite standby power load system. | See Tier 1 Material, Table 2.6.4-1, item 2.a. | See Tier 1 Material, Table 2.6.4-1, item 2.a. |
| 4.c) Each standby diesel generator 6900 Vac circuit breaker closes after receiving a signal from the onsite standby power system. | Testing will be performed using real or simulated signals from the standby diesel load system. | Each standby diesel generator 6900 Vac circuit breaker closes after receiving a signal from the standby diesel system. |
| 4.d) Each ancillary diesel generator unit is sized to supply power to long-term safety-related post-accident monitoring loads and control room lighting and ventilation through a regulating transformer; and for one PCS recirculation pump. | Each ancillary diesel generator will be operated with fuel supplied from the ancillary diesel generator fuel tank and with a load of 35 kW or greater and a power factor between 0.9 and 1.0 for a time period required to reach engine temperature equilibrium plus 2.5 hours. | Each diesel generator provides power to the load with a generator terminal voltage of $480 \pm 10\%$ volts and a frequency of $60 \pm 5\%$ Hz. |
| 4.e) The ECS provides two loss-of-voltage signals to the onsite standby power system (ZOS), one for each diesel-backed 6900 Vac switchgear bus. | Tests on the as-built ECS system will be conducted by simulating a loss-of-voltage condition on each diesel-backed 6900 Vac switchgear bus. | A loss-of-voltage signal is generated when the loss-of-voltage condition is simulated. |
| 4.f) The ECS provides a reverse-power trip of the generator circuit breaker which is blocked for at least 15 seconds following a turbine trip. | Tests on the as-built ECS system will be conducted by simulating a turbine trip signal followed by a simulated reverse-power condition. The generator circuit breaker trip signal will be monitored. | The generator circuit breaker trip signal does not occur until at least 15 seconds after the simulated turbine trip. |
| 5. Controls exist in the MCR to cause the circuit breakers identified in Table 2.6.1-3 to perform the listed functions. | Tests will be performed to verify that controls in the MCR can operate the circuit breakers identified in Table 2.6.1-3. | Controls in the MCR cause the circuit breakers identified in Table 2.6.1-3 to operate. |
| 6. Displays of the parameters identified in Table 2.6.1-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.6.1-3 in the MCR. | Displays identified in Table 2.6.1-3 can be retrieved in the MCR. |

| Table 2.6.1-5 | | |
|---|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| RCP Circuit Breaker | ECS-ES-31 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-32 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-41 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-42 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-51 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-52 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-61 | Auxiliary Building |
| RCP Circuit Breaker | ECS-ES-62 | Auxiliary Building |
| 6900 V Switchgear Bus 1 | ECS-ES-1 | Annex Building |
| 6900 V Switchgear Bus 2 | ECS-ES-2 | Annex Building |
| 6900 V Switchgear Bus 3 | ECS-ES-3 | Turbine Building |
| 6900 V Switchgear Bus 4 | ECS-ES-4 | Turbine Building |
| 6900 V Switchgear Bus 5 | ECS-ES-5 | Turbine Building |
| 6900 V Switchgear Bus 6 | ECS-ES-6 | Turbine Building |
| Main Generator | ZAS-MG-01 | Turbine Building |
| Generator Circuit Breaker | ZAS-ES-01 | Turbine Building |
| Main Step-up Transformer | ZAS-ET-1A | Yard |
| Main Step-up Transformer | ZAS-ET-1B | Yard |
| Main Step-up Transformer | ZAS-ET-1C | Yard |
| Unit Auxiliary Transformer A | ZAS-ET-2A | Yard |
| Unit Auxiliary Transformer B | ZAS-ET-2B | Yard |
| Reserve Auxiliary Transformer A | ZAS-ET-4A | Yard |
| Reserve Auxiliary Transformer B | ZAS-ET-4B | Yard |
| Ancillary Diesel Generator #1 | ECS-MG-01 | Annex Building |
| Ancillary Diesel Generator #2 | ECS-MG-02 | Annex Building |
| Ancillary Diesel Generator Distribution Panel 1 | ECS-ED-01 | Annex Building |
| Ancillary Diesel Generator Distribution Panel 1 | ECS-ED-02 | Annex Building |

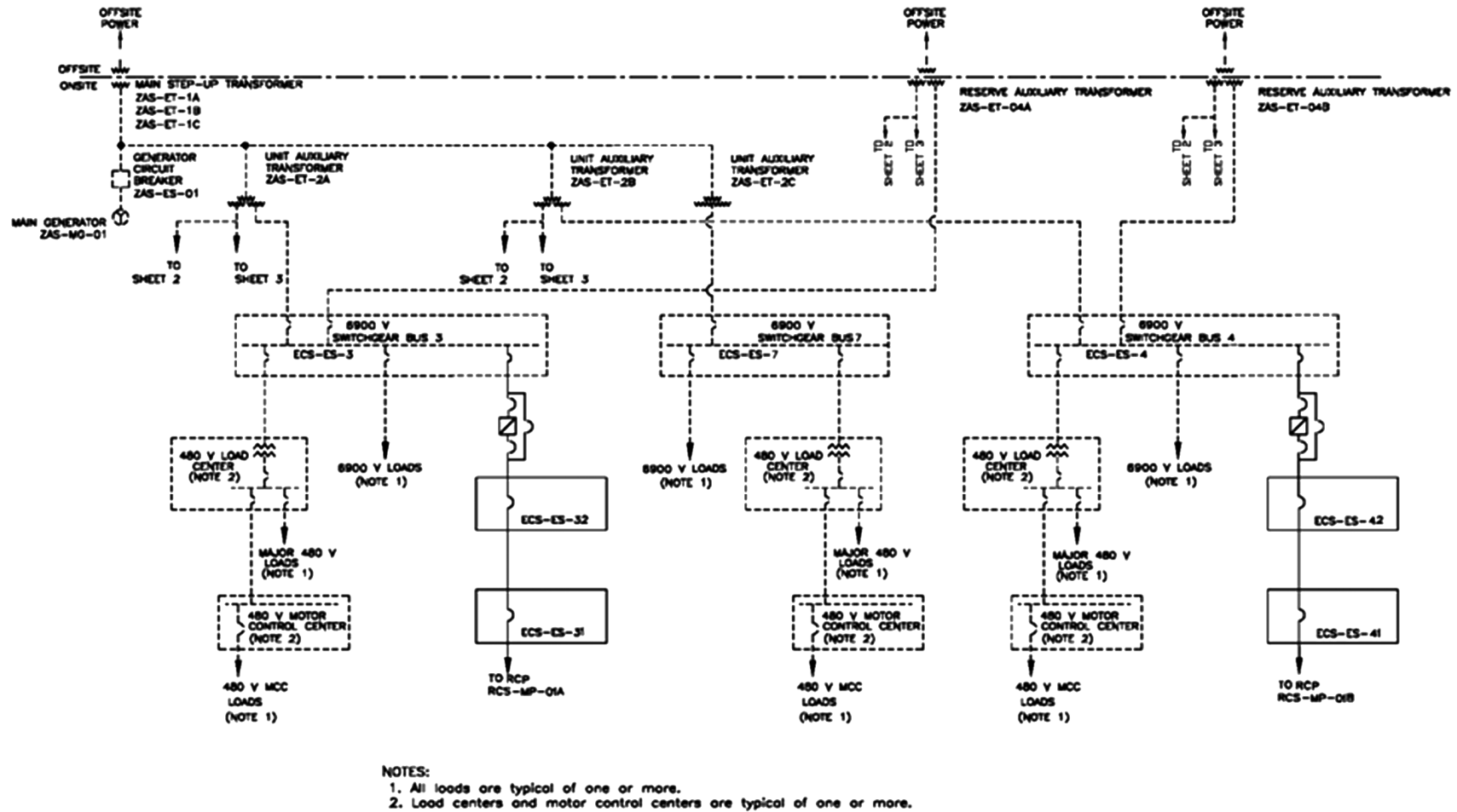


Figure 2.6.1-1 (Sheet 1 of 4)
Main ac Power System

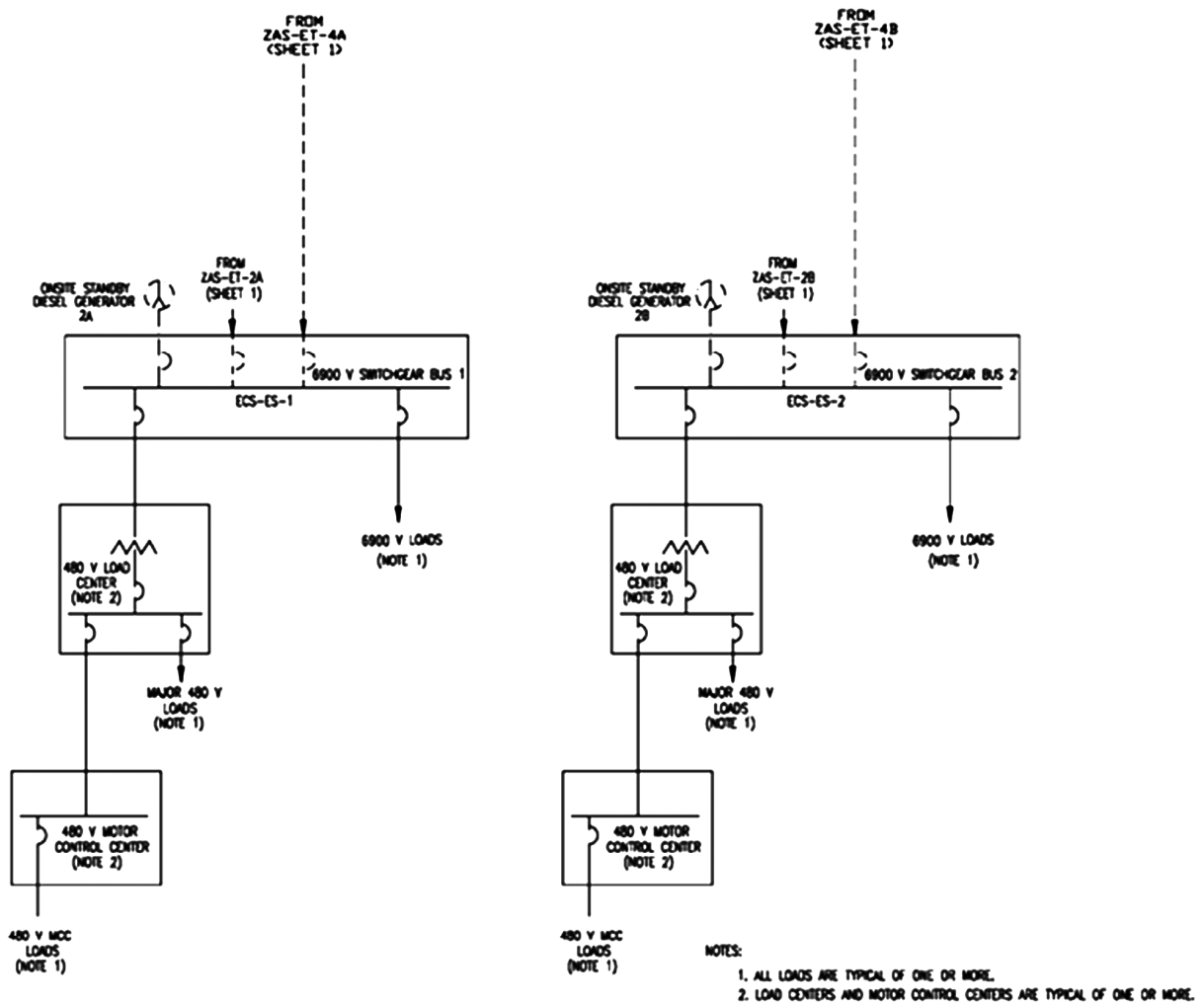


Figure 2.6.1-1 (Sheet 2 of 4)
Main ac Power System

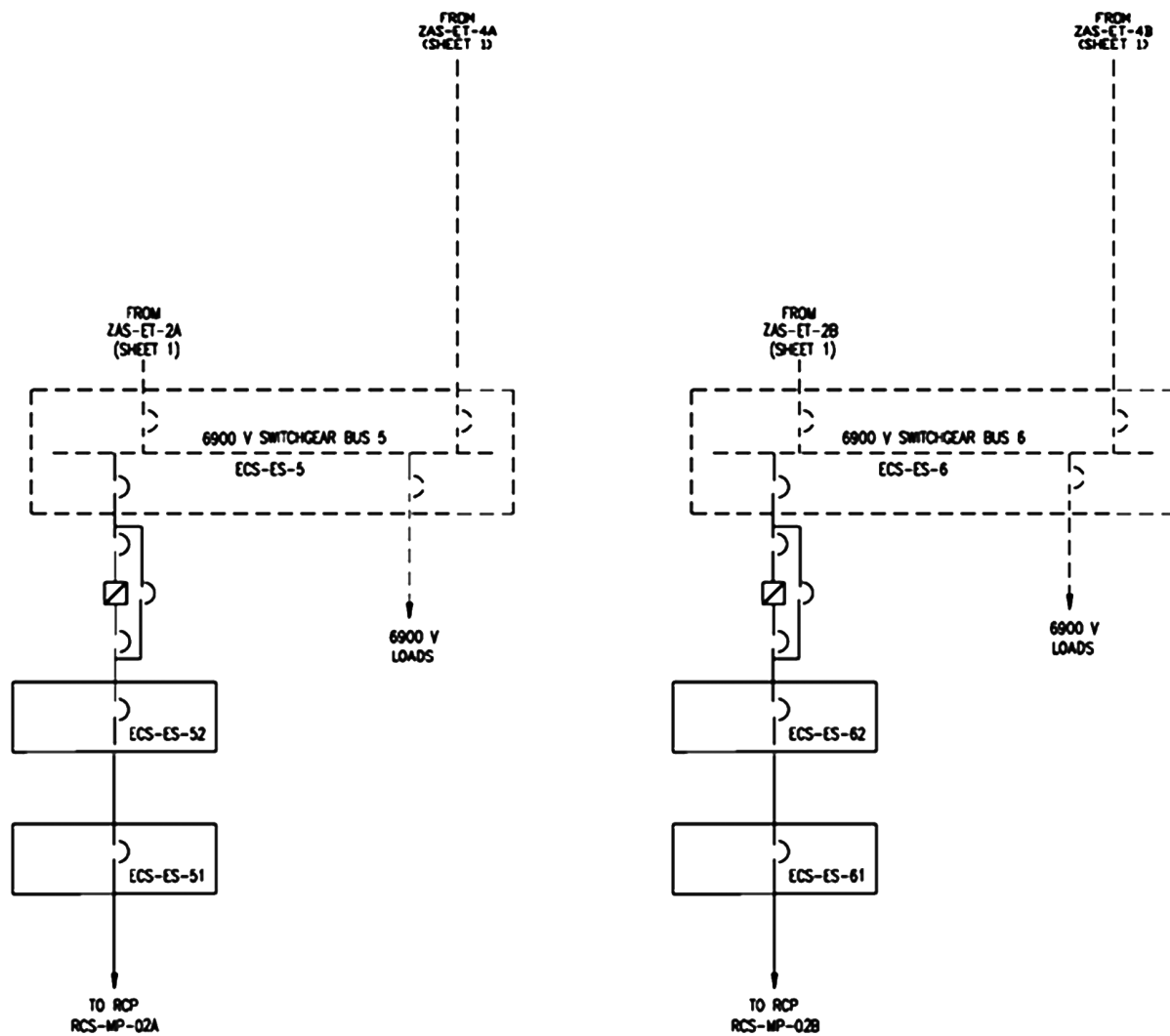


Figure 2.6.1-1 (Sheet 3 of 4)
Main ac Power System

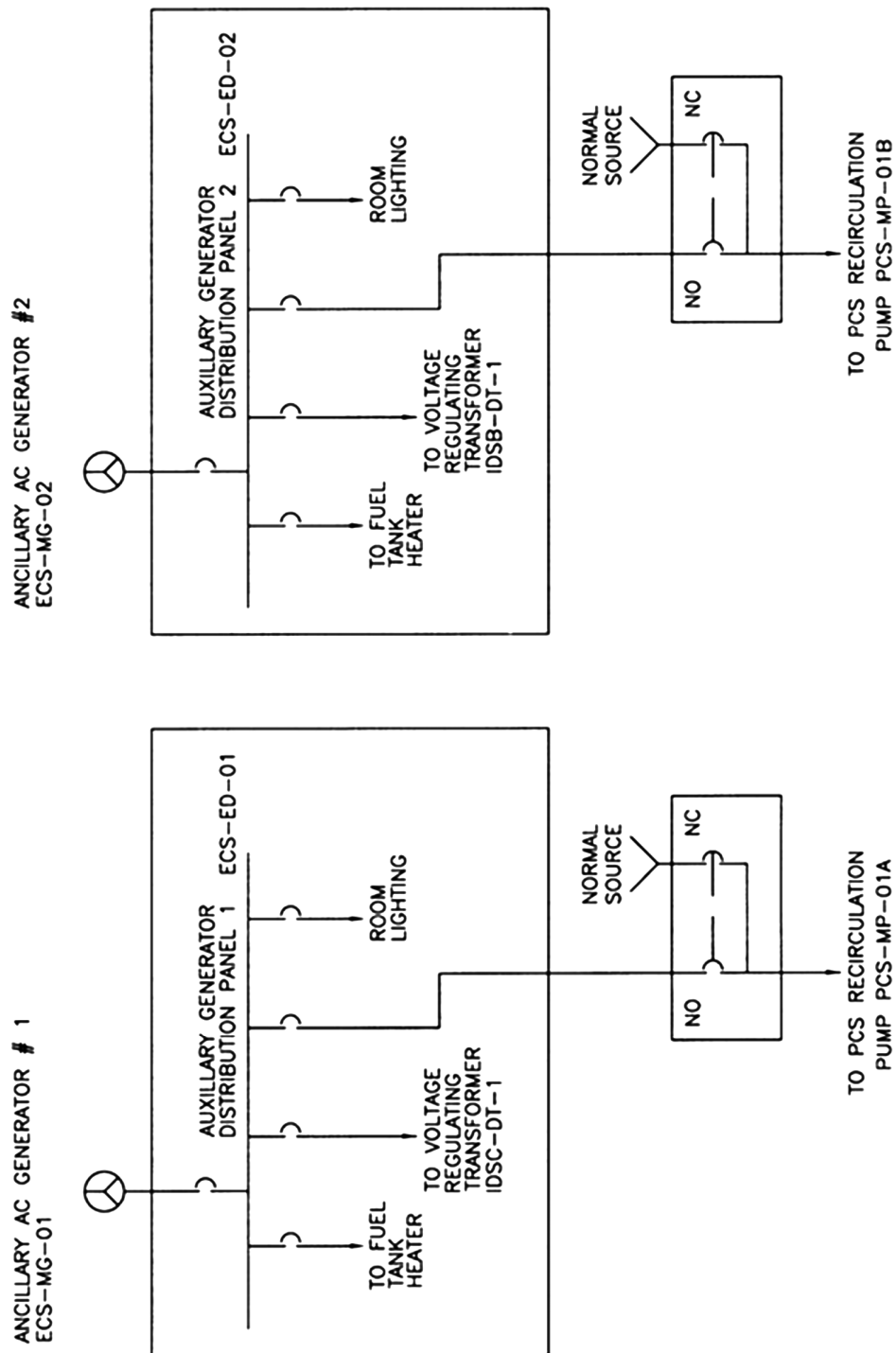


Figure 2.6.1-1 (Sheet 4 of 4)
Main ac Power System

2.6.2 Non-Class 1E dc and Uninterruptible Power Supply System**Design Description**

The non-Class 1E dc and uninterruptible power supply system (EDS) provides dc and uninterruptible ac electrical power to nonsafety-related loads during normal and off-normal conditions.

The EDS is as shown in Figure 2.6.2-1 and the component locations of the EDS are as shown in Table 2.6.2-2.

1. The functional arrangement of the EDS is as described in the Design Description of this Section 2.6.2.
2. The EDS provides the following nonsafety-related functions:
 - a) Each EDS load group 1, 2, 3, and 4 battery charger supplies the corresponding dc switchboard bus load while maintaining the corresponding battery charged.
 - b) Each EDS load group 1, 2, 3, and 4 battery supplies the corresponding dc switchboard bus load for a period of 2 hours without recharging.
 - c) Each EDS load group 1, 2, 3, and 4 inverter supplies the corresponding ac load.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.2-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the EDS.

| Table 2.6.2-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the EDS is as described in the Design Description of this Section 2.6.2. | Inspection of the as-built system will be performed. | The as-built EDS conforms with the functional arrangement as described in the Design Description of this Section 2.6.2. |
| 2.a) Each EDS load group 1, 2, 3, and 4 battery charger supplies the corresponding dc switchboard bus load while maintaining the corresponding battery charged. | Testing of each as-built battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads. | Each battery charger provides an output current of at least 900 amps with an output voltage in the range 105 to 140 V. |
| 2.b) Each EDS load group 1, 2, 3, and 4 battery supplies the corresponding dc switchboard bus load for a period of 2 hours without recharging. | Testing of each as-built battery will be performed by applying a simulated or real load, or a combination of simulated or real loads. The test will be conducted on a battery that has been fully charged and has been connected to a battery charger maintained at 135 ± 1 V for a period of no less than 24 hours prior to the test. | The battery terminal voltage is greater than or equal to 105 V after a period of no less than 2 hours, with an equivalent load greater than 850 amps. |
| 2.c) Each EDS load group 1, 2, 3, and 4 inverter supplies the corresponding ac load. | Testing of each as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads, equivalent to a resistive load greater than 55 kW. | Each inverter provides a line-to-line output voltage of $208 \pm 2\%$ V at a frequency of $60 \pm 0.5\%$ Hz. |

| Table 2.6.2-2 | | |
|----------------------------------|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Load Group 1 Battery | EDS1-DB-1 | Annex Building |
| Load Group 2 Battery | EDS2-DB-1 | Annex Building |
| Load Group 3 Battery | EDS3-DB-1 | Annex Building |
| Load Group 4 Battery | EDS4-DB-1 | Annex Building |
| Load Group 1 Battery Charger | EDS1-DC-1 | Annex Building |
| Load Group 2 Battery Charger | EDS2-DC-1 | Annex Building |
| Load Group 3 Battery Charger | EDS3-DC-1 | Annex Building |
| Load Group 4 Battery Charger | EDS4-DC-1 | Annex Building |
| Load Group 1 125 Vdc Switchboard | EDS1-DS-1 | Annex Building |
| Load Group 2 125 Vdc Switchboard | EDS2-DS-1 | Annex Building |
| Load Group 3 125 Vdc Switchboard | EDS3-DS-1 | Annex Building |
| Load Group 4 125 Vdc Switchboard | EDS4-DS-1 | Annex Building |
| Load Group 1 Inverter | EDS1-DU-1 | Annex Building |
| Load Group 2 Inverter | EDS2-DU-1 | Annex Building |
| Load Group 3 Inverter | EDS3-DU-1 | Annex Building |
| Load Group 4 Inverter | EDS4-DU-1 | Annex Building |

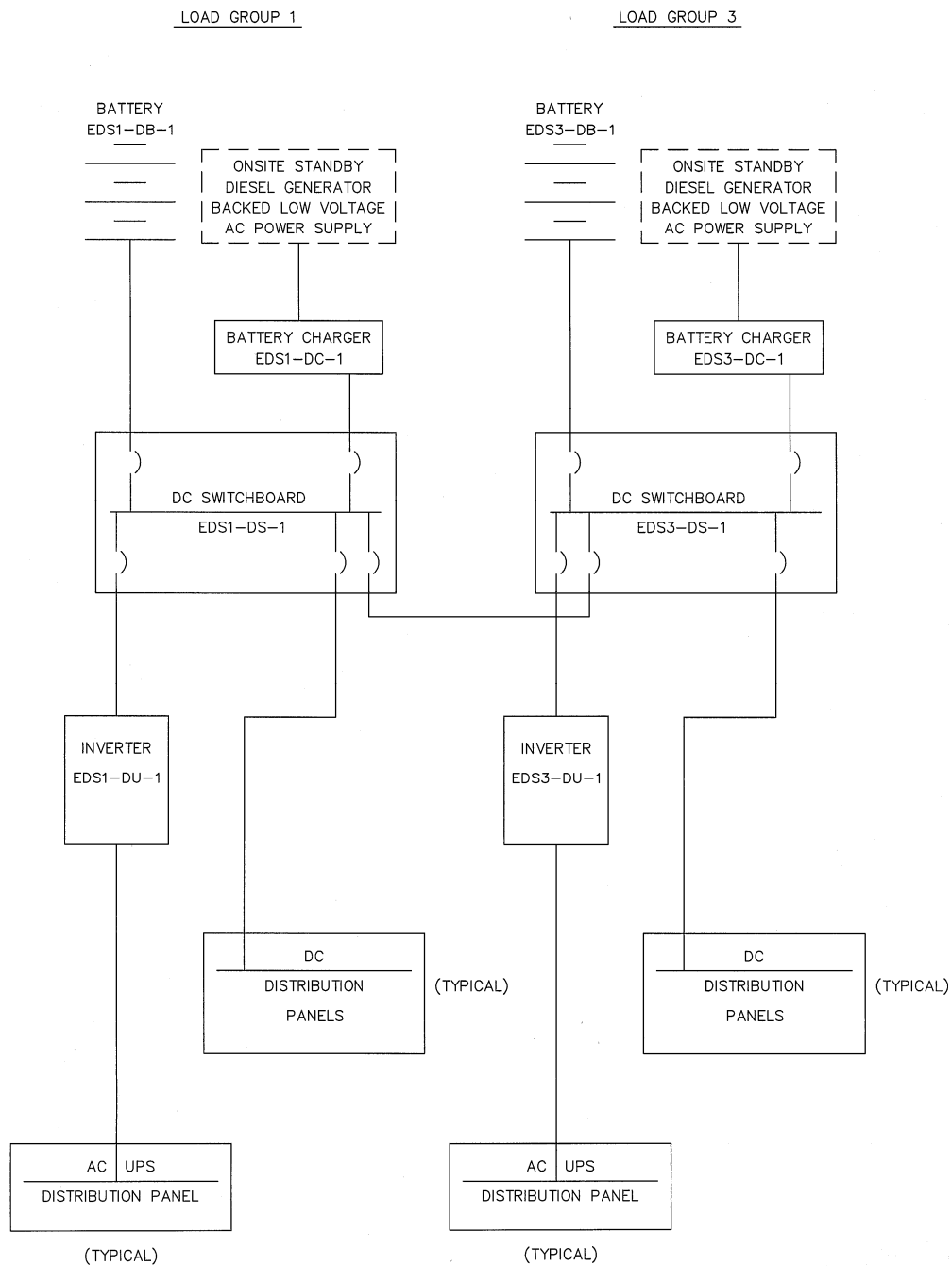


Figure 2.6.2-1 (Sheet 1 of 2)
Non-Class 1E dc and Uninterruptible Power Supply System

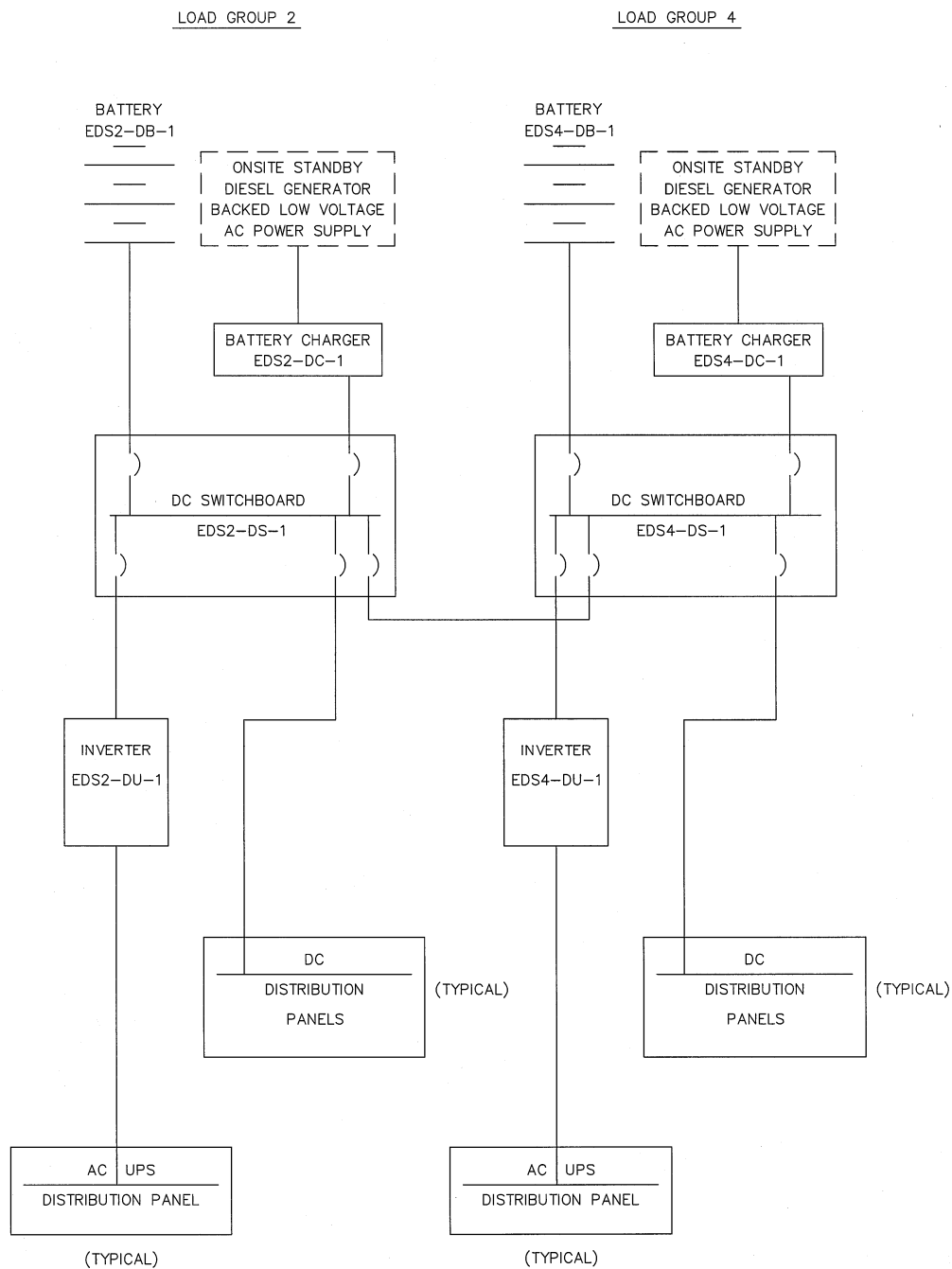


Figure 2.6.2-1 (Sheet 2 of 2)
Non-Class 1E dc and Uninterruptible Power Supply System

2.6.3 Class 1E dc and Uninterruptible Power Supply System**Design Description**

The Class 1E dc and uninterruptible power supply system (IDS) provides dc and uninterruptible ac electrical power for safety-related equipment during normal and off-normal conditions.

The IDS is as shown in Figure 2.6.3-1 and the component locations of the IDS are as shown in Table 2.6.3-4.

1. The functional arrangement of the IDS is as described in the Design Description of this Section 2.6.3.
2. The seismic Category I equipment identified in Table 2.6.3-1 can withstand seismic design basis loads without loss of safety function.
3. Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E cables.
4. The IDS provides the following safety-related functions:
 - a) The IDS provides electrical independence between the Class 1E divisions.
 - b) The IDS provides electrical isolation between the non-Class 1E ac power system and the non-Class 1E lighting in the MCR.
 - c) Each IDS 24-hour battery bank supplies a dc switchboard bus load for a period of 24 hours without recharging.
 - d) Each IDS 72-hour battery bank supplies a dc switchboard bus load for a period of 72 hours without recharging.
 - e) The IDS spare battery bank supplies a dc load equal to or greater than the most severe switchboard bus load for the required period without recharging.
 - f) Each IDS 24-hour inverter supplies its ac load.
 - g) Each IDS 72-hour inverter supplies its ac load.
 - h) Each IDS 24-hour battery charger provides the protection and safety monitoring system (PMS) with two loss-of-ac input voltage signals.
 - i) The IDS supplies an operating voltage at the terminals of the Class 1E motor-operated valves identified in Tier 1 Material subsections 2.1.2, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.3.2, 2.3.6, and 2.7.1 that is greater than or equal to the minimum specified voltage.

5. The IDS provides the following nonsafety-related functions:
 - a) Each IDS 24-hour battery charger supplies a dc switchboard bus load while maintaining the corresponding battery charged.
 - b) Each IDS 72-hour battery charger supplies a dc switchboard bus load while maintaining the corresponding battery charged.
 - c) Each IDS regulating transformer supplies an ac load when powered from the 480 V motor control center (MCC).
 - d) The IDS Divisions B and C regulating transformers supply their post-72 hour ac loads when powered from an ancillary diesel generator.
6. Safety-related displays identified in Table 2.6.3-1 can be retrieved in the MCR.
7. The IDS dc battery fuses and battery charger circuit breakers, and dc distribution panels, MCCs, and their circuit breakers and fuses, are sized to supply their load requirements.
8. Circuit breakers and fuses in IDS battery, battery charger, dc distribution panel, and MCC circuits are rated to interrupt fault currents.
9. The IDS batteries, battery chargers, dc distribution panels, and MCCs are rated to withstand fault currents for the time required to clear the fault from its power source.
10. The IDS electrical distribution system cables are rated to withstand fault currents for the time required to clear the fault from its power source.
11. Displays of the parameters identified in Table 2.6.3-2 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.3-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the IDS.

| Table 2.6.3-1 | | | | |
|---|-----------|----------------|---------------------------------|------------------------|
| Equipment Name | Tag No. | Seismic Cat. I | Class 1E/Qual. for Harsh Envir. | Safety-Related Display |
| Division A 250 Vdc 24-Hour Battery Bank | IDSA-DB-1 | Yes | Yes/No | No |
| Division B 250 Vdc 24-Hour Battery Bank 1 | IDSB-DB-1 | Yes | Yes/No | No |
| Division B 250 Vdc 72-Hour Battery Bank 2 | IDSB-DB-2 | Yes | Yes/No | No |
| Division C 250 Vdc 24-Hour Battery Bank 1 | IDSC-DB-1 | Yes | Yes/No | No |
| Division C 250 Vdc 72-Hour Battery Bank 2 | IDSC-DB-2 | Yes | Yes/No | No |
| Division D 250 Vdc 24-Hour Battery Bank | IDSD-DB-1 | Yes | Yes/No | No |
| Spare 250 Vdc Battery Bank | IDSS-DB-1 | Yes | Yes/No | No |
| Division A 24-Hour Battery Charger 1 | IDSA-DC-1 | Yes | Yes/No | No |
| Division B 24-Hour Battery Charger 1 | IDSB-DC-1 | Yes | Yes/No | No |
| Division B 72-Hour Battery Charger 2 | IDSB-DC-2 | Yes | Yes/No | No |
| Division C 24-Hour Battery Charger 1 | IDSC-DC-1 | Yes | Yes/No | No |
| Division C 72-Hour Battery Charger 2 | IDSC-DC-2 | Yes | Yes/No | No |
| Division D 24-Hour Battery Charger 1 | IDSD-DC-1 | Yes | Yes/No | No |
| Spare Battery Charger 1 | IDSS-DC-1 | Yes | Yes/No | No |
| Division A 250 Vdc Distribution Panel | IDSA-DD-1 | Yes | Yes/No | No |
| Division B 250 Vdc Distribution Panel | IDSB-DD-1 | Yes | Yes/No | No |
| Division C 250 Vdc Distribution Panel | IDSC-DD-1 | Yes | Yes/No | No |
| Division D 250 Vdc Distribution Panel | IDSD-DD-1 | Yes | Yes/No | No |
| Division A 120 Vac Distribution Panel 1 | IDSA-EA-1 | Yes | Yes/No | No |
| Division A 120 Vac Distribution Panel 2 | IDSA-EA-2 | Yes | Yes/No | No |
| Division B 120 Vac Distribution Panel 1 | IDSB-EA-1 | Yes | Yes/No | No |
| Division B 120 Vac Distribution Panel 2 | IDSB-EA-2 | Yes | Yes/No | No |
| Division B 120 Vac Distribution Panel 3 | IDSB-EA-3 | Yes | Yes/No | No |
| Division C 120 Vac Distribution Panel 1 | IDSC-EA-1 | Yes | Yes/No | No |
| Division C 120 Vac Distribution Panel 2 | IDSC-EA-2 | Yes | Yes/No | No |
| Division C 120 Vac Distribution Panel 3 | IDSC-EA-3 | Yes | Yes/No | No |
| Division D 120 Vac Distribution Panel 1 | IDSD-EA-1 | Yes | Yes/No | No |

| Table 2.6.3-1 (cont.) | | | | |
|---|-----------|----------------|---------------------------------|------------------------|
| Equipment Name | Tag No. | Seismic Cat. I | Class 1E/Qual. for Harsh Envir. | Safety-Related Display |
| Division D 120 Vac Distribution Panel 2 | IDSD-EA-2 | Yes | Yes/No | No |
| Division A Fuse Panel 4 | IDSA-EA-4 | Yes | Yes/No | No |
| Division B Fuse Panel 4 | IDSB-EA-4 | Yes | Yes/No | No |
| Division B Fuse Panel 5 | IDSB-EA-5 | Yes | Yes/No | No |
| Division B Fuse Panel 6 | IDSB-EA-6 | Yes | Yes/No | No |
| Division C Fuse Panel 4 | IDSC-EA-4 | Yes | Yes/No | No |
| Division C Fuse Panel 5 | IDSC-EA-5 | Yes | Yes/No | No |
| Division C Fuse Panel 6 | IDSC-EA-6 | Yes | Yes/No | No |
| Division D Fuse Panel 4 | IDSD-EA-4 | Yes | Yes/No | No |
| Division A Fused Transfer Switch Box 1 | IDSA-DF-1 | Yes | Yes/No | No |
| Division B Fused Transfer Switch Box 1 | IDSB-DF-1 | Yes | Yes/No | No |
| Division B Fused Transfer Switch Box 2 | IDSB-DF-2 | Yes | Yes/No | No |
| Division C Fused Transfer Switch Box 1 | IDSC-DF-1 | Yes | Yes/No | No |
| Division C Fused Transfer Switch Box 2 | IDSC-DF-2 | Yes | Yes/No | No |
| Division D Fused Transfer Switch Box 1 | IDSD-DF-1 | Yes | Yes/No | No |
| Spare Fused Transfer Switch Box 1 | IDSS-DF-1 | Yes | Yes/No | No |
| Division A 250 Vdc MCC | IDSA-DK-1 | Yes | Yes/No | No |
| Division B 250 Vdc MCC | IDSB-DK-1 | Yes | Yes/No | No |
| Division C 250 Vdc MCC | IDSC-DK-1 | Yes | Yes/No | No |
| Division D 250 Vdc MCC | IDSD-DK-1 | Yes | Yes/No | No |
| Division A 250 Vdc Switchboard 1 | IDSA-DS-1 | Yes | Yes/No | Yes (Bus Voltage) |
| Division B 250 Vdc Switchboard 1 | IDSB-DS-1 | Yes | Yes/No | Yes (Bus Voltage) |
| Division B 250 Vdc Switchboard 2 | IDSB-DS-2 | Yes | Yes/No | Yes (Bus Voltage) |
| Division C 250 Vdc Switchboard 1 | IDSC-DS-1 | Yes | Yes/No | Yes (Bus Voltage) |

| Table 2.6.3-1 (cont.) | | | | |
|-----------------------------------|-----------|----------------|-------------------------------------|------------------------|
| Equipment Name | Tag No. | Seismic Cat. I | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display |
| Division C 250 Vdc Switchboard 2 | IDSC-DS-2 | Yes | Yes/No | Yes (Bus Voltage) |
| Division D 250 Vdc Switchboard 1 | IDSD-DS-1 | Yes | Yes/No | Yes (Bus Voltage) |
| Division A Regulating Transformer | IDSA-DT-1 | Yes | Yes/No | No |
| Division B Regulating Transformer | IDSB-DT-1 | Yes | Yes/No | No |
| Division C Regulating Transformer | IDSC-DT-1 | Yes | Yes/No | No |
| Division D Regulating Transformer | IDSD-DT-1 | Yes | Yes/No | No |
| Division A 24-Hour Inverter 1 | IDSA-DU-1 | Yes | Yes/No | No |
| Division B 24-Hour Inverter 1 | IDSB-DU-1 | Yes | Yes/No | No |
| Division B 72-Hour Inverter 2 | IDSB-DU-2 | Yes | Yes/No | No |
| Division C 24-Hour Inverter 1 | IDSC-DU-1 | Yes | Yes/No | No |
| Division C 72-Hour Inverter 2 | IDSC-DU-2 | Yes | Yes/No | No |
| Division D 24-Hour Inverter 1 | IDSD-DU-1 | Yes | Yes/No | No |
| Spare Termination Box 2 | IDSS-DF-2 | Yes | Yes/No | No |
| Spare Termination Box 3 | IDSS-DF-3 | Yes | Yes/No | No |
| Spare Termination Box 4 | IDSS-DF-4 | Yes | Yes/No | No |
| Spare Termination Box 5 | IDSS-DF-5 | Yes | Yes/No | No |

| Table 2.6.3-2 | | |
|--|-----------|---|
| Equipment | Tag No. | Display/Status Indication |
| Division A Battery Monitor | IDSA-DV-1 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division B 24-Hour Battery Monitor | IDSB-DV-1 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division B 72-Hour Battery Monitor | IDSB-DV-2 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division C 24-Hour Battery Monitor | IDSC-DV-1 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division C 72-Hour Battery Monitor | IDSC-DV-2 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division D Battery Monitor | IDSD-DV-1 | Yes (Battery Ground Detection, Battery High Discharge Rate) |
| Division A Fused Transfer Switch Box | IDSA-DF-1 | Yes (Battery Current, Battery Disconnect Switch Position) |
| Division B 24-Hour Fused Transfer Switch Box | IDSB-DF-1 | Yes (Battery Current, Battery Disconnect Switch Position) |
| Division B 72-Hour Fused Transfer Switch Box | IDSB-DF-2 | Yes (Battery Current, Battery Disconnect Switch Position) |
| Division C 24-Hour Fused Transfer Switch Box | IDSC-DF-1 | Yes (Battery Current, Battery Disconnect Switch Position) |
| Division C 72-Hour Fused Transfer Switch Box | IDSC-DF-2 | Yes (Battery Current, Battery Disconnect Switch Position) |
| Division D Fused Transfer Switch Box | IDSD-DF-1 | Yes (Battery Current, Battery Disconnect Switch Position) |

| Table 2.6.3-2 (cont.) | | |
|------------------------------------|-----------|---|
| Equipment | Tag No. | Display/Status Indication |
| Division A Battery Charger | IDSA-DC-1 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |
| Division B 24-Hour Battery Charger | IDSB-DC-1 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |
| Division B 72-Hour Battery Charger | IDSB-DC-2 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |
| Division C 24-Hour Battery Charger | IDSC-DC-1 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |
| Division C 72-Hour Battery Charger | IDSC-DC-2 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |
| Division D Battery Charger | IDSD-DC-1 | Yes (Charger Output Current, Charger Trouble ⁽¹⁾) |

Note: (1) Battery charger trouble includes charger dc output under/over voltage

| Table 2.6.3-3 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the IDS is as described in the Design Description of this Section 2.6.3. | Inspection of the as-built system will be performed. | The as-built IDS conforms with the functional arrangement as described in the Design Description of this Section 2.6.3. |
| 2. The seismic Category I equipment identified in Table 2.6.3-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.6.3-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.6.3-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 3. Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E cables. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 4.a) The IDS provides electrical independence between the Class 1E divisions. | Testing will be performed on the IDS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.6.3-1 when the assigned Class 1E division is provided the test signal. |
| 4.b) The IDS provides electrical isolation between the non-Class 1E ac power system and the non-Class 1E lighting in the MCR. | Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed. | A report exists and concludes that the battery chargers, regulating transformers, and isolation fuses prevent credible faults from propagating into the IDS. |

| Table 2.6.3-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.c) Each IDS 24-hour battery bank supplies a dc switchboard bus load for a period of 24 hours without recharging. | Testing of each 24-hour as-built battery bank will be performed by applying a simulated or real load, or a combination of simulated or real loads which envelope the battery bank design duty cycle. The test will be conducted on a battery bank that has been fully charged and has been connected to a battery charger maintained at 270 ± 2 V for a period of no less than 24 hours prior to the test. | The battery terminal voltage is greater than or equal to 210 V after a period of no less than 24 hours with an equivalent load that equals or exceeds the battery bank design duty cycle capacity. |
| 4.d) Each IDS 72-hour battery bank supplies a dc switchboard bus load for a period of 72 hours without recharging. | Testing of each 72-hour as-built battery bank will be performed by applying a simulated or real load, or a combination of simulated or real loads which envelope the battery bank design duty cycle. The test will be conducted on a battery bank that has been fully charged and has been connected to a battery charger maintained at 270 ± 2 V for a period of no less than 24 hours prior to the test. | The battery terminal voltage is greater than or equal to 210 V after a period of no less than 72 hours with an equivalent load that equals or exceeds the battery bank design duty cycle capacity. |
| 4.e) The IDS spare battery bank supplies a dc load equal to or greater than the most severe switchboard bus load for the required period without recharging. | Testing of the as-built spare battery bank will be performed by applying a simulated or real load, or a combination of simulated or real loads which envelope the most severe of the division batteries design duty cycle. The test will be conducted on a battery bank that has been fully charged and has been connected to a battery charger maintained at 270 ± 2 V for a period of no less than 24 hours prior to the test. | The battery terminal voltage is greater than or equal to 210 V after a period with a load and duration that equals or exceeds the most severe battery bank design duty cycle capacity. |

| Table 2.6.3-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.f) Each IDS 24-hour inverter supplies its ac load. | Testing of each 24-hour as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads, equivalent to a resistive load greater than 12 kW. The inverter input voltage will be no more than 210 Vdc during the test. | Each 24-hour inverter supplies a line-to-line output voltage of $208 \pm 2\%$ V at a frequency of $60 \pm 0.5\%$ Hz. |
| 4.g) Each IDS 72-hour inverter supplies its ac load. | Testing of each 72-hour as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads, equivalent to a resistive load greater than 7 kW. The inverter input voltage will be no more than 210 Vdc during the test. | Each 72-hour inverter supplies a line-to-line output voltage of $208 \pm 2\%$ V at a frequency of $60 \pm 0.5\%$ Hz. |
| 4.h) Each IDS 24-hour battery charger provides the PMS with two loss-of-ac input voltage signals. | Testing will be performed by simulating a loss of input voltage to each 24-hour battery charger. | Two PMS input signals exist from each 24-hour battery charger indicating loss of ac input voltage when the loss-of-input voltage condition is simulated. |
| 4.i) The IDS supplies an operating voltage at the terminals of the Class 1E motor operated valves identified in Tier 1 Material subsections 2.1.2, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.3.2, 2.3.6, and 2.7.1 that is greater than or equal to the minimum specified voltage. | Testing will be performed by stroking each specified motor-operated valve and measuring the terminal voltage at the motor starter input terminals with the motor operating. The battery terminal voltage will be no more than 210 Vdc during the test. | The motor starter input terminal voltage is greater than or equal 200 Vdc with the motor operating. |
| 5.a) Each IDS 24-hour battery charger supplies a dc switchboard bus load while maintaining the corresponding battery charged. | Testing of each as-built 24-hour battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads. | Each 24-hour battery charger provides an output current of at least 150 A with an output voltage in the range 210 to 280 V. |
| 5.b) Each IDS 72-hour battery charger supplies a dc switchboard bus load while maintaining the corresponding battery charged. | Testing of each 72-hour as-built battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads. | Each 72-hour battery charger provides an output current of at least 125 A with an output voltage in the range 210 to 280 V. |

| Table 2.6.3-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.c) Each IDS regulating transformer supplies an ac load when powered from the 480 V MCC. | Testing of each as-built regulating transformer will be performed by applying a simulated or real load, or a combination of simulated or real loads, equivalent to a resistive load greater than 30 kW when powered from the 480 V MCC. | Each regulating transformer supplies a line-to-line output voltage of $208 \pm 2\%$ V. |
| 5.d) The IDS Divisions B and C regulating transformers supply their post-72-hour ac loads when powered from an ancillary diesel generator. | Inspection of the as-built system will be performed. | i) Ancillary diesel generator 1 is electrically connected to regulating transformer IDSC-DT-1 ii) Ancillary diesel generator 2 is electrically connected to regulating transformer IDSB-DT-1. |
| 6. Safety-related displays identified in Table 2.6.3-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.6.3-1 can be retrieved in the MCR. |
| 7. The IDS dc battery fuses and battery charger circuit breakers, and dc distribution panels, MCCs, and their circuit breakers and fuses, are sized to supply their load requirements. | Analyses for the as-built IDS dc electrical distribution system to determine the capacities of the battery fuses and battery charger circuit breakers, and dc distribution panels, MCCs, and their circuit breakers and fuses, will be performed. | Analyses for the as-built IDS dc electrical distribution system exist and conclude that the capacities of as-built IDS battery fuses and battery charger circuit breakers, and dc distribution panels, MCCs, and their circuit breakers and fuses, as determined by their nameplate ratings, exceed their analyzed load requirements. |
| 8. Circuit breakers and fuses in IDS battery, battery charger, dc distribution panel, and MCC circuits are rated to interrupt fault currents. | Analyses for the as-built IDS dc electrical distribution system to determine fault currents will be performed. | Analyses for the as-built IDS dc electrical distribution system exist and conclude that the analyzed fault currents do not exceed the interrupt capacity of circuit breakers and fuses in the battery, battery charger, dc distribution panel, and MCC circuits, as determined by their nameplate ratings. |

| Table 2.6.3-3 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 9. The IDS batteries, battery chargers, dc distribution panels, and MCCs are rated to withstand fault currents for the time required to clear the fault from its power source. | Analyses for the as-built IDS dc electrical distribution system to determine fault currents will be performed. | Analyses for the as-built IDS dc electrical distribution system exist and conclude that the fault current capacities of as-built IDS batteries, battery chargers, dc distribution panels, and MCCs, as determined by manufacturer's ratings, exceed their analyzed fault currents for the time required to clear the fault from its power source as determined by the circuit interrupting device coordination analyses. |
| 10. The IDS electrical distribution system cables are rated to withstand fault currents for the time required to clear the fault from its power source. | Analyses for the as-built IDS dc electrical distribution system to determine fault currents will be performed. | Analyses for the as-built IDS dc electrical distribution system exist and conclude that the IDS dc electrical distribution system cables will withstand the analyzed fault currents, as determined by manufacturer's ratings, for the time required to clear the fault from its power source as determined by the circuit interrupting device coordination analyses. |
| 11. Displays of the parameters identified in Table 2.6.3-2 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays identified in Table 2.6.3-2 in the MCR. | Displays identified in Table 2.6.3-2 can be retrieved in the MCR. |

| Table 2.6.3-4 | | |
|---|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Division A 250 Vdc 24-Hour Battery Bank | IDSA-DB-1 | Auxiliary Building |
| Division B 250 Vdc 24-Hour Battery Bank 1 | IDSB-DB-1 | Auxiliary Building |
| Division B 250 Vdc 72-Hour Battery Bank 2 | IDSB-DB-2 | Auxiliary Building |
| Division C 250 Vdc 24-Hour Battery Bank 1 | IDSC-DB-1 | Auxiliary Building |
| Division C 250 Vdc 72-Hour Battery Bank 2 | IDSC-DB-2 | Auxiliary Building |
| Division D 250 Vdc 24-Hour Battery Bank | IDSD-DB-1 | Auxiliary Building |
| Spare 250 Vdc Battery Bank | IDSS-DB-1 | Auxiliary Building |
| Division A 24-Hour Battery Charger 1 | IDSA-DC-1 | Auxiliary Building |
| Division B 24-Hour Battery Charger 1 | IDSB-DC-1 | Auxiliary Building |
| Division B 72-Hour Battery Charger 2 | IDSB-DC-2 | Auxiliary Building |
| Division C 24-Hour Battery Charger 1 | IDSC-DC-1 | Auxiliary Building |
| Division C 72-Hour Battery Charger 2 | IDSC-DC-2 | Auxiliary Building |
| Division D 24-Hour Battery Charger 1 | IDSD-DC-1 | Auxiliary Building |
| Spare Battery Charger 1 | IDSS-DC-1 | Auxiliary Building |
| Division A 250 Vdc Distribution Panel | IDSA-DD-1 | Auxiliary Building |
| Division B 250 Vdc Distribution Panel | IDSB-DD-1 | Auxiliary Building |
| Division C 250 Vdc Distribution Panel | IDSC-DD-1 | Auxiliary Building |
| Division D 250 Vdc Distribution Panel | IDSD-DD-1 | Auxiliary Building |
| Division A 120 Vac Distribution Panel 1 | IDSA-EA-1 | Auxiliary Building |
| Division A 120 Vac Distribution Panel 2 | IDSA-EA-2 | Auxiliary Building |
| Division B 120 Vac Distribution Panel 1 | IDSB-EA-1 | Auxiliary Building |
| Division B 120 Vac Distribution Panel 2 | IDSB-EA-2 | Auxiliary Building |
| Division B 120 Vac Distribution Panel 3 | IDSB-EA-3 | Auxiliary Building |
| Division C 120 Vac Distribution Panel 1 | IDSC-EA-1 | Auxiliary Building |
| Division C 120 Vac Distribution Panel 2 | IDSC-EA-2 | Auxiliary Building |
| Division C 120 Vac Distribution Panel 3 | IDSC-EA-3 | Auxiliary Building |
| Division D 120 Vac Distribution Panel 1 | IDSD-EA-1 | Auxiliary Building |
| Division D 120 Vac Distribution Panel 2 | IDSD-EA-2 | Auxiliary Building |

| Table 2.6.3-4 (cont.) | | |
|--|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Division A Fuse Panel 4 | IDSA-EA-4 | Auxiliary Building |
| Division B Fuse Panel 4 | IDSB-EA-4 | Auxiliary Building |
| Division B Fuse Panel 5 | IDSB-EA-5 | Auxiliary Building |
| Division B Fuse Panel 6 | IDSB-EA-6 | Auxiliary Building |
| Division C Fuse Panel 4 | IDSC-EA-4 | Auxiliary Building |
| Division C Fuse Panel 5 | IDSC-EA-5 | Auxiliary Building |
| Division C Fuse Panel 6 | IDSC-EA-6 | Auxiliary Building |
| Division D Fuse Panel 4 | IDSD-EA-4 | Auxiliary Building |
| Division A Fused Transfer Switch Box 1 | IDSA-DF-1 | Auxiliary Building |
| Division B Fused Transfer Switch Box 1 | IDSB-DF-1 | Auxiliary Building |
| Division B Fused Transfer Switch Box 2 | IDSB-DF-2 | Auxiliary Building |
| Division C Fused Transfer Switch Box 1 | IDSC-DF-1 | Auxiliary Building |
| Division C Fused Transfer Switch Box 2 | IDSC-DF-2 | Auxiliary Building |
| Division D Fused Transfer Switch Box 1 | IDSD-DF-1 | Auxiliary Building |
| Spare Fused Transfer Switch Box 1 | IDSS-DF-1 | Auxiliary Building |
| Division A 250 Vdc MCC | IDSA-DK-1 | Auxiliary Building |
| Division B 250 Vdc MCC | IDSB-DK-1 | Auxiliary Building |
| Division C 250 Vdc MCC | IDSC-DK-1 | Auxiliary Building |
| Division D 250 Vdc MCC | IDSD-DK-1 | Auxiliary Building |
| Division A 250 Vdc Switchboard 1 | IDSA-DS-1 | Auxiliary Building |
| Division B 250 Vdc Switchboard 1 | IDSB-DS-1 | Auxiliary Building |
| Division B 250 Vdc Switchboard 2 | IDSB-DS-2 | Auxiliary Building |
| Division C 250 Vdc Switchboard 1 | IDSC-DS-1 | Auxiliary Building |
| Division C 250 Vdc Switchboard 2 | IDSC-DS-2 | Auxiliary Building |
| Division D 250 Vdc Switchboard 1 | IDSD-DS-1 | Auxiliary Building |
| Division A Regulating Transformer | IDSA-DT-1 | Auxiliary Building |
| Division B Regulating Transformer | IDSB-DT-1 | Auxiliary Building |
| Division C Regulating Transformer | IDSC-DT-1 | Auxiliary Building |

| Table 2.6.3-4 (cont.) | | |
|-----------------------------------|-----------|--------------------|
| Component Name | Tag No. | Component Location |
| Division D Regulating Transformer | IDSD-DT-1 | Auxiliary Building |
| Division A 24-Hour Inverter 1 | IDSA-DU-1 | Auxiliary Building |
| Division B 24-Hour Inverter 1 | IDSB-DU-1 | Auxiliary Building |
| Division B 72-Hour Inverter 2 | IDSB-DU-2 | Auxiliary Building |
| Division C 24-Hour Inverter 1 | IDSC-DU-1 | Auxiliary Building |
| Division C 72-Hour Inverter 2 | IDSC-DU-2 | Auxiliary Building |
| Division D 24-Hour Inverter 1 | IDSD-DU-1 | Auxiliary Building |
| Spare Termination Box 2 | IDSS-DF-2 | Auxiliary Building |
| Spare Termination Box 3 | IDSS-DF-3 | Auxiliary Building |
| Spare Termination Box 4 | IDSS-DF-4 | Auxiliary Building |
| Spare Termination Box 5 | IDSS-DF-5 | Auxiliary Building |

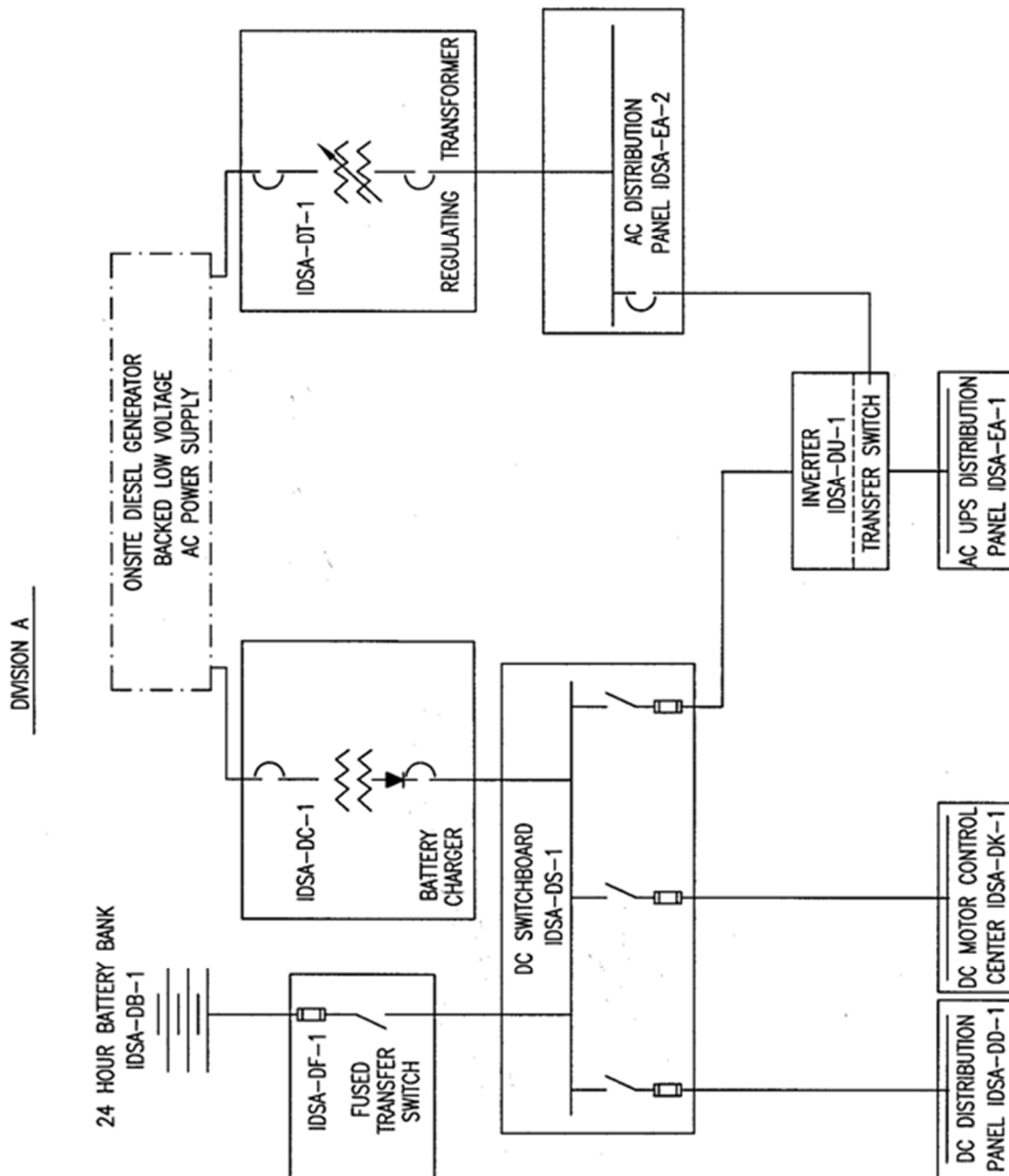


Figure 2.6.3-1 (Sheet 1 of 4)
Class 1E dc and Uninterruptible Power Supply System (Division A)

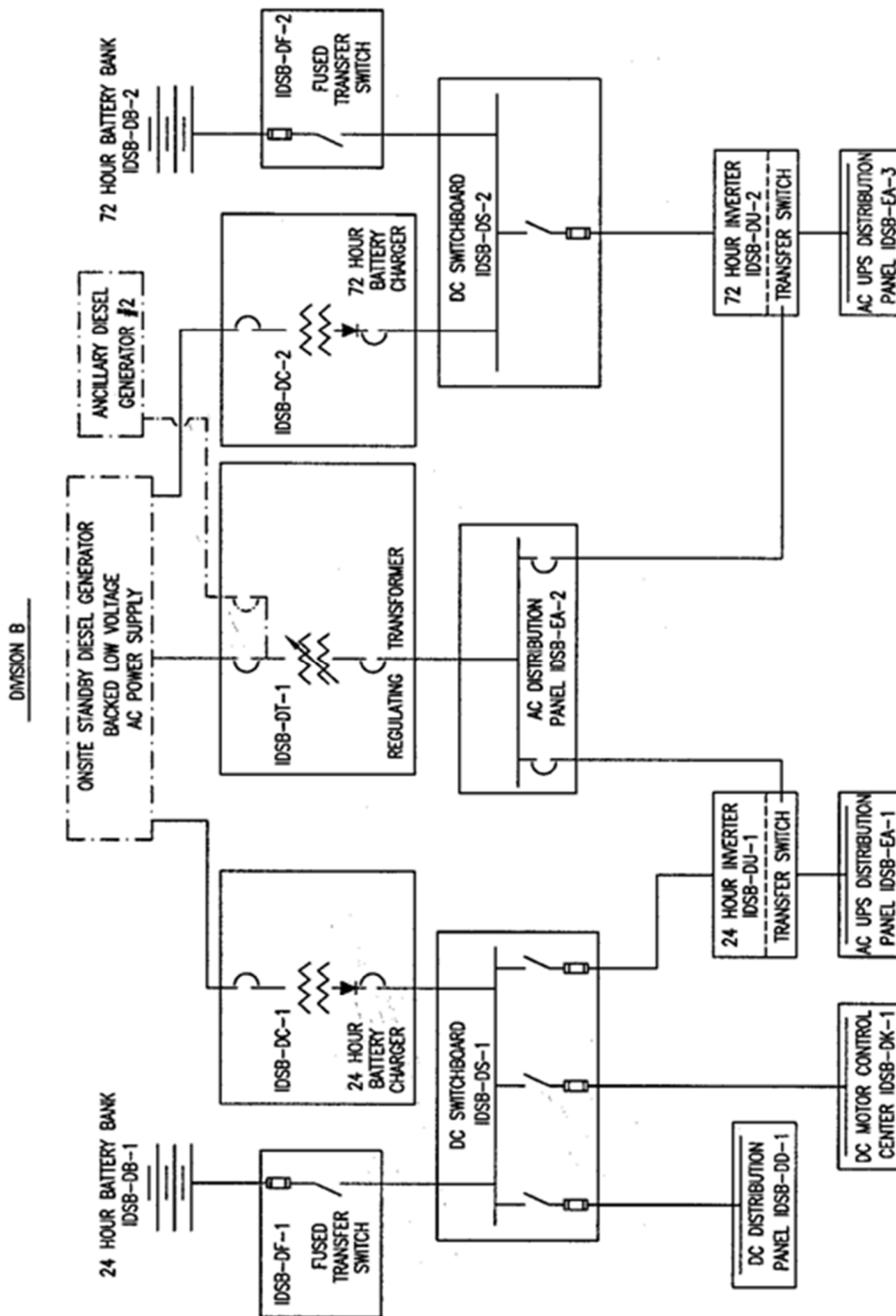


Figure 2.6.3-1 (Sheet 2 of 4)
Class 1E dc and Uninterruptible Power Supply System (Division B)

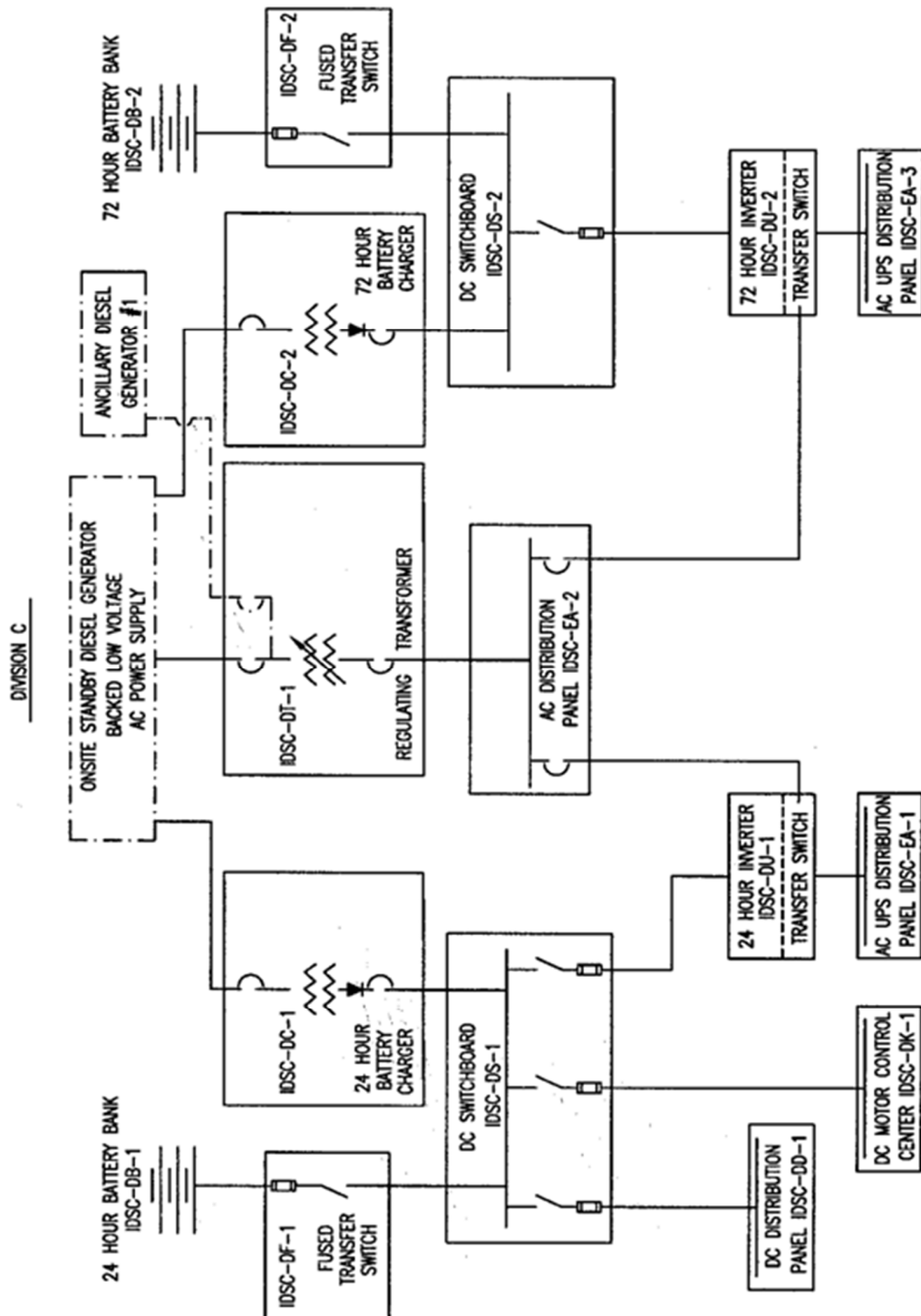


Figure 2.6.3-1 (Sheet 3 of 4)
Class 1E dc and Uninterruptible Power Supply System (Division C)

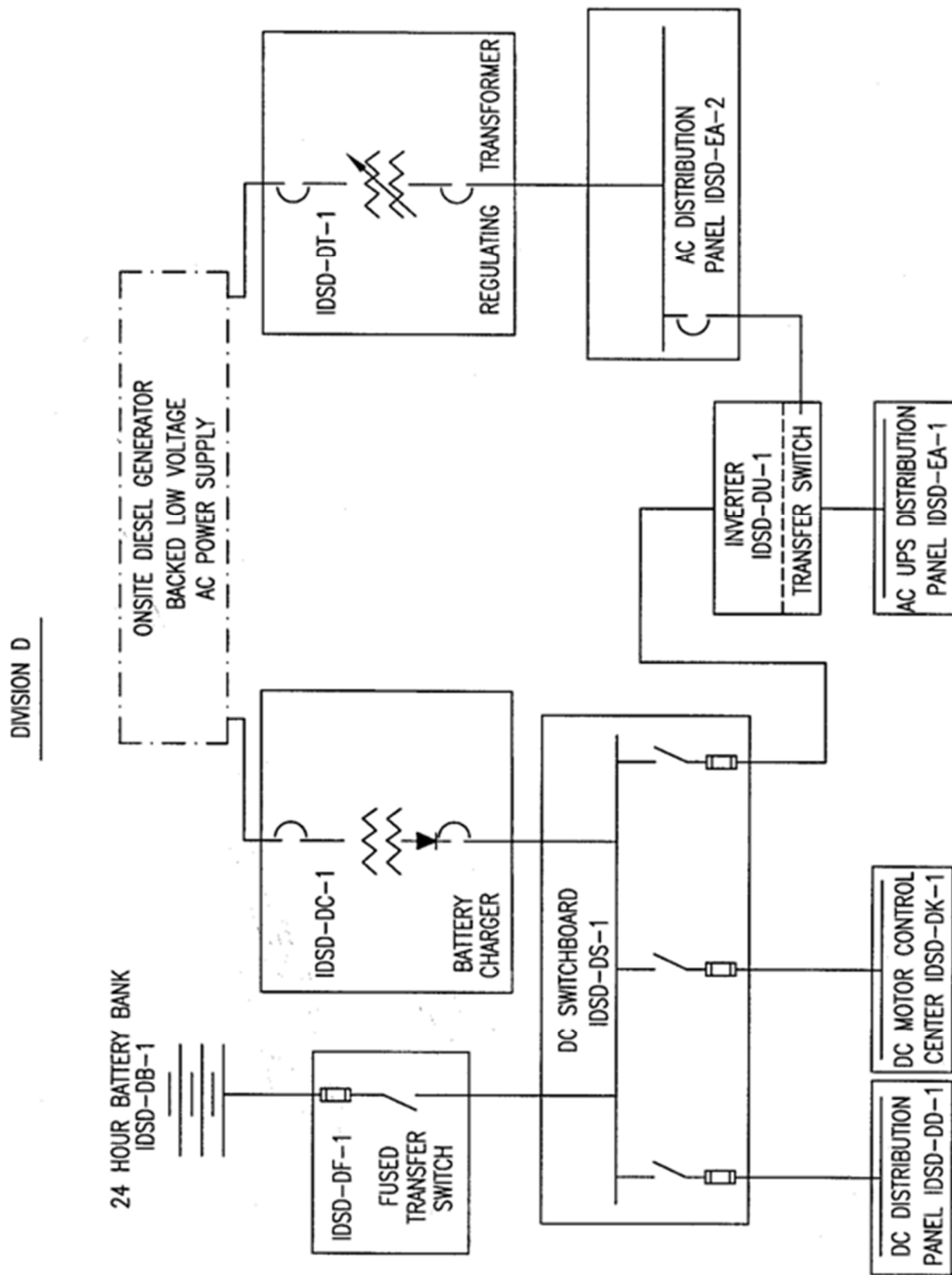


Figure 2.6.3-1 (Sheet 4 of 4)
Class 1E dc and Uninterruptible Power Supply System (Division D)

2.6.4 Onsite Standby Power System**Design Description**

The onsite standby power system (ZOS) provides backup ac electrical power for nonsafety-related loads during normal and off-normal conditions.

The ZOS has two standby diesel generator units and the component locations of the ZOS are as shown in Table 2.6.4-2. The centerline of the diesel engine exhaust gas discharge is located more than twenty (20) feet higher than that of the combustion air intake.

1. The functional arrangement of the ZOS is as described in the Design Description of this Section 2.6.4.
2. The ZOS provides the following nonsafety-related functions:
 - a) On loss of power to a 6900 volt diesel-backed bus, the associated diesel generator automatically starts and produces ac power at rated voltage and frequency. The source circuit breakers and bus load circuit breakers are opened, and the generator is connected to the bus.
 - b) Each diesel generator unit is sized to supply power to the selected nonsafety-related electrical components.
 - c) Automatic-sequence loads are sequentially loaded on the associated buses.
3. Displays of diesel generator status (running/not running) and electrical output power (watts) can be retrieved in the main control room (MCR).
4. Controls exist in the MCR to start and stop each diesel generator.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.4-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the ZOS.

| Table 2.6.4-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the ZOS is as described in the Design Description of this Section 2.6.4. | Inspection of the as-built system will be performed. | The as-built ZOS conforms with the functional arrangement as described in the Design Description of this Section 2.6.4. |
| 2.a) On loss of power to a 6900 volt diesel-backed bus, the associated diesel generator automatically starts and produces ac power at rated voltage and frequency. The source circuit breakers and bus load circuit breakers are opened, and the generator is connected to the bus. | Tests on the as-built ZOS system will be conducted by providing a simulated loss-of-voltage signal. The starting air supply receiver will not be replenished during the test. | Each as-built diesel generator automatically starts on receiving a simulated loss-of-voltage signal and attains a voltage of $6900 \pm 10\%$ V and frequency $60 \pm 5\%$ Hz after the start signal is initiated and opens ac power system breakers on the associated 6900 V bus. |
| 2.b) Each diesel generator unit is sized to supply power to the selected nonsafety-related electrical components. | Each diesel generator will be operated with a load of 4000 kW or greater and a power factor between 0.9 and 1.0 for a time period required to reach engine temperature equilibrium plus 2.5 hours. | Each diesel generator provides power to the load with a generator terminal voltage of $6900 \pm 10\%$ V and a frequency of $60 \pm 5\%$ Hz. |
| 2.c) Automatic-sequence loads are sequentially loaded on the associated buses. | An actual or simulated signal is initiated to start the load sequencer operation. Output signals will be monitored to determine the operability of the load sequencer. Time measurements are taken to determine the load stepping intervals. | The load sequencer initiates a closure signal within ± 5 seconds of the set intervals to connect the loads. |
| 3. Displays of diesel generator status (running/not running) and electrical output power (watts) can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays in the MCR. | Displays of diesel generator status and electrical output power can be retrieved in the MCR. |
| 4. Controls exist in the MCR to start and stop each diesel generator. | A test will be performed to verify that controls in the MCR can start and stop each diesel generator. | Controls in the MCR operate to start and stop each diesel generator. |

| Table 2.6.4-2 | | |
|-----------------------------------|------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Onsite Diesel Generator A Package | ZOS-MS-05A | Diesel Generator Building |
| Onsite Diesel Generator B Package | ZOS-MS-05B | Diesel Generator Building |

2.6.5 Lighting System**Design Description**

The lighting system (ELS) provides the normal and emergency lighting in the main control room (MCR) and at the remote shutdown workstation (RSW).

1. The functional arrangement of the ELS is as described in the Design Description of this Section 2.6.5.
2. The ELS has six groups of emergency lighting fixtures located in the MCR and at the RSW. Each group is powered by one of the Class 1E inverters. The ELS has four groups of panel lighting fixtures located on or near safety panels in the MCR. Each group is powered by one of the Class 1E inverters in Divisions B and C (one 24-hour and one 72-hour inverter in each Division).
3. The lighting fixtures located in the MCR utilize seismic supports.
4. The panel lighting circuits are classified as associated and treated as Class 1E. These lighting circuits are routed with the Divisions B and C Class 1E circuits. Separation is provided between ELS associated divisions and between associated divisions and non-Class 1E cable.
5. The normal lighting can provide 50 foot candles at the safety panel and at the workstations in the MCR and at the RSW.
6. The emergency lighting can provide 10 foot candles at the safety panel and at the workstations in the MCR and at the RSW.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.5-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the ELS.

| Table 2.6.5-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the ELS is as described in the Design Description of this Section 2.6.5. | Inspection of the as-built system will be performed. | The as-built ELS conforms with the functional arrangement as described in the Design Description of this Section 2.6.5. |
| 2. The ELS has six groups of emergency lighting fixtures located in the MCR and at the RSW. Each group is powered by one of the Class 1E inverters. The ELS has four groups of panel lighting fixtures located on or near safety panels in the MCR. Each group is powered by one of the Class 1E inverters in Divisions B and C (one 24-hour and one 72-hour inverter in each Division). | i) Inspection of the as-built system will be performed. ii) Testing of the as-built system will be performed using one Class 1E inverter at a time. | i) The as-built ELS has six groups of emergency lighting fixtures located in the MCR and at the RSW. The ELS has four groups of panel lighting fixtures located on or near safety panels in the MCR. ii) Each of the six as-built emergency lighting groups is supplied power from its respective Class 1E inverter and each of the four as-built panel lighting groups is supplied power from its respective Class 1E inverter. |
| 3. The lighting fixtures located in the MCR utilize seismic supports. | i) Inspection will be performed to verify that the lighting fixtures located in the MCR are located on the Nuclear Island. ii) Analysis of seismic supports will be performed. | i) The lighting fixtures located in the MCR are located on the Nuclear Island. ii) A report exists and concludes that the seismic supports can withstand seismic design basis loads. |
| 4. The panel lighting circuits are classified as associated and treated as Class 1E. These lighting circuits are routed with the Divisions B and C Class 1E circuits. Separation is provided between ELS associated divisions and between associated divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |

| Table 2.6.5-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5. The normal lighting can provide 50 foot candles at the safety panel and at the workstations in the MCR and at the RSW. | i) Testing of the as-built normal lighting in the MCR will be performed. ii) Testing of the as-built normal lighting at the RSW will be performed. | i) When adjusted for maximum illumination and powered by the main ac power system, the normal lighting in the MCR provides at least 50 foot candles at the safety panel and at the workstations. ii) When adjusted for maximum illumination and powered by the main ac power system, the normal lighting in the RSW provides at least 50 foot candles at the safety panel and at the workstations. |
| 6. The emergency lighting can provide 10 foot candles at the safety panel and at the workstations in the MCR and at the RSW. | i) Testing of the as-built emergency lighting in the MCR will be performed. ii) Testing of the as-built emergency lighting at the RSW will be performed. | i) When adjusted for maximum illumination and powered by the six Class 1E inverters, the emergency lighting in the MCR provides at least 10 foot candles at the safety panel and at the workstations. ii) When adjusted for maximum illumination and powered by the six Class 1E inverters, the emergency lighting provides at least 10 foot candles at the RSW. |

2.6.6 Grounding and Lightning Protection System**Design Description**

The grounding and lightning protection system (EGS) provides electrical grounding for instrumentation grounding, equipment grounding, and lightning protection during normal and off-normal conditions.

1. The EGS provides an electrical grounding system for: (1) instrument/computer grounding; (2) electrical system grounding of the neutral points of the main generator, main step-up transformers, auxiliary transformers, load center transformers, and onsite standby diesel generators; and (3) equipment grounding of equipment enclosures, metal structures, metallic tanks, ground bus of switchgear assemblies, load centers, motor control centers, and control cabinets. Lightning protection is provided for exposed structures and buildings housing safety-related and fire protection equipment. Each grounding system and lightning protection system is grounded to the station grounding grid.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.6-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the EGS.

| Table 2.6.6-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>1. The EGS provides an electrical grounding system for:</p> <p>(1) instrument/computer grounding;</p> <p>(2) electrical system grounding of the neutral points of the main generator, main step-up transformers, auxiliary transformers, load center transformers, auxiliary and onsite standby diesel generators; and</p> <p>(3) equipment grounding of equipment enclosures, metal structures, metallic tanks, ground bus of switchgear assemblies, load centers, motor control centers, and control cabinets. Lightning protection is provided for exposed structures and buildings housing safety-related and fire protection equipment. Each grounding system and lightning protection system is grounded to the station grounding grid.</p> | <p>i) An inspection for the instrument/computer grounding system connection to the station grounding grid will be performed.</p> <p>ii) An inspection for the electrical system grounding connection to the station grounding grid will be performed.</p> <p>iii) An inspection for the equipment grounding system connection to the station grounding grid will be performed.</p> <p>iv) An inspection for the lightning protection system connection to the station grounding grid will be performed.</p> | <p>i) A connection exists between the instrument/computer grounding system and the station grounding grid.</p> <p>ii) A connection exists between the electrical system grounding and the station grounding grid.</p> <p>iii) A connection exists between the equipment grounding system and the station grounding grid.</p> <p>iv) A connection exists between the lightning protection system and the station grounding grid.</p> |

2.6.7 Special Process Heat Tracing System

No entry for this system.

2.6.8 Cathodic Protection System

No entry.

2.6.9 Plant Security System**Design Description**

The physical security system provides physical features to detect, delay, assist response to, and defend against the design basis threat (DBT) for radiological sabotage. The physical security system consists of physical barriers and an intrusion detection system. The details of the physical security system are categorized as Safeguards Information. The physical security system provides protection for vital equipment and plant personnel.

1. The external walls, doors, ceiling, and floors in the main control room, the central alarm station, and the secondary alarm station are bullet-resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4.
2. Not used.
3. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within a vital area.
4. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area.
5.
 - a) Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability can provide assessment of activities before and after each alarm annunciation within the perimeter barrier.
 - b) The central and secondary alarm stations are located inside the protected area, and the interior of each alarm station is not visible from the perimeter of the protected area.
 - c) The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, the design enables the survivability of equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel.
6. The vehicle barrier system is installed and located at the necessary stand-off distance to protect against the DBT vehicle bombs.
7.
 - a) Vital equipment is located only within a vital area.
 - b) Access to vital equipment requires passage through the vital area barrier.
8. Isolation zones and exterior areas within the protected area are provided with illumination to permit observation of abnormal presence or activity of persons or vehicles.
9. Emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress.
10. Not used.

- 11. Not used.
- 12. Not used.
- 13.
 - a) The central and secondary alarm stations have conventional (landline) telephone service with the main control room and local law enforcement authorities.
 - b) The central and secondary alarm stations are capable of continuous communications with security personnel.
 - c) Non-portable communication equipment in the central and secondary alarm stations remains operable from an independent power source in the event of loss of normal power.
- 14. Not used.
- 15.
 - a) Security alarm devices including transmission lines to annunciators are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power). Alarm annunciation shall indicate the type of alarm (e.g., intrusion alarms and emergency exit alarm) and location.
 - b) Intrusion detection and assessment systems concurrently provide visual displays and audible annunciation of alarms in the central and secondary alarm station.
- 16. Equipment exists to record onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.9-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the physical security system.

| Table 2.6.9-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The external walls, doors, ceiling, and floors in the main control room, the central alarm station, and the secondary alarm station are bullet-resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4. | See Tier 1 Material, Table 3.3-6, item 14. | See Tier 1 Material, Table 3.3-6, item 14. |
| 2. Not used. | | |
| 3. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within the vital area. | See Tier 1 Material, Table 3.3-6, item 16. | See Tier 1 Material, Table 3.3-6, item 16. |
| 4. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area. | See Tier 1 Material, Table 3.3-6, item 17. | See Tier 1 Material, Table 3.3-6, item 17. |
| 5.a) Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability can provide assessment of activities before and after each alarm annunciation within the perimeter area barrier. | Test, inspection, or a combination of test and inspections of the installed systems will be performed. | Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability provides assessment of activities before and after alarm annunciation within the perimeter barrier. |
| 5.b) The central and secondary alarm stations are located inside the protected area, and the interior of each alarm station is not visible from the perimeter of the protected area. | Inspections of the central and secondary alarm stations will be performed. | The central and secondary alarm stations are located inside the protected area, and the interior of each alarm station is not visible from the perimeter of the protected area. |

| Table 2.6.9-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.c) The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, the design enables the survivability of equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel. | Inspections and/or analysis of the central and secondary alarm station will be performed. | The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel exists. |
| 6. The vehicle barrier system is installed and located at the necessary stand-off distance to protect against the DBT vehicle bombs. | Inspections and analysis will be performed for the vehicle barrier system . | The vehicle barrier system will protect against the DBT vehicle bombs based upon the stand-off distance of the system. |
| 7.a) Vital equipment is located only within a vital area. | Inspection will be performed to confirm that vital equipment is located within a vital area. | All vital equipment is located only within a vital area. |
| 7.b) Access to vital equipment requires passage through the vital area barrier. | Inspection will be performed to confirm that access to vital equipment requires passage through the vital area barrier. | Vital equipment is located within a protected area such that access to vital equipment requires passage through the vital area barrier. |
| 8. Isolation zones and exterior areas within the protected area are provided with illumination to permit observation of abnormal presence or activity of persons or vehicles. | Inspection of the illumination in the isolation zones and external areas of the protected area will be performed. | The illumination in isolation zones and exterior areas within the protected area is 0.2 foot candles measured horizontally at ground level or, alternatively, sufficient to permit observation. |
| 9. Emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress. | Test, inspection, or a combination of tests and inspections of the emergency exits through the vital area boundaries will be performed. | The emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress. |
| 10. Not used. | . | |
| 11. Not used. | | |
| 12. Not used. | | |

| Table 2.6.9-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 13.a) The central and secondary alarm stations have conventional (landline) telephone service with the main control room and local law enforcement authorities. | Tests, inspections, or a combination of tests and inspections of the central and secondary alarm stations' conventional telephone services will be performed. | The central and secondary alarm stations are equipped with conventional (landline) telephone service with the main control room and local law enforcement authorities. |
| 13.b) The central and secondary alarm stations are capable of continuous communication with security personnel. | Tests, inspections, or a combination of tests and inspections of the central and secondary alarm stations' continuous communication capabilities will be performed. | The central and secondary alarm stations are equipped with the capability to continuously communicate with security officers, watchmen, armed response individuals, or any security personnel that have responsibilities during a contingency event. |
| 13.c) Non-portable communication equipment in the central and secondary alarm stations remains operable from an independent power source in the event of loss of normal power. | Tests, inspections, or a combination of tests and inspections of the non-portable communications equipment will be performed. | Non-portable communication devices (including conventional telephone systems) in the central and secondary alarm stations are wired to an independent power supply that enables the system to remain operable in the event of loss of normal power. |
| 14. Not used. | | |
| 15.a) Security alarm devices, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power). Alarm annunciation shall indicate the type of alarm (e.g., intrusion alarms and emergency exit alarm) and location. | A test will be performed to verify that security alarms, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power) and that alarm annunciation indicates the type of alarm (e.g., intrusion alarms and emergency exit alarms) and location. | A report exists and concludes that security alarm devices, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when the system is on standby power) and that alarm annunciation indicates the type of alarm (e.g., intrusion alarms and emergency exit alarms) and location. |

| Table 2.6.9-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 15.b) Intrusion detection and assessment systems concurrently provide visual displays and audible annunciation of alarms in the central and secondary alarm stations. | Tests will be performed on intrusion detection and assessment equipment. | The intrusion detection system concurrently provides visual displays and audible annunciations of alarms in both the central and secondary alarm stations. |
| 16. Equipment exists to record onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time. | Test, analysis, or a combination of test and analysis will be performed to ensure that equipment is capable of recording each onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time. | A report exists and concludes that equipment is capable of recording each onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time. |

2.6.10 Main Generation System

No entry. Covered in Section 2.6.1, Main ac Power System.

2.6.11 Excitation and Voltage Regulation System

No entry for this system.

2.7 HVAC Systems

2.7.1 Nuclear Island Nonradioactive Ventilation System

Design Description

The nuclear island nonradioactive ventilation system (VBS) serves the main control room (MCR), control support area (CSA), Class 1E dc equipment rooms, Class 1E instrumentation and control (I&C) rooms, Class 1E electrical penetration rooms, Class 1E battery rooms, remote shutdown room (RSR), reactor coolant pump trip switchgear rooms, adjacent corridors, and passive containment cooling system (PCS) valve room during normal plant operation. The VBS consists of the following independent subsystems: the main control room/control support area HVAC subsystem, the class 1E electrical room HVAC subsystem, and the passive containment cooling system valve room heating and ventilation subsystem. The VBS provides heating, ventilation, and cooling to the areas served when ac power is available. The system provides breathable air to the control room and maintains the main control room and control support area areas at a slightly positive pressure with respect to the adjacent rooms and outside environment during normal operations. The VBS monitors the main control room supply air for radioactive particulate and iodine concentrations and provides filtration of main control room/control support area air during conditions of abnormal (high) airborne radioactivity. In addition, the VBS isolates the HVAC penetrations in the main control room boundary on "high-high" particulate or iodine radioactivity in the main control room supply air duct or on a loss of ac power for more than 10 minutes. The Sanitary Drainage System (SDS) also isolates a penetration in the main control room boundary on "high-high" particulate or iodine radioactivity in the main control room supply air duct or on a loss of ac power for more than 10 minutes. Additional penetrations from the SDS and Potable Water System (PWS) into the main control room boundary are maintained leak tight using a loop seal in the piping, and the Waste Water System (WWS) is isolated using a normally closed safety related manual isolation valve. These features support operation of the main control room emergency habitability system (VES), and have been included in Tables 2.7.1-1 and 2.7.1-2.

The VBS is as shown in Figure 2.7.1-1 and the component locations of the VBS are as shown in Table 2.7.1-5.

1. The functional arrangement of the VBS is as described in the Design Description of this subsection 2.7.1.
2.
 - a) The components identified in Table 2.7.1-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
 - b) The piping identified in Table 2.7.1-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.
3.
 - a) Pressure boundary welds in components identified in Table 2.7.1-1 as ASME Code Section III meet ASME Code Section III requirements.
 - b) Pressure boundary welds in piping identified in Table 2.7.1-2 as ASME Code Section III meet ASME Code Section III requirements.

4. a) The components identified in Table 2.7.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.
b) The piping identified in Table 2.7.1-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.
5. The seismic Category I equipment identified in Table 2.7.1-1 can withstand seismic design basis loads without loss of safety function.
6. a) The Class 1E components identified in Table 2.7.1-1 are powered from their respective Class 1E division.
b) Separation is provided between VBS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
7. The VBS and SDS provide the safety-related function to isolate the pipes that penetrate the MCR pressure boundary.
8. The VBS provides the following nonsafety-related functions:
 - a) The VBS provides cooling to the MCR, CSA, RSR, and Class 1E electrical rooms.
 - b) The VBS provides ventilation cooling to the Class 1E battery rooms.
 - c) The VBS maintains MCR and CSA habitability when radioactivity is detected.
 - d) The VBS provides ventilation cooling via the ancillary equipment in Table 2.7.1-3 to the MCR and the division B&C Class 1E I&C rooms.
9. Safety-related displays identified in Table 2.7.1-1 can be retrieved in the MCR.
10. a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.7.1-1 to perform their active functions.
b) The valves identified in Table 2.7.1-1 as having protection and safety monitoring system (PMS) control perform their active safety function after receiving a signal from the PMS.
11. After loss of motive power, the valves identified in Table 2.7.1-1 assume the indicated loss of motive power position.
12. Controls exist in the MCR to cause the components identified in Table 2.7.1-3 to perform the listed function.
13. Displays of the parameters identified in Table 2.7.1-3 can be retrieved in the MCR.
14. The background noise level in the MCR and RSR does not exceed 65 dB(A) when the VBS is operating.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.1-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the VBS.

| Table 2.7.1-1 | | | | | | | | | |
|---------------------------------|-------------|-----------------------|----------------|-------------------------|---------------------------------|------------------------|--------------------------------|-----------------|-------------------------------|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS ⁽¹⁾ | Active Function | Loss of Motive Power Position |
| MCR Supply Air Isolation Valve | VBS-PL-V186 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR Supply Air Isolation Valve | VBS-PL-V187 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR Return Air Isolation Valve | VBS-PL-V188 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR Return Air Isolation Valve | VBS-PL-V189 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR Exhaust Air Isolation Valve | VBS-PL-V190 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR Exhaust Air Isolation Valve | VBS-PL-V191 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| PWS MCR Isolation Valve | PWS-PL-V418 | Yes | Yes | No | -/- | No | No | Transfer Closed | - |
| PWS MCR Isolation Valve | PWS-PL-V420 | Yes | Yes | No | -/- | No | No | Transfer Closed | - |
| PWS MCR Vacuum Relief | PWS-PL-V498 | Yes | Yes | No | -/- | No | No | Transfer Open | - |
| MCR SDS (Vent) Isolation Valve | SDS-PL-V001 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |
| MCR SDS (Vent) Isolation Valve | SDS-PL-V002 | Yes | Yes | Yes | Yes/No | Yes (Valve Position) | Yes/No | Transfer Closed | As Is |

| Table 2.7.1-1 (cont.) | | | | | | | | | |
|----------------------------|-------------|--------------------------------|-------------------|-------------------------------|---|---------------------------|-----------------------------------|--------------------|--|
| Equipment Name | Tag No. | ASME Code Section III | Seismic Cat. I | Remotely Operated Valve | Class 1E/ Qual. for Harsh Envir. | Safety-Related Display | Control PMS/DAS ⁽¹⁾ | Active Function | Loss of Motive Power Position |
| MCR WWS Isolation Valve | WWS-PL-V506 | Yes | Yes | No | — | No | No | — | — |

1. DAS = diverse actuation system

| Table 2.7.1-2 | | | | |
|---------------------------------------|-------------|-----------------------|-------------------|--------------------------------|
| Line Name | Line Number | ASME Code Section III | Leak Before Break | Functional Capability Required |
| Main Control Room Supply | VBS-L311 | Yes | No | No |
| Main Control Room Exhaust | VBS-L312 | Yes | No | No |
| Main Control Room Toilet Exhaust | VBS-L313 | Yes | No | No |
| Main Control Room Sanitary Vent Line | SDS-PL-L035 | Yes | No | No |
| Main Control Room Sanitary Drain Line | SDS-PL-L030 | Yes | No | No |
| Main Control Room Water Line | PWS-PL-L319 | Yes | No | No |
| Main Control Room Water Line | PWS-PL-L320 | Yes | No | No |
| Main Control Room Waste Water Line | WWS-PL-L808 | Yes | No | No |
| Main Control Room Water Line | WWS-PL-L851 | Yes | No | No |

| Table 2.7.1-3 | | | |
|--|--------------------------|---------------------|------------------|
| Equipment | Tag No. | Display | Control Function |
| Supplemental Air Filtration Unit Fan A | VBS-MA-03A | Yes (Run Status) | Start |
| Supplemental Air Filtration Unit Fan B | VBS-MA-03B | Yes (Run Status) | Start |
| MCR/CSA Supply Air Handling Units (AHU) A Fans | VBS-MA-01A VBS-MA-02A | Yes (Run Status) | Start |
| MCR/CSA Supply AHU B Fans | VBS-MA-01B VBS-MA-02B | Yes (Run Status) | Start |
| Division "A" and "C" Class 1E Electrical Room AHU A Fans | VBS-MA-05A VBS-MA-06A | Yes (Run Status) | Start |
| Division "A" and "C" Class 1E Electrical Room AHU C Fans | VBS-MA-05C VBS-MA-06C | Yes (Run Status) | Start |
| Division "B" and "D" Class 1E Electrical Room AHU B Fans | VBS-MA-05B VBS-MA-06B | Yes (Run Status) | Start |
| Division "B" and "D" Class 1E Electrical Room AHU D Fans | VBS-MA-05D VBS-MA-06D | Yes (Run Status) | Start |
| Division "A" and "C" Class 1E Battery Room Exhaust Fans | VBS-MA-07A VBS-MA-07C | Yes (Run Status) | Start |
| Division "B" and "D" Class 1E Battery Room Exhaust Fans | VBS-MA-07B VBS-MA-07D | Yes (Run Status) | Start |
| MCR Ancillary Fans | VBS-MA-10A VBS-MA-10B | No | Run |
| Division B Room Ancillary Fan | VBS-MA-11 | No | Run |
| Division C Room Ancillary Fan | VBS-MA-12 | No | Run |

| Table 2.7.1-4 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VBS is as described in the Design Description of this subsection 2.7.1 | Inspection of the as-built system will be performed. | The as-built VBS conforms with the functional arrangement described in the Design Description of this subsection 2.7.1. |
| 2.a) The components identified in Table 2.7.1-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built components as documented in the ASME design reports. | The ASME Code Section III design reports exist for the as-built components identified in Table 2.7.1-1 as ASME Code Section III. |
| 2.b) The piping identified in Table 2.7.1-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements. | Inspection will be conducted of the as-built piping as documented in the ASME design reports. | The ASME code Section III design reports exist for the as-built piping identified in Table 2.7.1-2 as ASME Code Section III. |
| 3.a) Pressure boundary welds in components identified in Table 2.7.1-1 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for nondestructive examination of pressure boundary welds. |
| 3.b) Pressure boundary welds in piping identified in Table 2.7.1-2 as ASME Code Section III meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for nondestructive examination of pressure boundary welds. |
| 4.a) The components identified in Table 2.7.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure. | A pressure test will be performed on the components required by the ASME Code Section III to be pressure tested. | A report exists and concludes that the results of the pressure test of the components identified in Table 2.7.1-1 as ASME Code Section III conform with the requirements of the ASME Code Section III. |
| 4.b) The piping identified in Table 2.7.1-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure. | A pressure test will be performed on the piping required by the ASME Code Section III to be pressure tested. | A report exists and concludes that the results of the pressure test of the piping identified in Table 2.7.1-2 as ASME Code Section III conform with the requirements of the ASME Code Section III. |

| Table 2.7.1-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5. The seismic Category I equipment identified in Table 2.7.1-1 can withstand seismic design basis loads without loss of safety function. | i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 2.7.1-1 is located on the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. | i) The seismic Category I equipment identified in Table 2.7.1-1 is located on the Nuclear Island. ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions. |
| 6.a) The Class 1E components identified in Table 2.7.1-1 are powered from their respective Class 1E division. | Testing will be performed on the VBS by providing a simulated test signal in each Class 1E division. | A simulated test signal exists at the Class 1E equipment identified in Table 2.7.1-1 when the assigned Class 1E division is provided the test signal. |
| 6.b) Separation is provided between VBS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable. | See Tier 1 Material, Table 3.3-6, item 7.d. | See Tier 1 Material, Table 3.3-6, item 7.d. |
| 7. The VBS and SDS provide the safety-related function to isolate the pipe that penetrates the MCR pressure boundary. | See item 10.b in this table. | See item 10.b in this table. |
| 8.a) The VBS provides cooling to the MCR, CSA, RSR, and Class 1E electrical rooms. | See item 12 in this table. | See item 12 in this table. |
| 8.b) The VBS provides ventilation cooling to the Class 1E battery rooms. | See item 12 in this table. | See item 12 in this table. |

| Table 2.7.1-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 8.c) The VBS maintains MCR and CSA habitability when radioactivity is detected. | See item 12 in this table. | See item 12 in this table. |
| 8.d) The VBS provides ventilation cooling via the ancillary equipment in Table 2.7.1-3 to the MCR and the division B&C Class 1E I&C rooms. | Testing will be performed on the components in Table 2.7.1-3. | The fans start and run. |
| 9. Safety-related displays identified in Table 2.7.1-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the safety-related displays in the MCR. | Safety-related displays identified in Table 2.7.1-1 can be retrieved in the MCR. |
| 10.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.7.1-1 to perform their active functions. | Stroke testing will be performed on the remotely operated valves identified in Table 2.7.1-1 using the controls in the MCR. | Controls in the MCR operate to cause the remotely operated valves identified in Table 2.7.1-1 to perform their active functions. |
| 10.b) The valves identified in Table 2.7.1-1 as having PMS control perform their active safety function after receiving a signal from the PMS. | Testing will be performed using real or simulated signals into the PMS. | The valves identified in Table 2.7.1-1 as having PMS control perform their active safety function after receiving a signal from PMS. |
| 11. After loss of motive power, the remotely operated valves identified in Table 2.7.1-1 assume the indicated loss of motive power position. | Testing of the remotely operated valves will be performed under the conditions of loss of motive power. | Upon loss of motive power, each remotely operated valves identified in Table 2.7.1-1 assumes the indicated loss of motive power position. |
| 12. Controls exist in the MCR to cause the components identified in Table 2.7.1-3 to perform the listed function. | Testing will be performed on the components in Table 2.7.1-3 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.7.1-3 to perform the listed functions. |
| 13. Displays of the parameters identified in Table 2.7.1-3 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.1-3 can be retrieved in the MCR. |
| 14. The background noise level in the MCR and RSR does not exceed 65 dB(A) when the VBS is operating. | The as-built VBS will be operated, and background noise levels in the MCR and RSR will be measured. | The background noise level in the MCR and RSR does not exceed 65 dB(A) when the VBS is operating. |

| Table 2.7.1-5 | | |
|---|------------|-----------------------------|
| Component Name | Tag No. | Component Location |
| Supplemental Air Filtration Unit A | VBS-MS-01A | Auxiliary Building |
| Supplemental Air Filtration Unit B | VBS-MS-01B | Auxiliary Building |
| MCR/CSA Supply Air Handling Unit A | VBS-MS-02A | Auxiliary Building |
| MCR/CSA Supply Air Handling Unit B | VBS-MS-02B | Annex Building |
| Division "A" and "C" Class 1E Electrical Room AHU A | VBS-MS-03A | Auxiliary Building |
| Division "A" and "C" Class 1E Electrical Room AHU C | VBS-MS-03C | Auxiliary Building |
| Division "B" and "D" Class 1E Electrical Room AHU B | VBS-MS-03B | Auxiliary Building |
| Division "B" and "D" Class 1E Electrical Room AHU D | VBS-MS-03D | Auxiliary Building |
| MCR Toilet Exhaust Fan | VBS-MA-04 | Auxiliary Building |
| Division "A&C" Class 1E Battery Room Exhaust Fan | VBS-MA-07A | Auxiliary Building |
| Division "A&C" Class 1E Battery Room Exhaust Fan | VBS-MA-07C | Auxiliary Building |
| Division "B&D" Class 1E Battery Room Exhaust Fan | VBS-MA-07B | Auxiliary Building |
| Division "B&D" Class 1E Battery Room Exhaust Fan | VBS-MA-07D | Auxiliary Building |
| PCS Valve Room Vent Fan | VBS-MA-08 | Containment Shield Building |
| CSA Toilet Exhaust Fan | VBS-MA-09 | Annex Building |
| MCR Ancillary Fan A | VBS-MA-10A | Auxiliary Building |
| MCR Ancillary Fan B | VBS-MA-10B | Auxiliary Building |
| Division B Ancillary Fan | VBS-MA-11 | Auxiliary Building |
| Division C Ancillary Fan | VBS-MA-12 | Auxiliary Building |

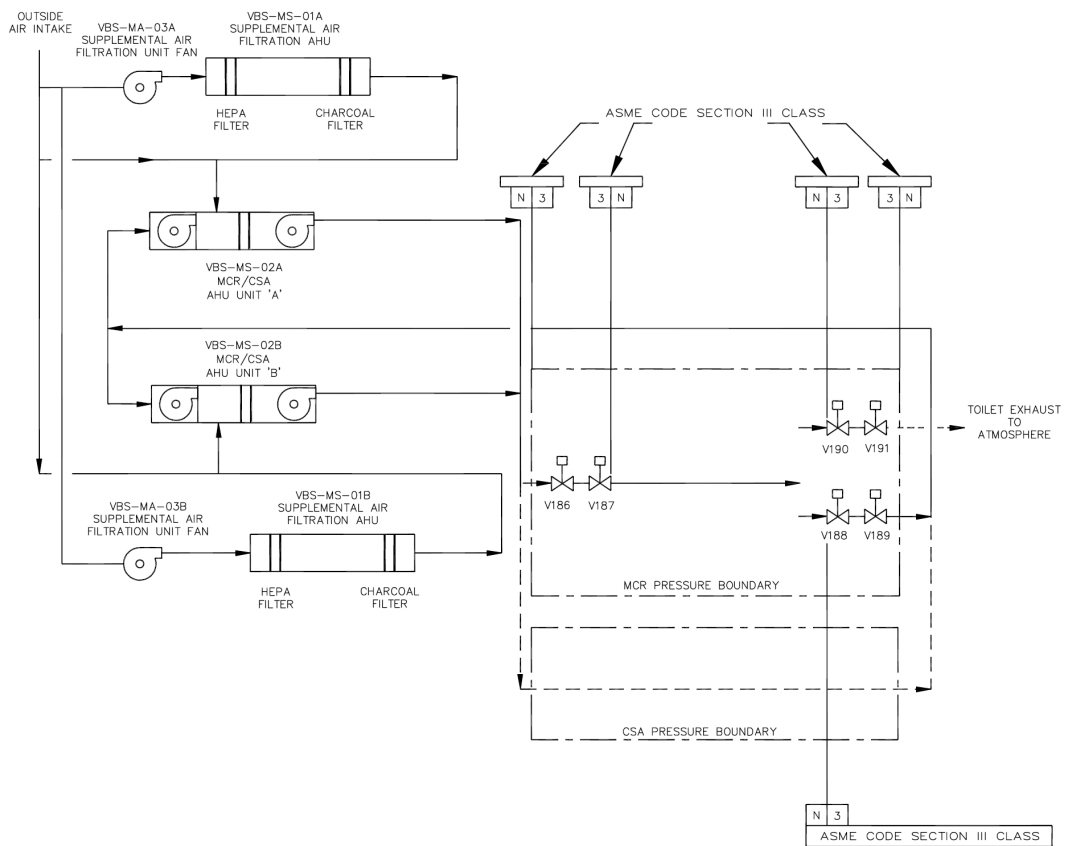


Figure 2.7.1-1 (Sheet 1 of 2)
Nuclear Island Nonradioactive Ventilation System

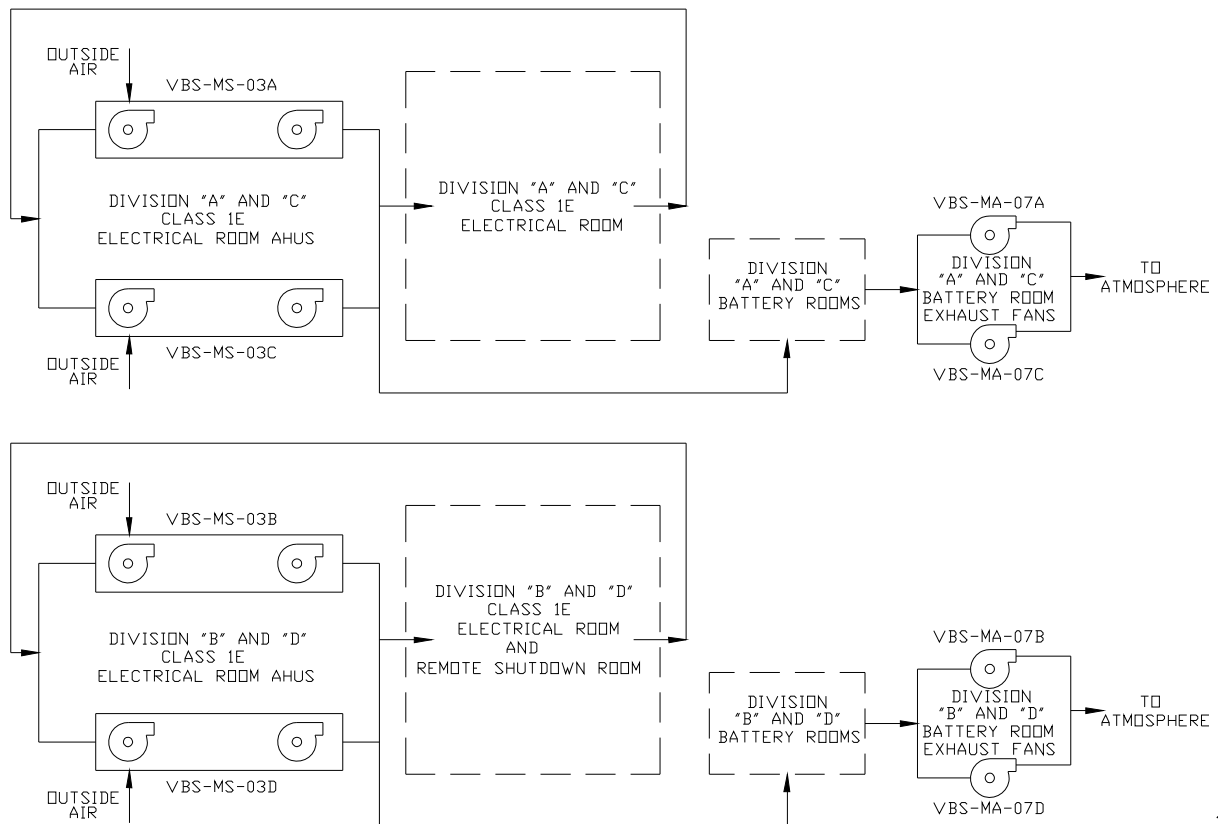


Figure 2.7.1-1 (Sheet 2 of 2)
Nuclear Island Nonradioactive Ventilation System

2.7.2 Central Chilled Water System**Design Description**

The plant heating, ventilation, and air conditioning (HVAC) systems require chilled water as a cooling medium to satisfy the ambient air temperature requirements for the plant. The central chilled water system (VWS) supplies chilled water to the HVAC systems and is functional during reactor full-power and shutdown operation. The VWS also provides chilled water to selected process systems.

The VWS is as shown in Figure 2.7.2-1 and the component locations of the VWS are as shown Table 2.7.2-3.

1. The functional arrangement of the VWS is as described in the Design Description of this Section 2.7.2.
2. The VWS provides the safety-related function of preserving containment integrity by isolation of the VWS lines penetrating the containment.
3. The VWS provides the following nonsafety-related functions:
 - a) The VWS provides chilled water to the supply air handling units serving the MCR, the Class 1E electrical rooms, and the unit coolers serving the RNS and CVS pump rooms.
 - b) The VWS air-cooled chillers transfer heat from the VWS to the surrounding atmosphere.
4. Controls exist in the MCR to cause the components identified in Table 2.7.2-1 to perform the listed function.
5. Displays of the parameters identified in Table 2.7.2-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.2-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the VWS.

| Table 2.7.2-1 | | | |
|---------------------------------|-------------|--------------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Air-cooled Chiller | VWS-MS-02 | Yes (Run Status) | Start |
| Air-cooled Chiller | VWS-MS-03 | Yes (Run Status) | Start |
| Air-cooled Chiller Pump | VWS-MP-02 | Yes (Run Status) | Start |
| Air-cooled Chiller Pump | VWS-MP-03 | Yes (Run Status) | Start |
| CVS Pump Room Unit Cooler Fan A | VAS-MA-07A | Yes (Run Status) | Start |
| CVS Pump Room Unit Cooler Fan B | VAS-MA-07B | Yes (Run Status) | Start |
| RNS Pump Room Unit Cooler Fan A | VAS-MA-08A | Yes (Run Status) | Start |
| RNS Pump Room Unit Cooler Fan B | VAS-MA-08B | Yes (Run Status) | Start |
| Air-cooled Chiller Water Valve | VWS-PL-V210 | Yes (Position Status) | Open |
| Air-cooled Chiller Water Valve | VWS-PL-V253 | Yes (Position Status) | Open |

| Table 2.7.2-2 Inspections, Tests, Analyses, and Acceptance Criteria | | | | | | | | | | | | | | | | |
|---|---|---|-------------|-------------------|---------------|-----|---------------|-----|---------------|----|---------------|----|---------------|----|---------------|----|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria | | | | | | | | | | | | | | |
| 1. The functional arrangement of the VWS is as described in the Design Description of this Section 2.7.2. | Inspection of the as-built system will be performed. | The as-built VWS conforms with the functional arrangement as described in the Design Description of this Section 2.7.2. | | | | | | | | | | | | | | |
| 2. The applicable portions of the VWS provide the safety-related function of preserving containment integrity by isolation of the VWS lines penetrating the containment. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | See Tier 1 Material, Table 2.2.1-3, items 1 and 7. | | | | | | | | | | | | | | |
| 3.a) The VWS provides chilled water to the supply air handling units serving the MCR, the Class 1E electrical rooms, and the unit coolers serving the RNS and CVS pump rooms. | Testing will be performed by measuring the flow rates to the chilled water cooling coils. | The water flow to each cooling coil equals or exceeds the following: <table><tr><td><u>Coil</u></td><td><u>Flow (gpm)</u></td></tr><tr><td>VBS MY C01A/B</td><td>138</td></tr><tr><td>VBS MY C02A/C</td><td>108</td></tr><tr><td>VBS MY C02B/D</td><td>84</td></tr><tr><td>VAS MY C07A/B</td><td>24</td></tr><tr><td>VAS MY C12A/B</td><td>15</td></tr><tr><td>VAS MY C06A/B</td><td>15</td></tr></table> | <u>Coil</u> | <u>Flow (gpm)</u> | VBS MY C01A/B | 138 | VBS MY C02A/C | 108 | VBS MY C02B/D | 84 | VAS MY C07A/B | 24 | VAS MY C12A/B | 15 | VAS MY C06A/B | 15 |
| <u>Coil</u> | <u>Flow (gpm)</u> | | | | | | | | | | | | | | | |
| VBS MY C01A/B | 138 | | | | | | | | | | | | | | | |
| VBS MY C02A/C | 108 | | | | | | | | | | | | | | | |
| VBS MY C02B/D | 84 | | | | | | | | | | | | | | | |
| VAS MY C07A/B | 24 | | | | | | | | | | | | | | | |
| VAS MY C12A/B | 15 | | | | | | | | | | | | | | | |
| VAS MY C06A/B | 15 | | | | | | | | | | | | | | | |
| 3.b) The VWS air-cooled chillers transfer heat from the VWS to the surrounding atmosphere. | Inspection will be performed for the existence of a report that determines the heat transfer capability of each air-cooled chiller. | A report exists and concludes that the heat transfer rate of each air-cooled chiller is greater than or equal to 230 tons. | | | | | | | | | | | | | | |
| 4. Controls exist in the MCR to cause the components identified in Table 2.7.2-1 to perform the listed function. | Testing will be performed on the components in Table 2.7.2-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.7.2-1 to perform the listed functions. | | | | | | | | | | | | | | |
| 5. Displays of the parameters identified in Table 2.7.2-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of parameters in the MCR. | The displays identified in Table 2.7.2-1 can be retrieved in the MCR. | | | | | | | | | | | | | | |

| Table 2.7.2-3 | | |
|---------------------------|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Water Chiller Pump A | VWS-MP-01A | Turbine Building |
| Water Chiller Pump B | VWS-MP-01B | Turbine Building |
| Air Cooled Chiller Pump 2 | VWS-MP-02 | Auxiliary Building |
| Air Cooled Chiller Pump 3 | VWS-MP-03 | Auxiliary Building |
| Water Chiller A | VWS-MS-01A | Turbine Building |
| Water Chiller B | VWS-MS-01B | Turbine Building |
| Air Cooled Chiller 2 | VWS-MS-02 | Auxiliary Building |
| Air Cooled Chiller 3 | VWS-MS-03 | Auxiliary Building |

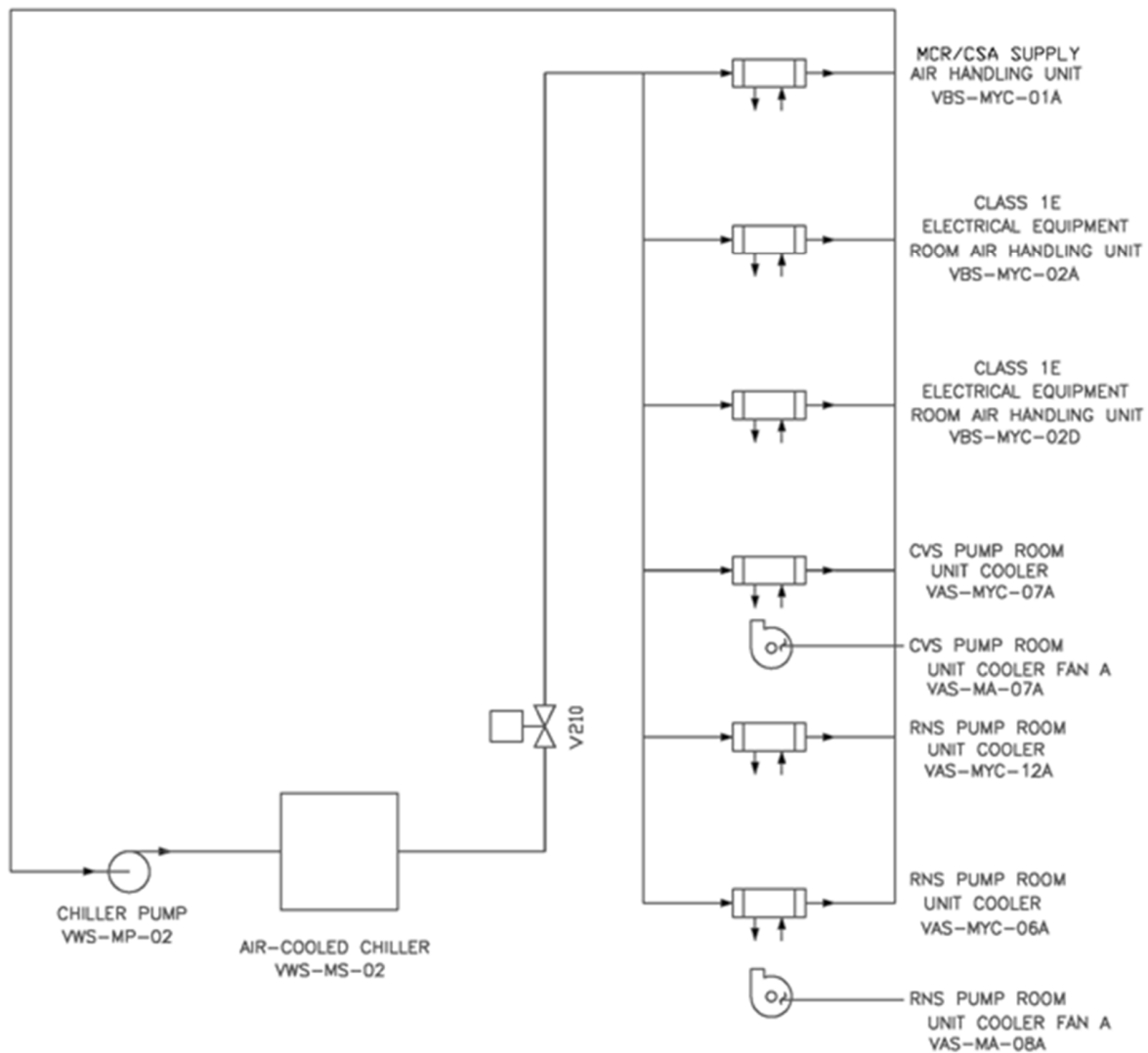


Figure 2.7.2-1 (Sheet 1 of 2)
Central Chilled Water System

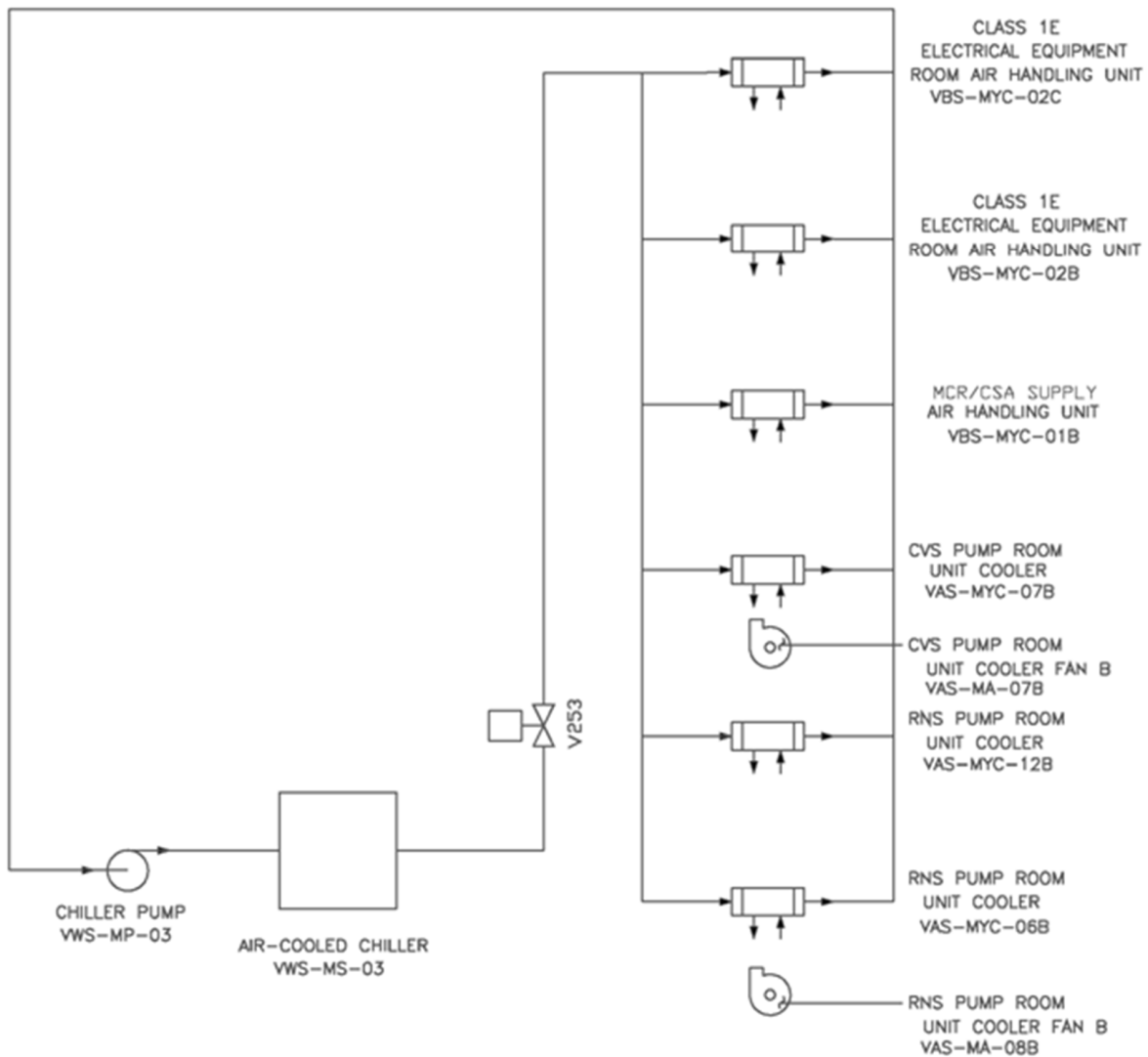


Figure 2.7.2-1 (Sheet 2 of 2)
Central Chilled Water System

2.7.3 Annex/Auxiliary Building Nonradioactive Ventilation System**Design Description**

The annex/auxiliary buildings nonradioactive HVAC system (VXS) serves the nonradioactive personnel and equipment areas, electrical equipment rooms, clean corridors, the ancillary diesel generator room and demineralized water deoxygenating room in the annex building, and the main steam isolation valve compartments, reactor trip switchgear rooms, and piping and electrical penetration areas in the auxiliary building. The VXS consists of the following independent subsystems: the general area HVAC subsystem, the switchgear room HVAC subsystem, the equipment room HVAC subsystem, the MSIV compartment HVAC subsystem, the mechanical equipment areas HVAC subsystem and the valve/piping penetration room HVAC subsystem.

The VXS is as shown in Figure 2.7.3-1 and the component locations of the VXS are as shown in Table 2.7.3-3.

1. The functional arrangement of the VXS is as described in the Design Description of this Section 2.7.3.
2. The VXS provides the following nonsafety-related functions:
 - a) The VXS provides cooling to the electrical switchgear, the battery charger, and the annex building nonradioactive air handling equipment rooms.
 - b) The VXS provides ventilation cooling to the electrical switchgear, the battery charger, and the annex building nonradioactive air handling equipment rooms when the ZOS operates during a loss of offsite power coincident with loss of chilled water.
3. Controls exist in the main control room (MCR) to cause the components identified in Table 2.7.3-1 to perform the listed function.
4. Displays of the parameters identified in Table 2.7.3-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the VXS.

| Table 2.7.3-1 | | | |
|---|--------------------------|------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Switchgear Room Air Handling Units (AHU) A Fans | VXS-MA-05A VXS-MA-06A | Yes (Run Status) | Start |
| Switchgear Room AHU B Fans | VXS-MA-05B VXS-MA-06B | Yes (Run Status) | Start |
| Equipment Room AHU A Fans | VXS-MA-01A VXS-MA-02A | Yes (Run Status) | Start |
| Equipment Room AHU B Fans | VXS-MA-01B VXS-MA-02B | Yes (Run Status) | Start |

| Table 2.7.3-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VXS is as described in the Design Description of this Section 2.7.3. | Inspection of the as-built system will be performed. | The as-built VXS conforms with the functional arrangement described in the Design Description of this Section 2.7.3. |
| 2.a) The VXS provides cooling to the electrical switchgear, the battery charger, and the annex building nonradioactive air handling equipment rooms when the ZOS operates and chilled water is available. | See item 3 in this table. | See item 3 in this table. |
| 2.b) The VXS provides ventilation cooling to the electrical switchgear, the battery charger, and the annex building nonradioactive air handling equipment rooms when the ZOS operates during a loss of offsite power coincident with loss of chilled water. | See item 3 in this table. | See item 3 in this table. |
| 3. Controls exist in the MCR to cause the components identified in Table 2.7.3-1 to perform the listed function. | Testing will be performed on the components in Table 2.7.3-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.7.3-1 to perform the listed functions. |
| 4. Displays of the parameters identified in Table 2.7.3-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.3-1 can be retrieved in the MCR. |

| Table 2.7.3-3 | | |
|---|-------------|--------------------|
| Component Name | Tag No. | Component Location |
| Annex Building General Area AHU A | VXS-MS-01A | Annex Building |
| Annex Building General Area AHU B | VXS-MS-01B | Annex Building |
| Annex Building Equipment Room AHU A | VXS-MS-02A | Annex Building |
| Annex Building Equipment Room AHU B | VXS-MS-02B | Annex Building |
| MSIV Compartment A AHU-A | VXS-MS-04A | Auxiliary Building |
| MSIV Compartment B AHU-B | VXS-MS-04B | Auxiliary Building |
| MSIV Compartment B AHU-C | VXS-MS-04C | Auxiliary Building |
| MSIV Compartment A AHU-D | VXS-MS-04D | Auxiliary Building |
| Switchgear Room AHU A | VXS-MS-05A | Annex Building |
| Switchgear Room AHU B | VXS-MS-05B | Annex Building |
| Mechanical Equipment Area AHU Unit A | VXS-MS-07A | Annex Building |
| Mechanical Equipment Area AHU Unit B | VXS-MS-07B | Annex Building |
| Valve/Piping Penetration Room AHU A | VXS-MS-08A | Auxiliary Building |
| Valve/Piping Penetration Room AHU B | VXS-MS-08B | Auxiliary Building |
| Battery Room #1 Exhaust Fan | VXS-MA-09A | Annex Building |
| Battery Room #2 Exhaust Fan | VXS-MA-09B | Annex Building |
| Toilet Exhaust Fan | VXS-MA-13 | Annex Building |
| Annex Building Nonradioactive Air Handling Equipment Room Unit Heater A | VXS-MY-W01A | Annex Building |
| Annex Building Nonradioactive Air Handling Equipment Room Unit Heater B | VXS-MY-W01B | Annex Building |
| Annex Building Nonradioactive Air Handling Equipment Room Unit Heater C | VXS-MY-W01C | Annex Building |

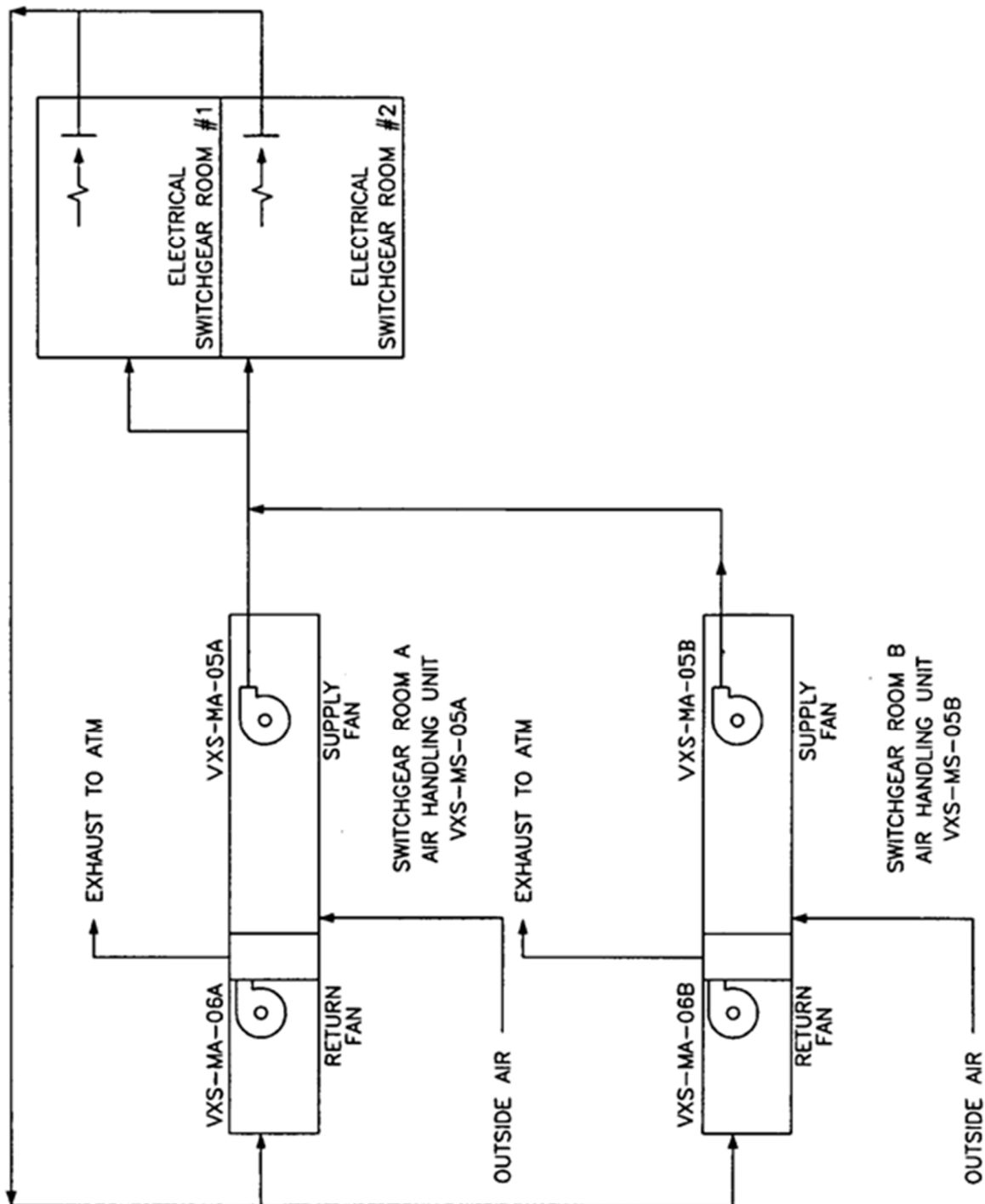


Figure 2.7.3-1 (Sheet 1 of 2)
Annex/Auxiliary Building Nonradioactive Ventilation System

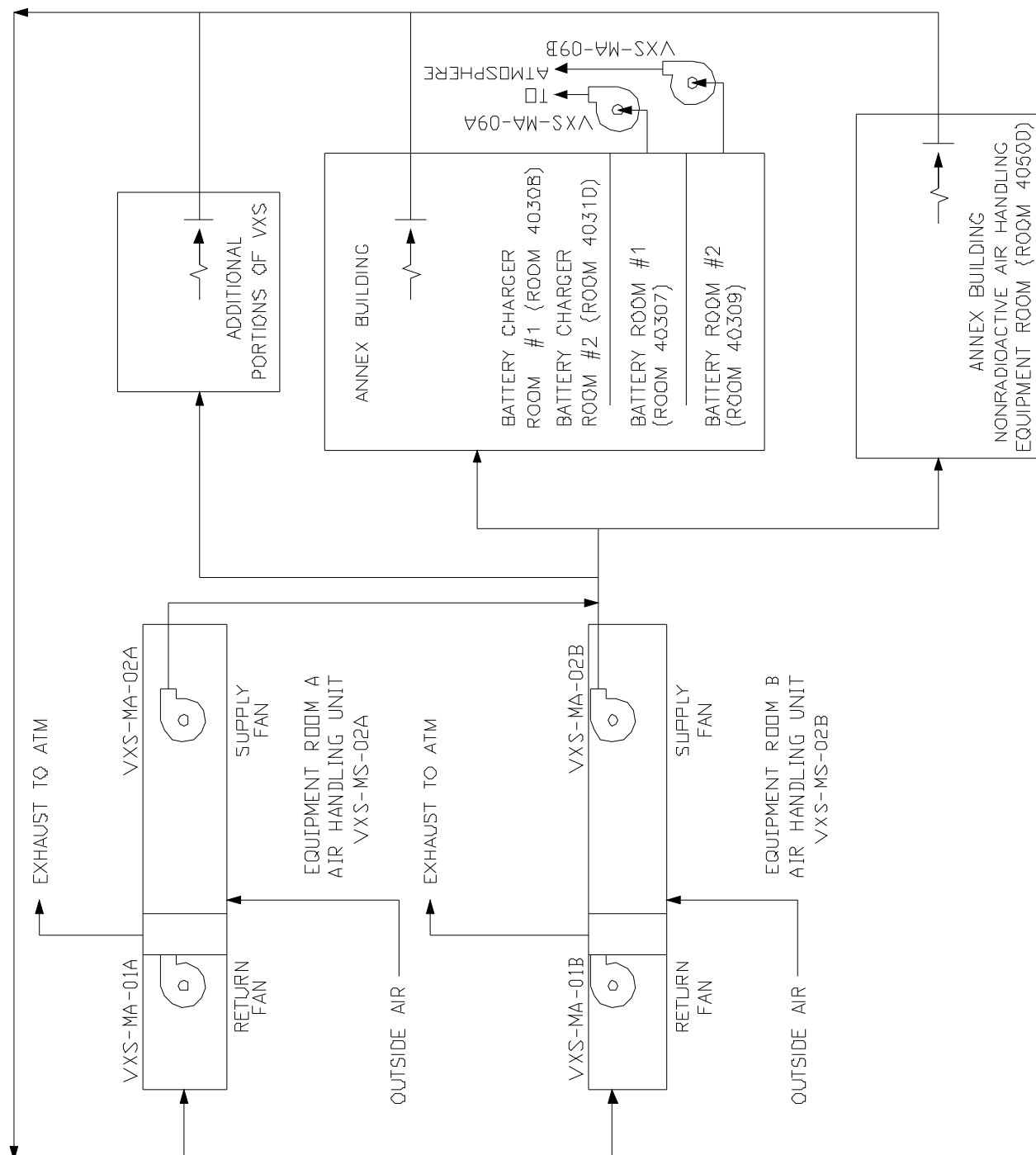


Figure 2.7.3-1 (Sheet 2 of 2)
Annex/Auxiliary Building Nonradioactive Ventilation System

2.7.4 Diesel Generator Building Ventilation System**Design Description**

The diesel generator building ventilation system (VZS) provides ventilation cooling of the diesel generator building for the onsite standby power system. The VZS also provides heating and ventilation within the diesel oil transfer module enclosure. The VZS consists of the following subsystems: the normal diesel building heating and ventilation subsystem, the standby diesel building exhaust ventilation subsystem, the fuel oil day tank vault exhaust subsystem and the diesel oil transfer module enclosures ventilation and heating subsystem.

The VZS is as shown in Figure 2.7.4-1 and the component locations of the VZS are as shown in Table 2.7.4-3.

1. The functional arrangement of the VZS is as described in the Design Description of this Section 2.7.4.
2. The VZS provides the following nonsafety-related functions:
 - a) The VZS provides ventilation cooling to the diesel generator rooms when the diesel generators are operating.
 - b) The VZS provides ventilation cooling to the electrical equipment service modules when the diesel generators are operating.
 - c) The VZS provides normal heating and ventilation to the diesel oil transfer module enclosure.
3. Controls exist in the main control room (MCR) to cause the components identified in Table 2.7.4-1 to perform the listed functions.
4. Displays of the parameters identified in Table 2.7.4-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.4-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the VZS.

| Table 2.7.4-1 | | | |
|---|----------------------------|---------------------|------------------|
| Equipment Name | Tag No. | Display | Control Function |
| Diesel Generator Room A Standby Exhaust Fans | VZS-MY-V01A VZS-MY-V02A | Yes (Run Status) | Start |
| Diesel Generator Room B Standby Exhaust Fans | VZS-MY-V01B VZS-MY-V02B | Yes (Run Status) | Start |
| Service Module A Air Handling Units (AHU) Supply Fan | VZS-MA-01A | Yes (Run Status) | Start |
| Service Module B AHU Supply Fan | VZS-MA-01B | Yes (Run Status) | Start |
| Diesel Oil Transfer Module Enclosure A Exhaust Fan | VZS-MY-V03A | Yes (Run Status) | Start |
| Diesel Oil Transfer Module Enclosure A Electric Unit Heater | VZS-MY-U03A | Yes (Run Status) | Energize |
| Diesel Oil Transfer Module Enclosure B Exhaust Fan | VZS-MY-V03B | Yes (Run Status) | Start |
| Diesel Oil Transfer Module Enclosure B Electric Unit Heater | VZS-MY-U03B | Yes (Run Status) | Energize |

| Table 2.7.4-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VZS is as described in the Design Description of this Section 2.7.4. | Inspection of the as-built system will be performed. | The as-built VZS conforms with the functional arrangement described in the Design Description of this Section 2.7.4. |
| 2.a) The VZS provides ventilation cooling to the diesel generator rooms when the diesel generators are operating. | See item 3 in this table. | See item 3 in this table. |
| 2.b) The VZS provides ventilation cooling to the electrical equipment service modules when the diesel generators are operating. | See item 3 in this table. | See item 3 in this table. |
| 2.c) The VZS provides normal heating and ventilation to the diesel oil transfer module enclosure. | See item 3 in this table. | See item 3 in this table. |
| 3. Controls exist in the MCR to cause the components identified in Table 2.7.4-1 to perform the listed function. | Testing will be performed on the components in Table 2.7.4-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.7.4-1 to perform the listed functions. |
| 4. Displays of the parameters identified in Table 2.7.4-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.4-1 can be retrieved in the MCR. |

| Table 2.7.4-3 | | |
|--|-------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Service Module AHU A | VZS-MS-01A | Diesel-Generator Building |
| Service Module AHU B | VZS-MS-01B | Diesel-Generator Building |
| Diesel Oil Transfer Module Enclosure A Unit Heater | VZS-MY-U03A | Yard |
| Diesel Oil Transfer Module Enclosure B Unit Heater | VZS-MY-U03B | Yard |
| D/G Building Standby Exhaust Fan 1A | VZS-MY-V01A | Diesel-Generator Building |
| D/G Building Standby Exhaust Fan 1B | VZS-MY-V01B | Diesel-Generator Building |
| D/G Building Standby Exhaust Fan 2A | VZS-MY-V02A | Diesel-Generator Building |
| D/G Building Standby Exhaust Fan 2B | VZS-MY-V02B | Diesel-Generator Building |
| Diesel Oil Transfer Module Enclosure A Exhaust Fan | VZS-MY-V03A | Yard |
| Diesel Oil Transfer Module Enclosure B Exhaust Fan | VZS-MY-V03B | Yard |
| Fuel Oil Day Tank Vault Exhaust Fan | VZS-MA-02A | Diesel-Generator Building |
| Fuel Oil Day Tank Vault Exhaust Fan | VZS-MA-02B | Diesel-Generator Building |

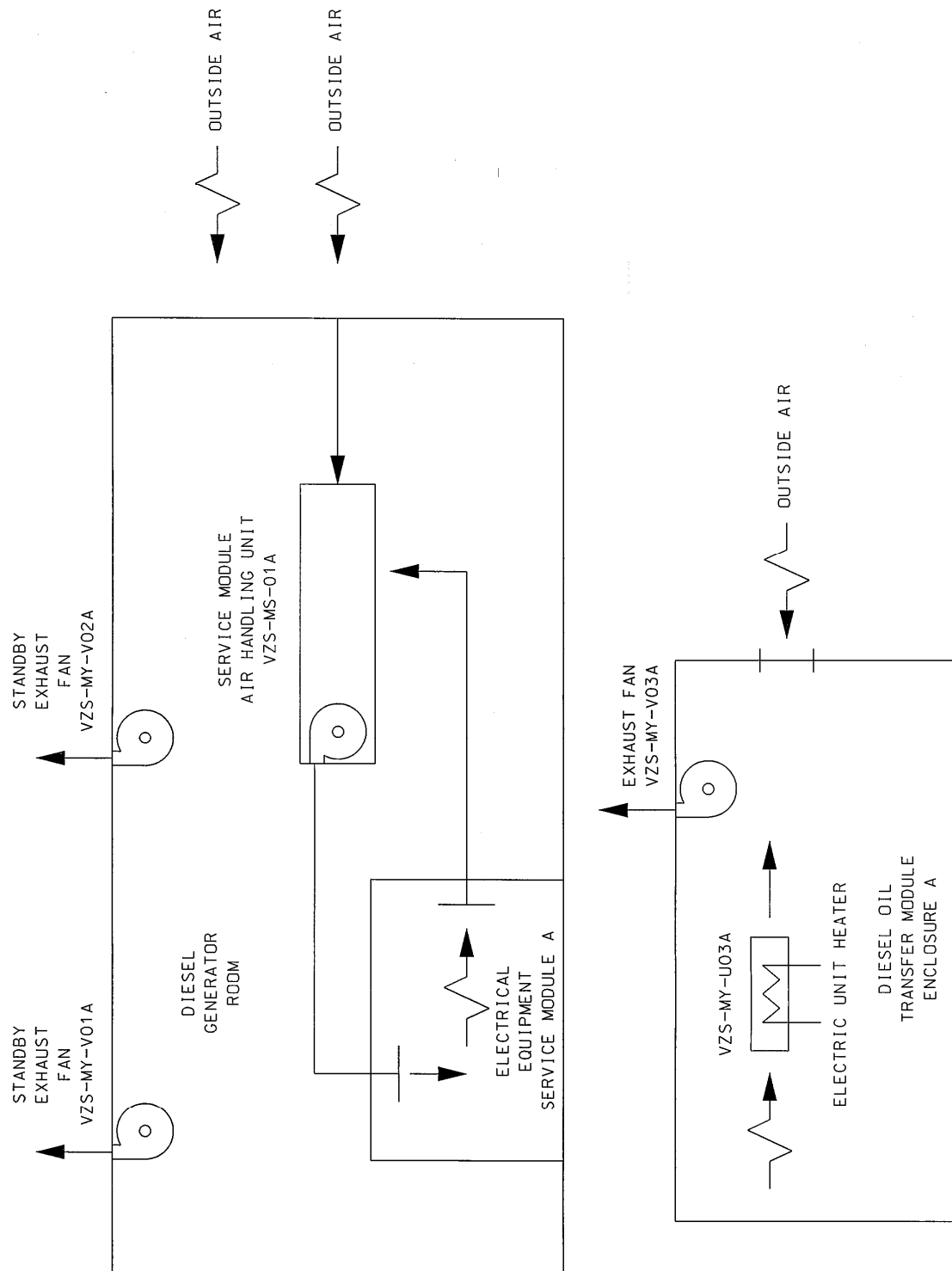


Figure 2.7.4-1 (Sheet 1 of 2)
Diesel Generator Building Ventilation System

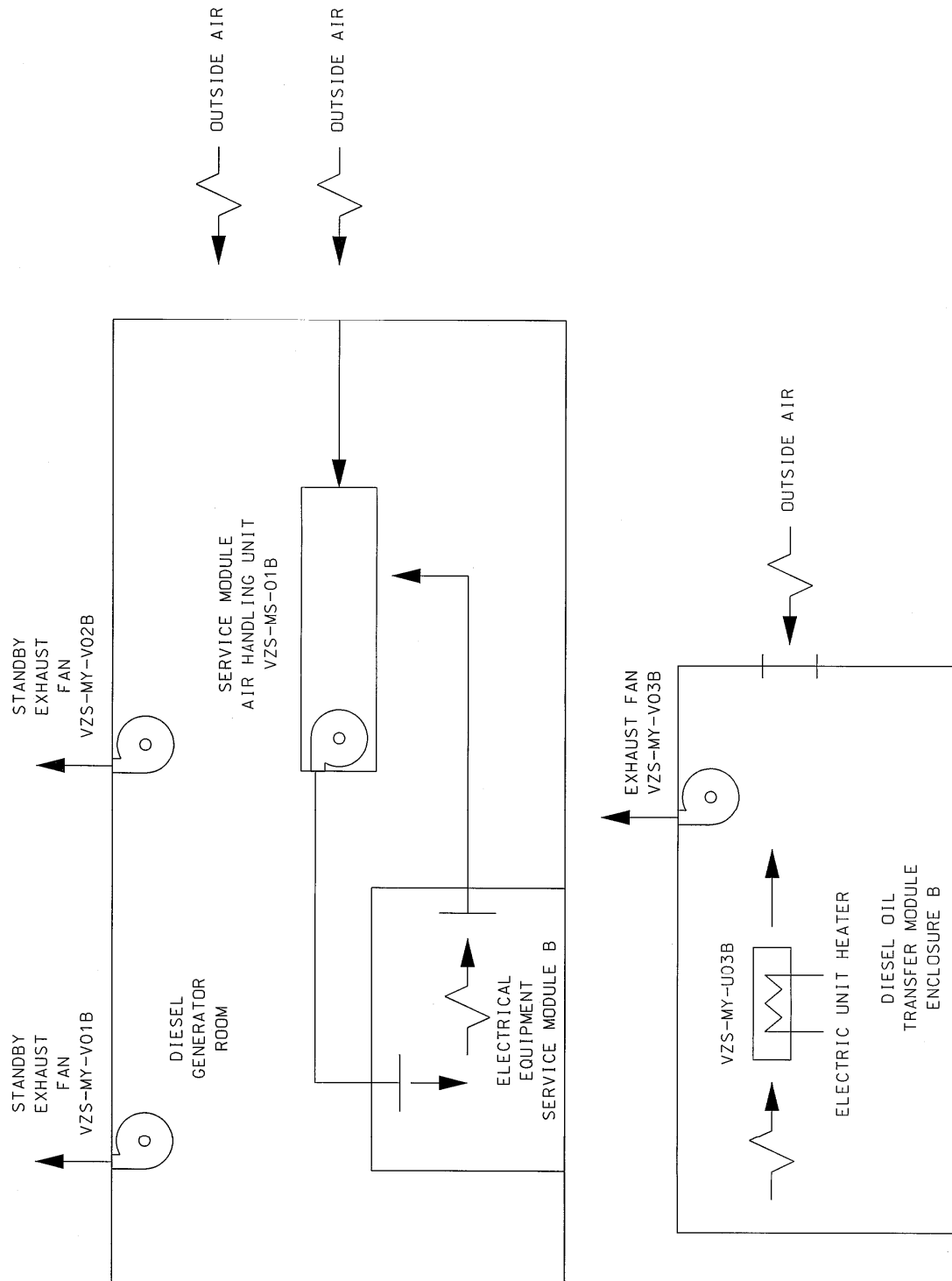


Figure 2.7.4-1 (Sheet 2 of 2)
Diesel Generator Building Ventilation System

2.7.5 Radiologically Controlled Area Ventilation System

Design Description

The radiologically controlled area ventilation system (VAS) serves the fuel handling area of the auxiliary building, and the radiologically controlled portions of the auxiliary and annex buildings, except for the health physics and hot machine shop areas, which are provided with a separate ventilation system (VHS). The VAS consists of two subsystems: the auxiliary/annex building ventilation subsystem and the fuel handling area ventilation subsystem. The subsystems provide ventilation to maintain occupied areas, and access and equipment areas within their design temperature range. They provide outside air for plant personnel and prevent the unmonitored release of airborne radioactivity to the atmosphere or adjacent plant areas. The VAS automatically isolates selected building areas by closing the supply and exhaust duct isolation dampers and starts the containment air filtration system (VFS) when high airborne radioactivity in the exhaust air duct or high ambient pressure differential is detected.

The component locations of the VAS are as shown in Table 2.7.5-3.

1. The functional arrangement of the VAS is as described in the Design Description of this Section 2.7.5.
2. The VAS maintains each building area at a slightly negative pressure relative to the atmosphere or adjacent clean plant areas.
3. Displays of the parameters identified in Table 2.7.5-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.5-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the VAS.

| Table 2.7.5-1 | | | |
|--|---------|---------|------------------|
| Equipment | Tag No. | Display | Control Function |
| Annex Building Pressure Differential Indicator | VAS-032 | Yes | - |
| Auxiliary Building Pressure Differential Indicator | VAS-033 | Yes | - |
| Fuel Handling Area Pressure Differential Indicator | VAS-030 | Yes | - |

Note: Dash (-) indicates not applicable.

| Table 2.7.5-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VAS is as described in the Design Description of this Section 2.7.5. | Inspection of the as-built system will be performed. | The as-built VAS conforms with the functional arrangement described in the Design Description of this Section 2.7.5. |
| 2. The VAS maintains each building area at a slightly negative pressure relative to the atmosphere or adjacent clean plant areas. | i) Testing will be performed to confirm that the VAS maintains each building at a slightly negative pressure when operating all VAS supply AHUs and all VAS exhaust fans. ii) Testing will be performed to confirm the ventilation flow rate through the auxiliary building fuel handling area when operating all VAS supply AHUs and all VAS exhaust fans. iii) Testing will be performed to confirm the auxiliary building radiologically controlled area ventilation flow rate when operating all VAS supply AHUs and all VAS exhaust fans. | i) The time average pressure differential in the served areas of the annex, fuel handling and radiologically controlled auxiliary buildings as measured by each of the instruments identified in Table 2.7.5-1 is negative. ii) A report exists and concludes that the calculated exhaust flow rate based on the measured flow rates is greater than or equal to 15,300 cfm. iii) A report exists and concludes that the calculated exhaust flow rate based on the measured flow rates is greater than or equal to 22,500 cfm. |
| 3. Displays of the parameters identified in Table 2.7.5-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.5-1 can be retrieved in the MCR. |

| Table 2.7.5-3 | | |
|--|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Auxiliary/Annex Building Supply AHU A | VAS-MS-01A | Annex Building |
| Auxiliary/Annex Building Supply AHU B | VAS-MS-01B | Annex Building |
| Fuel Handling Area Supply AHU A | VAS-MS-02A | Annex Building |
| Fuel Handling Area Supply AHU B | VAS-MS-02B | Annex Building |
| CVS Pump Room Unit Cooler A | VAS-MS-05A | Auxiliary Building |
| CVS Pump Room Unit Cooler B | VAS-MS-05B | Auxiliary Building |
| RNS Pump Room Unit Cooler A | VAS-MS-06A | Auxiliary Building |
| RNS Pump Room Unit Cooler B | VAS-MS-06B | Auxiliary Building |
| Auxiliary/Annex Building Exhaust Fan A | VAS-MA-02A | Auxiliary Building |
| Auxiliary/Annex Building Exhaust Fan B | VAS-MA-02B | Auxiliary Building |
| Fuel Handling Area Exhaust Fan A | VAS-MA-06A | Auxiliary Building |
| Fuel Handling Area Exhaust Fan B | VAS-MA-06B | Auxiliary Building |

2.7.6 Containment Air Filtration System**Design Description**

The containment air filtration system (VFS) provides intermittent flow of outdoor air to purge and filter the containment atmosphere of airborne radioactivity during normal plant operation, and continuous flow during hot or cold plant shutdown conditions to reduce airborne radioactivity levels for personnel access. The VFS can also provide filtered exhaust for the radiologically controlled area ventilation system (VAS) during abnormal conditions.

The VFS is as shown in Figure 2.7.6-1 and the component locations of the VFS are as shown in Table 2.7.6-3.

1. The functional arrangement of the VFS is as described in the Design Description of this Section 2.7.6.
2. The VFS provides the safety-related functions of preserving containment integrity by isolation of the VFS lines penetrating containment and providing vacuum relief for the containment vessel.
3. The VFS provides the intermittent flow of outdoor air to purge the containment atmosphere during normal plant operation, and continuous flow during hot or cold plant shutdown conditions.
4. Controls exist in the main control room (MCR) to cause the components identified in Table 2.7.6-1 to perform the listed function.
5. Displays of the parameters in Table 2.7.6-1 can be retrieved in the MCR.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.6-2 specifies the inspections, tests, analyses, and associated criteria for the VFS.

| Table 2.7.6-1 | | | |
|---|------------|---------------------|------------------|
| Equipment | Tag No. | Display | Control Function |
| Containment Air Handling Units (AHU) Supply Fan A | VFS-MA-01A | Yes (Run Status) | Start |
| Containment AHU Supply Fan B | VFS-MA-01B | Yes (Run Status) | Start |
| Containment AHU Supply Fan A Flow Sensor | VFS-012A | Yes | - |
| Containment AHU Supply Fan B Flow Sensor | VFS-012B | Yes | - |
| Containment Exhaust Fan A | VFS-MA-02A | Yes (Run Status) | Start |
| Containment Exhaust Fan B | VFS-MA-02B | Yes (Run Status) | Start |
| Containment Exhaust Fan A Flow Sensor | VFS-011A | Yes | - |
| Containment Exhaust Fan B Flow Sensor | VFS-011B | Yes | - |

| Table 2.7.6-2 | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VFS is as described in the Design Description of this Section 2.7.6. | Inspection of the as-built system will be performed. | The as-built VFS conforms with the functional arrangement described in the Design Description of this Section 2.7.6. |
| 2. The VFS provides the safety-related functions of preserving containment integrity by isolation of the VFS lines penetrating containment and providing vacuum relief for the containment vessel. | i) See Tier 1 Material, Table 2.2.1-3, items 1 and 7. ii) Testing will be performed to demonstrate that remotely operated containment vacuum relief isolation valves open within the required response time. | i) See Tier 1 Material, Table 2.2.1-3, items 1 and 7. ii) The containment vacuum relief isolation valves (VFS-PL-V800A and VFS-PL-V800B) open within 30 seconds. |
| 3. The VFS provides the intermittent flow of outdoor air to purge the containment atmosphere during normal plant operation, and continuous flow during hot or cold plant shutdown conditions. | i) Testing will be performed to confirm that containment supply AHU fan A when operated with containment exhaust fan A provides a flow of outdoor air. ii) Testing will be performed to confirm that containment supply AHU fan B when operated with containment exhaust fan B provides a flow of outdoor air. iii) Inspection will be conducted of the containment purge discharge line (VFS-L204) penetrating the containment. | i) The flow rate measured at each fan is greater than or equal to 3,600 scfm. ii) The flow rate measured at each fan is greater than or equal to 3,600 scfm. iii) The <u>nominal</u> line size is ≥ 36 in. |
| 4. Controls exist in the MCR to cause the components identified in Table 2.7.6-1 to perform the listed function. | Testing will be performed on the components in Table 2.7.6-1 using controls in the MCR. | Controls in the MCR operate to cause the components listed in Table 2.7.6-1 to perform the listed functions. |
| 5. Displays of the parameters identified in Table 2.7.6-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.6-1 can be retrieved in the MCR. |

| Table 2.7.6-3 | | |
|---|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Containment Air Filtration Supply AHU A | VFS-MS-01A | Annex Building |
| Containment Air Filtration Supply AHU B | VFS-MS-01B | Annex Building |
| Containment Air Filtration Exhaust Unit A | VFS-MS-02A | Annex Building |
| Containment Air Filtration Exhaust Unit B | VFS-MS-02B | Annex Building |

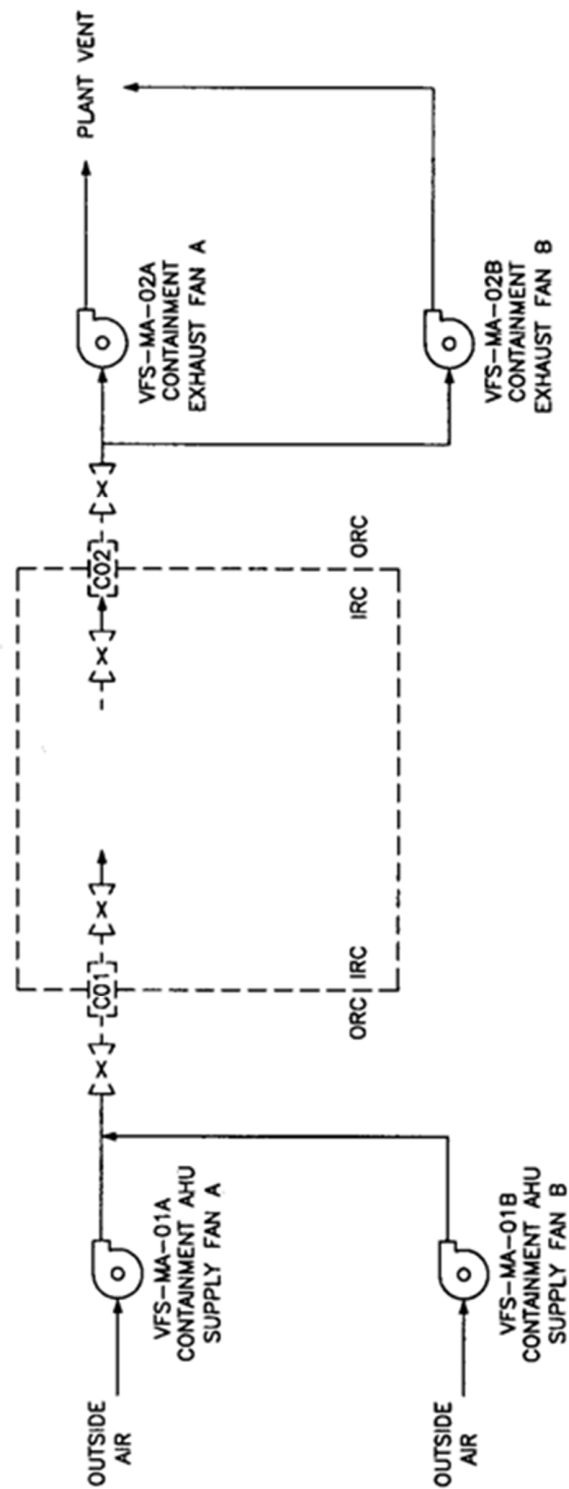


Figure 2.7.6-1
Containment Air Filtration System

2.7.7 Containment Recirculation Cooling System

Design Description

The containment recirculation cooling system (VCS) controls the containment air temperature and humidity during normal operation, refueling and shutdown.

The locations of the VCS are as shown in Table 2.7.7-3.

1. The functional arrangement of the VCS is as described in the Design Description of this Section 2.7.7.
2. Displays of the parameters identified in Table 2.7.7-1 can be retrieved in the main control room (MCR).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.7-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the VCS.

| Table 2.7.7-1 | | |
|---------------------------------|--|--|
| Equipment Name | Tag No. | Display |
| Containment Temperature Channel | VCS-061 | Yes |
| Containment Fan Cooler Fan | VCS-MA-01A VCS-MA-01C VCS-MA-01B VCS-MA-01D | Yes (Run Status) Yes (Run Status) Yes (Run Status) Yes (Run Status) |

Note: Dash (-) indicates not applicable.

| Table 2.7.7-2 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The functional arrangement of the VCS is as described in the Design Description of this Section 2.7.7. | Inspection of the as-built system will be performed. | The as-built VCS conforms with the functional arrangement described in the Design Description of this Section 2.7.7. |
| 2. Displays of the parameters identified in Table 2.7.7-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the parameters in the MCR. | The displays identified in Table 2.7.7-1 are retrieved in the MCR. |

| Table 2.7.7-3 | | |
|--|------------|--------------------|
| Component Name | Tag No. | Component Location |
| Reactor Containment Recirculation Fan Coil Unit Assembly A | VCS-MS-01A | Containment |
| Reactor Containment Recirculation Fan Coil Unit Assembly B | VCS-MS-01B | Containment |

2.7.8 Radwaste Building HVAC System

The radwaste building HVAC system (VRS) serves the radwaste building and provides radiation monitoring of exhaust prior to release to the environment.

2.7.9 Turbine Island Building Ventilation System

No entry for this system.

2.7.10 Health Physics and Hot Machine Shop HVAC System

The health physics and hot machine shop system (VHS) serves the health physics and hot machine shop area of the annex building and provides radiation monitoring of exhaust prior to release to the environment.

2.7.11 Hot Water Heating System

No entry for this system.

3.1 Emergency Response Facilities

Design Description

The technical support center (TSC) is a facility from which management and technical support is provided to main control room (MCR) personnel during emergency conditions. The operations support center (OSC) provides an assembly area where operations support personnel report in an emergency. The control support area (CSA) is an area nearby the main control room from which support can be provided to the main control room.

1. The TSC has floor space of at least 75 ft² per person for a minimum of 25 persons.
2. The TSC has voice communication equipment for communication with the MCR, emergency operations facility, OSC, and the U.S. Nuclear Regulatory Commission (NRC).
3. The plant parameters listed in Table 2.5.4-1, minimum inventory table, in subsection 2.5.4, Data Display and Processing System (DDS), with a "Yes" in the "Display" column, can be retrieved in the TSC.
4. The OSC has voice communication equipment for communication with the MCR and TSC.
5. The TSC and OSC are in different locations.
6. The CSA provides a habitable workspace environment.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.1-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the emergency response facilities.

| Table 3.1-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The TSC has floor space of at least 75 ft ² per person for a minimum of 25 persons. | An inspection will be performed of the TSC floor space. | The TSC has at least 1875 ft ² of floor space. |
| 2. The TSC has voice communication equipment for communication with the MCR, emergency operations facility, OSC, and the NRC. | An inspection and test will be performed of the TSC voice communication equipment. | Communications equipment is installed, and voice transmission and reception are accomplished. |
| 3. The plant parameters listed in Table 2.5.4-1, minimum inventory table, in subsection 2.5.4, DDS, with a "Yes" in the "Display" column, can be retrieved in the TSC. | An inspection will be performed for retrievability of the plant parameters in the TSC. | The plant parameters listed in Table 2.5.4-1, minimum inventory table, in subsection 2.5.4, DDS, with a "Yes" in the "Display" column, can be retrieved in the TSC. |
| 4. The OSC has voice communication equipment for communication with the MCR and TSC. | Inspection will be performed of the OSC voice communication equipment. | Communications equipment is installed, and voice transmission and reception are accomplished. |
| 5. The TSC and OSC are in different locations. | An inspection will be performed of the location of the TSC and OSC. | The TSC and OSC are in different locations. |
| 6. The CSA provides a habitable workspace environment. | See Tier 1 Material, Table 2.7.1-4, items 1, 8a), 8c), 12, and 13, Nuclear Island Nonradioactive Ventilation System. | See Tier 1 Material, Table 2.7.1-4, items 1, 8a), 8c), 12, and 13, Nuclear Island Nonradioactive Ventilation System. |

3.2 Human Factors Engineering

Design Description

The AP1000 human-system interface (HSI) will be developed and implemented based upon a human factors engineering (HFE) program. Figure 3.2-1 illustrates the HFE program elements. The HSI scope includes the design of the operation and control centers system (OCS) and each of the HSI resources. For the purposes of the HFE program, the OCS includes the main control room (MCR), the remote shutdown workstation (RSW), the local control stations, and the associated workstations for each of these centers. The HSI resources include the wall panel information system, alarm system, plant information system (nonsafety-related displays), qualified data processing system (safety-related displays), and soft and dedicated controls. Minimum inventories of controls, displays, and visual alerts are specified as part of the HSI for the MCR and the RSW.

The MCR provides a facility and resources for the safe control and operation of the plant. The MCR includes a minimum inventory of displays, visual alerts and fixed-position controls. Refer to item 8.a and Table 2.5.2-5 of subsection 2.5.2 for this minimum inventory.

The remote shutdown room (RSR) provides a facility and resources to establish and maintain safe shutdown conditions for the plant from a location outside of the MCR. The RSW includes a minimum inventory of displays, controls, and visual alerts. Refer to item 2 and Table 2.5.4-1 of subsection 2.5.4 for this minimum inventory. As stated in item 8.b of subsection 2.5.2, the protection and safety monitoring system (PMS) provides for the transfer of control capability from the MCR to the RSW.

The mission of local control stations is to provide the resources, outside of the MCR, for operations personnel to perform monitoring and control activities.

Implementation of the HFE program includes activity 1 below. The MCR includes design features specified by items 2 through 4 below. The RSW includes the design features specified by items 5 through 8 below. Local control stations include the design feature of item 9.

1. The HFE program verification and validation implementation plans are developed in accordance with the programmatic level description of the AP1000 human factors verification and validation plan. The implementation plans establish the methods for conducting evaluations of the integrated HSI design. The development of the HFE verification and validation plans are complete. The following documents were developed:
 - a) HSI task support verification – APP-OCS-GEH-220, “AP1000 Human Factors Engineering Task Support Verification Plan,” Westinghouse Electric Company LLC
 - b) HFE design verification – APP-OCS-GEH-120, “AP1000 Human Factors Engineering Design Verification Plan,” Westinghouse Electric Company LLC
 - c) Integrated system validation – APP-OCS-GEH-320, “AP1000 Human Factors Engineering Integrated System Validation Plan,” Westinghouse Electric Company LLC
 - d) Issue resolution verification – APP-OCS-GEH-420, “AP1000 Human Factors Engineering Discrepancy Resolution Process,” Westinghouse Electric Company LLC

- e) Plant HFE/HSI (as designed at the time of plant startup) verification – APP-OCS-GEH-520, “AP1000 Plant Startup Human Factors Engineering Design Verification Plan,” Westinghouse Electric Company LLC
- 2. The MCR includes reactor operator workstations, supervisor workstation(s), safety-related displays, and safety-related controls.
- 3. The MCR provides a suitable workspace environment for use by MCR operators.
- 4. The HSI resources available to the MCR operators include the alarm system, plant information system (nonsafety-related displays), wall panel information system, nonsafety-related controls (soft and dedicated), and computerized procedure system.
- 5. The RSW includes reactor operator workstation(s) from which licensed operators perform remote shutdown operations.
- 6. The RSR provides a suitable workspace environment, separate from the MCR, for use by the RSW operators.
- 7. The HSI resources available at the RSW include the alarm system displays, the plant information system, and the controls.
- 8. The RSW and the available HSI permit execution of tasks by licensed operators to establish and maintain safe shutdown.
- 9. The capability to access displays and controls is provided (controls as assigned by the MCR operators) for local control and monitoring from selected locations throughout the plant.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.2-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the HFE program, MCR, RSW, and local control stations.

| Table 3.2-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>1. The HFE verification and validation program is performed in accordance with the HFE verification and validation implementation plan and includes the following activities:</p> <p>a) HSI Task support verification</p> <p>b) HFE design verification</p> <p>c) Integrated system validation</p> | <p>a) An evaluation of the implementation of the HSI task support verification will be performed.</p> <p>b) An evaluation of the implementation of the HFE design verification will be performed.</p> <p>c) (i) An evaluation of the implementation of the integrated system validation will be performed.</p> | <p>a) A report exists and concludes that: Task support verification was conducted in conformance with the implementation plan and includes verification that the information and controls provided by the HSI match the display and control requirements generated by the function-based task analyses and the operational sequence analyses.</p> <p>b) A report exists and concludes that: HFE design verification was conducted in conformance with the implementation plan and includes verification that the HSI design is consistent with the AP1000 specific design guidelines (compiled as specified in the third acceptance criteria of design commitment 3) developed for each HSI resource.</p> <p>c) (i) A report exists and concludes that: The test scenarios listed in the implementation plan for integrated system validation were executed in conformance with the plan and noted human deficiencies were addressed.</p> |

| Table 3.2-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>c) (ii) Tests and analyses of the following plant evolutions and transients, using a facility that physically represents the MCR configuration and dynamically represents the MCR HSI and the operating characteristics and responses of the AP1000 design, will be performed:</p> <ul style="list-style-type: none"> – Normal plant heatup and startup to 100% power – Normal plant shutdown and cooldown to cold shutdown – Transients: reactor trip and turbine trip – Accidents: <ul style="list-style-type: none"> - Small-break LOCA - Large-break LOCA - Steam line break - Feedwater line break - Steam generator tube rupture | <p>c) (ii) A report exists and concludes that: The test and analysis results demonstrate that the MCR operators can perform the following:</p> <ul style="list-style-type: none"> – Heat up and start up the plant to 100% power – Shut down and cool down the plant to cold shutdown – Bring the plant to safe shutdown following the specified transients – Bring the plant to a safe, stable state following the specified accidents |
| d) Issue resolution verification | d) An evaluation of the implementation of the HFE design issue resolution verification will be performed. | d) A report exists and concludes that: HFE design issue resolution verification was conducted in conformance with the implementation plan and includes verification that human factors issues documented in the design issues tracking system have been addressed in the final design. |
| e) Plant HFE/HSI (as designed at the time of plant startup) verification | e) An evaluation of the implementation of the plant HFE/HSI (as designed at the time of plant startup) verification will be performed. | e) A report exists and concludes that: The plant HFE/HSI, as designed at the time of plant startup, is consistent with the HFE/HSI verified in 1.a) through 1.d). |

| Table 3.2-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 2. The MCR includes reactor operator workstations, supervisor workstation(s), safety-related displays, and safety-related controls. | An inspection of the MCR workstations and control panels will be performed. | The MCR includes reactor operator workstations, supervisor workstation(s), safety-related displays, and safety-related controls. |
| 3. The MCR provides a suitable workspace environment for use by the MCR operators. | i) See Tier 1 Material, subsection 2.7.1, Nuclear Island Nonradioactive Ventilation System. ii) See Tier 1 Material, subsection 2.2.5, MCR Emergency Habitability System. iii) See Tier 1 Material, subsection 2.6.3, Class 1E dc and UPS System. iv) See Tier 1 Material, subsection 2.6.5, Lighting System. v) See Tier 1 Material, subsection 2.3.19, Communication System. | i) See Tier 1 Material, subsection 2.7.1, Nuclear Island Nonradioactive Ventilation System. ii) See Tier 1 Material, subsection 2.2.5, MCR Emergency Habitability System. iii) See Tier 1 Material, subsection 2.6.3, Class 1E dc and UPS system. iv) See Tier 1 Material, subsection 2.6.5, Lighting System. v) See Tier 1 Material, subsection 2.3.19, Communication System. |
| 4. The HSI resources available to the MCR operators include the alarm system, plant information system (nonsafety-related displays), wall panel information system, nonsafety-related controls (soft and dedicated), and computerized procedure system. | An inspection of the HSI resources available in the MCR for the MCR operators will be performed. | The HSI (at the time of plant startup) includes an alarm system, plant information system (nonsafety-related displays), wall panel information system, nonsafety-related controls (soft and dedicated), and computerized procedure system. |
| 5. The RSW includes reactor operator workstation(s) from which licensed operators perform remote shutdown operations. | An inspection of the RSW will be performed. | The RSW includes reactor operator workstation(s). |

| Table 3.2-1 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 6. The RSR provides a suitable workspace environment, separate from the MCR, for use by the RSW operators. | i) See Tier 1 Material, subsection 2.7.1, Nuclear Island Nonradioactive Ventilation System. ii) See Tier 1 Material, subsection 2.6.5, Lighting System. iii) See Tier 1 Material, subsection 2.3.19, Communication System. | i) See Tier 1 Material, subsection 2.7.1, Nuclear Island Nonradioactive Ventilation System. ii) See Tier 1 Material, subsection 2.6.5, Lighting System. iii) See Tier 1 Material, subsection 2.3.19, Communication System. |
| 7. The HSI resources available at the RSW include the alarm system displays, the plant information system, and the controls. | An inspection of the HSI resources available at the RSW will be performed. | The as-built HSI at the RSW includes the alarm system displays, the plant information system, and the controls. |
| 8. The RSW and the available HSI permit execution of tasks by licensed operators to establish and maintain safe shutdown. | Test and analysis, using a workstation that physically represents the RSW and dynamically represents the RSW HSI and the operating characteristics and responses of the AP1000, will be performed. | A report exists and concludes that the test and analysis results demonstrate that licensed operators can achieve and maintain safe shutdown conditions from the RSW. |
| 9. The capability to access displays and controls is provided (controls as assigned by the MCR operators) for local control and monitoring from selected locations throughout the plant. | An inspection of the local control and monitoring capability is provided. | The capability for local control and monitoring from selected locations throughout the plant exists. |

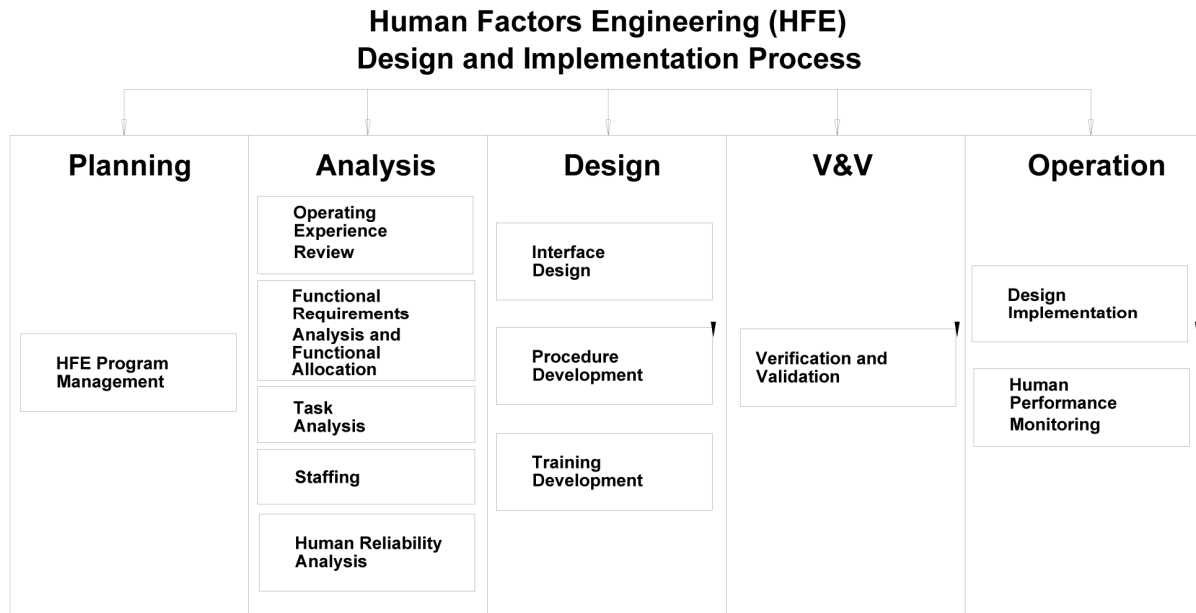


Figure 3.2-1
Human Factors Engineering (HFE)
Design and Implementation Process

3.3 Buildings

Design Description

The nuclear island structures include the containment (the steel containment vessel and the containment internal structure) and the shield and auxiliary buildings. The containment, shield and auxiliary buildings are structurally integrated on a common basemat which is embedded below the finished plant grade level. The containment vessel is a cylindrical welded steel vessel with elliptical upper and lower heads, supported by embedding a lower segment between the containment internal structures concrete and the basemat concrete. The containment internal structure is reinforced concrete with structural modules used for some walls and floors. The shield building cylinder is a composite steel and concrete (SC) structure except for the portion surrounded by the auxiliary building, which is reinforced concrete (RC). The shield building, in conjunction with the internal structures of the containment building, provides shielding for the reactor coolant system and the other radioactive systems and components housed in the containment. The shield building roof is a reinforced concrete structure containing an integral, steel lined passive containment cooling water storage tank. The auxiliary building is reinforced concrete and houses the safety-related mechanical and electrical equipment located outside the containment and shield buildings.

The portion of the annex building adjacent to the nuclear island is a structural steel and reinforced concrete seismic Category II structure and houses the control support area, non-IE electrical equipment, and hot machine shop.

The radwaste building is a steel framed structure and houses the low level waste processing and storage.

The turbine building is a non-safety related structure that houses the main turbine generator and the power conversion cycle equipment and auxiliaries. There is no safety-related equipment in the turbine building. The turbine building is located on a separate foundation. The turbine building structure is adjacent to the auxiliary building to the south and the annex building to the south and east. The turbine building consists of two separate superstructures, the first bay and the main area, both supported on a common reinforced concrete basemat. The first bay, next to the auxiliary building, consists of a combination of reinforced concrete walls and steel framing with reinforced concrete and steel grated floors. It is classified as a seismic Category II structure due to its immediate proximity to the auxiliary building. The main area of the turbine building, immediately to the north of the first bay, is a steel framed building with reinforced concrete and steel grated floors. It is classified as a non-seismic structure. The non-seismic portion of the turbine building is designed with a mix of concentrically and eccentrically braced framing.

The diesel generator building is a non-safety related structure that houses the two standby diesel engine powered generators and the power conversion cycle equipment and auxiliaries. There is no safety-related equipment in the diesel generator building. The diesel generator building is located on a separate foundation at a distance from the nuclear island structures.

The plant gas system (PGS) provides hydrogen, carbon dioxide, and nitrogen gases to the plant systems as required. The component locations of the PGS are located in the yard areas.

1. The physical arrangement of the nuclear island structures, the annex building, and the turbine building is as described in the Design Description of this Section 3.3, and as shown on Figures 3.3-1 through 3.3-14. The physical arrangement of the radwaste building and the diesel generator building is as described in the Design Description of this Section 3.3.
2. a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads, as specified in the Design Description, without loss of structural integrity and the safety-related functions. The design bases loads are those loads associated with:
 - Normal plant operation (including dead loads, live loads, lateral earth pressure loads, and equipment loads, including hydrodynamic loads, temperature and equipment vibration);
 - External events (including rain, snow, flood, tornado, tornado generated missiles and earthquake); and
 - Internal events (including flood, pipe rupture, equipment failure, and equipment failure generated missiles).
- b) Site grade level is located relative to floor elevation 100'-0" per Table 3.3-5. Floor elevation 100'-0" is defined as the elevation of the floor at design plant grade.
- c) The containment and its penetrations are designed and constructed to ASME Code Section III, Class MC.⁽¹⁾
- d) The containment and its penetrations retain their pressure boundary integrity associated with the design pressure.
- e) The containment and its penetrations maintain the containment leakage rate less than the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident.
- f) The key dimensions of the nuclear island structures are as defined on Table 3.3-5.
- g) The containment vessel greater than 7 feet above the operating deck provides a heat transfer surface. A free volume exists inside the containment shell above the operating deck.
- h) The containment free volume below elevation 108' provides containment floodup during a postulated loss-of-coolant accident.
3. Walls and floors of the nuclear island structures as defined on Table 3.3-1, except for designed openings and penetrations, provide shielding during normal operations.
4. a) Walls and floors of the annex building as defined on Table 3.3-1, except for designed openings and penetrations, provide shielding during normal operations.

1. Containment isolation devices are addressed in subsection 2.2.1, Containment System.

- b) The walls on the outside of the waste accumulation room in the radwaste building provide shielding from accumulated waste.
 - c) The walls on the outside of the packaged waste storage room in the radwaste building provide shielding from stored waste.
5. a) Exterior walls and the basemat of the nuclear island have a water barrier up to site grade.
- b) The boundaries between mechanical equipment rooms and the electrical and instrumentation and control (I&C) equipment rooms of the auxiliary building as identified in Table 3.3-2 are designed to prevent flooding of rooms that contain safety-related equipment up to the maximum flood level for each room defined in Table 3.3-2.
 - c) The boundaries between the following rooms, which contain safety-related equipment – passive core cooling system (PXS) valve/accumulator room A (11206), PXS valve/accumulator room B (11207), and chemical and volume system (CVS) room (11209) – are designed to prevent flooding between these rooms.
6. a) The radiologically controlled area of the auxiliary building between floor elevations 66'-6" and 82'-6" contains adequate volume to contain the liquid volume of faulted liquid radwaste system (WLS) storage tanks. The available room volumes of the radiologically controlled area of the auxiliary building between floor elevations 66'-6" and 82'-6" exceeds the volume of the liquid radwaste storage tanks (WLS-MT-05A, MT-05B, MT-06A, MT-06B, MT-07A, MT-07B, MT-07C, MT-11).
- b) The radwaste building packaged waste storage room has a volume greater than or equal to 1293 cubic feet.
7. a) Class 1E electrical cables, fiber optic cables associated with only one division, and raceways are identified according to applicable color-coded Class 1E divisions.
- b) Class 1E divisional electrical cables and communication cables associated with only one division are routed in their respective divisional raceways.
 - c) Separation is maintained between Class 1E divisions in accordance with the fire areas as identified in Table 3.3-3.
 - d) Physical separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables.
 - e) Class 1E communication cables which interconnect two divisions are routed and separated such that the Protection and Safety Monitoring System voting logic is not defeated by the loss of any single raceway or fire area.
8. Systems, structures, and components identified as essential targets are protected from the dynamic and environmental effects of postulated pipe ruptures.

9. The reactor cavity sump has a minimum concrete thickness as shown on Table 3.3-5 between the bottom of the sump and the steel containment.
10. The shield building roof and the passive containment cooling system (PCS) storage tank support and retain the PCS water. The passive containment cooling system tank has a stainless steel liner which provides a barrier on the inside surfaces of the tank. Leak chase channels are provided over the tank boundary liner welds.
11. Deleted.
12. The extended turbine generator axis intersects the shield building.
13. Separation is provided between the structural elements of the turbine, annex, and radwaste buildings and the nuclear island structure. This separation permits horizontal motion of the buildings in a safe shutdown earthquake without impact between structural elements of the buildings.
14. The external walls, doors, ceiling, and floors in the main control room, the central alarm station, and the secondary alarm station are bullet-resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4.
15. Deleted.
16. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within a vital area.
17. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area.
18. Deleted.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.3-6 specifies the inspections, tests, analyses, and associated acceptance criteria for the buildings.

3. Non-System Based Design Descriptions & ITAAC

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| Table 3.3-1 Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|---|--|---|--|
| Wall or Section Description | Column Lines ⁽⁷⁾ | Floor Elevation or Elevation Range ⁽⁷⁾⁽⁸⁾ | Concrete Thickness ⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Containment Building Internal Structure | | | | |
| Shield Wall between Reactor Vessel Cavity and RCDT Room | E-W wall parallel with column line 7 (Inside face is 3'-0" north of column line 7. Width of wall section with stated thickness is defined by inside wall of reactor vessel cavity.) | From 71'-6" to 83'-0" | 3'-0" | Yes |
| West Reactor Vessel Cavity Wall | N-S wall parallel with column line N (Width of wall section with stated thickness is defined by inside wall of reactor vessel cavity). | From 83'-0" to 98'-0" | 7'-6" | Yes |
| North Reactor Vessel Cavity Wall | E-W wall parallel with column line 7 (Width of wall section with stated thickness is defined by inside wall of reactor vessel cavity). | From 83'-0" to 98'-0" | 9'-0" | Yes |

1. The column lines and floor elevations are identified and included on Figures 3.3-1 through 3.3-13.
2. These wall (and floor) thicknesses have a construction tolerance of ± 1 inch, except for exterior walls below grade where the tolerance is +12 inches, -1 inch. These tolerances are not applicable to the nuclear island basemat.
3. For walls that are part of structural modules, the concrete thickness also includes the steel face plates. Where faceplates with a nominal thickness of 0.5 inches are used in the construction of the wall modules, the wall thicknesses in this column apply. Where faceplates thicker than the nominal 0.5 inches are used in the construction of the structural wall modules, the wall thicknesses in the area of the thicker faceplates are greater than indicated in this column by the amount of faceplate thickness increase over the nominal 0.5 inches. Overlay plates are not considered part of the faceplates, and thus are not considered in the wall thicknesses identified in this column.
4. For floors with steel surface plates, the concrete thickness also includes the plate thickness.
5. Where a wall (or a floor) has openings, the concrete thickness does not apply at the opening.
6. The elevation ranges for the shield building items are rounded to the nearest inch.
7. The Wall or Section Description, Column Line information, and Floor Elevation or Elevation Ranges are provided as reference points to define the general location. The concrete thickness of an item intersecting other walls, roofs or floors at a designated location (e.g., column line) is not intended to be measured to the stated column line, but only to the point where the intersection occurs.
8. Where applicable, the upper wall portions extend to their associated roofs, which may vary in elevation, e.g., sloped roofs.
9. From one wall/floor section to another, the concrete thickness transitions from one thickness to another, consistent with the configurations in Figures 3.3-1 through 3.3-14.

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|---|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| East Reactor Vessel Cavity Wall | N-S wall parallel with column line N (Width of wall section with stated thickness is defined by inside wall of reactor vessel cavity.) | From 83'-0" to 98'-0" | 7'-6" | Yes |
| West Refueling Cavity Wall | N-S wall parallel with column line N | From 98'-0" to 135'-3" | 4'-0" | Yes |
| North Refueling Cavity Wall | E-W wall parallel with column line 7 | From 98'-0" to 135'-3" | 4'-0" | Yes |
| East Refueling Cavity Wall | N-S wall parallel with column line N | From 98'-0" to 135'-3" | 4'-0" | Yes |
| South Refueling Cavity Wall | E-W wall parallel with column line 7 | From 98'-0" to 135'-3" | 4'-0" | Yes |
| South wall of west steam generator compartment | Not Applicable | From 103'-0" to 153'-0" | 2'-6" | Yes |
| West wall of west steam generator compartment | N-S wall parallel with column line N | From 103'-0" to 153'-0" | 2'-6" | Yes |
| North wall of west steam generator compartment | Not Applicable | From 103'-0" to 153'-0" | 2'-6" | Yes |
| South wall of pressurizer compartment | Not Applicable | From 103'-0" to 153'-6" | 2'-6" | Yes |
| West wall of pressurizer compartment | N-S wall parallel with column line N | From 107'-2" to 160'-0" | 2'-6" | Yes |
| North wall of pressurizer compartment | E-W wall parallel with column line 7 | From 107'-2" to 160'-0" | 2'-6" | Yes |
| East wall of pressurizer compartment | N-S wall parallel with column line N | From 118'-6" to 160'-0" | 2'-6" | Yes |
| North-east wall of in-containment refueling water storage tank | Parallel to column line N | From 103'-0" to 135'-3" | 2'-6" | No |
| West wall of in-containment refueling water storage tank | Not applicable | From 103'-0" to 135'-3" | 5/8" steel plate with stiffeners | No |
| South wall of east steam generator compartment | Not Applicable | From 87'-6" to 153'-0" | 2'-6" | Yes |
| East wall of east steam generator compartment | N-S wall parallel with column Line N | From 94'-0" to 153'-0" | 2'-6" | Yes |
| North wall of east steam generator compartment | Not Applicable | From 87'-6" to 153'-0" with a 158'-0" portion | 2'-6" | Yes |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|-----------------------------------|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Shield Building⁽⁶⁾ | | | | |
| Shield Building Cylinder | Not Applicable | From 100'-0" to 248'-6" | 3'-0" (including 3/4 inch thick min. steel plate liner on each face on portion not protected by auxiliary building) | Yes |
| Air Inlet | Not Applicable | From 248'-6" to 251'-6" | 3'-0" (including 3/4 inch thick min. steel plate liner on each face) | Yes |
| | | From 251'-6" to 254'-6" | 3'-0" to 4'-6" (including 1 inch thick steel plate liner on each face) | Yes |
| | | From 254'-6" to 266'-4" | 4'-6" (including 1 inch thick min. steel plate liner on each face) | Yes |
| Tension Ring | Not Applicable | From 266'-4" to 271'-6" (at top of plate) | 4'-6" (including 1-1/2 inch thick steel plate liner on each face) | Yes |
| Conical Roof | Not Applicable | From 271'-6" to 293'-9" | 3'-0" (including 1/2 inch thick min. steel plate liner on bottom face, outside of PCS tank exterior wall) | Yes |
| PCS Tank External Cylindrical Wall | Not Applicable | From 293'-9" to 328'-9" | 2'-0" | Yes |
| PCS Tank Internal Cylindrical Wall | Not Applicable | From 309'-4" to 329'-0" | 1'-6" | Yes |
| PCS Tank Roof | Not Applicable | 328'-9" (Lowest) 329'-0" (Highest) | 1'-3" | No |
| Nuclear Island Basemat | Below shield building | From 60'-6" to containment vessel or 82'-6" | 6'-0" to 22'-0" (varies) | No |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|--|--|---|--|
| Wall or Section Description | Column Lines ⁽⁷⁾ | Floor Elevation or Elevation Range ⁽⁷⁾⁽⁸⁾ | Concrete Thickness ⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Auxiliary Building Walls/Floors Radiologically Controlled | | | | |
| Column Line 1 wall | From I to N | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line 1 wall | From I to 5'-6" east of L-2 | From 100'-0" to 180'-0" | 2'-3" | Yes |
| Column Line 1 wall | From 5'-6" east of L-2 to N | From 100'-0" to 125'-0" | 3'-0" | Yes |
| Column Line 1 wall | From 5'-6" east of L-2 to N | From 125'-0" to 180'-0" | 2'-3" | Yes |
| Column Line 2 wall | From I to K-2 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line 2 wall | From K-2 to L-2 | From 66'-6" to 135'-3" | 5'-0" | Yes |
| Column Line 2 wall | From L-2 to N | From 82'-6" to 135'-3" | 2'-6" | Yes |
| Column Line 2 wall | From I to J-1 | From 135'-3" to 153'-0" | 2'-0" | Yes |
| Column Line 3 wall | From J-1 to J-2 | From 66'-6" to 82'-6" | 2'-6" | Yes |
| Column Line 3 wall | From J-1 to J-2 | From 100'-0" to 135'-3" | 2'-6" | Yes |
| Column Line 3 wall | From J-2 to K-2 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line 3 wall | From K-2 to L-2 | From 66'-6" to 92'-8 1/2" | 2'-6" | Yes |
| Column Line 4 wall | From I to J-1 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line 4 wall | From J-1 to J-2 | From 66'-6" to 92'-6" | 2'-6" | Yes |
| Column Line 4 wall | From J-1 to J-2 | From 107'-2" to 135'-3" | 2'-6" | Yes |
| Column Line 4 wall | From J-2 to K-2 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line 4 wall | From I to intersection with shield building wall | From 135'-3" to 180'-0" | 2'-0" | Yes |
| Column Line 5 wall | From I to shield building; with opening east of J-1 (below 107'-2" floor). | From 66'-6" to 160'-6" | 2'-0" | Yes |
| Wall, 17'-3" north of Column Line 7 | From I to 8' east of J-1 | From 66'-6" to 82'-6" | 2'-0" | Yes |
| Wall, 10'-6" south of Column Line 7.3 | From I to 5'-6" east of J-1 | From 66'-6" to 82'-6" | 2'-0" | Yes |
| Wall, 10'-6" south of Column Line 7.3 | From I to just east of J | From 82'-6" to 100'-0" | 2'-0" | Yes |
| Column Line 1 wall | From 1 to 4 | From 66'-6" to 100'-0" | 3'-0" | No |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|--|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Column Line I wall | From 3 to 4 | From 100'-0" to 107'-2" | 3'-0" | Yes |
| Column Line I wall | From 4 to 16'-0" south of 5 | From 66'-6" to 107'-2" | 3'-0" | No |
| Column Line I wall | From 16'-0" south of 5 to 5 | From 66'-6" to 105'-0" | 3'-0" | No |
| Column Line I wall | From 5 to 7.3 | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line I wall | From 1 to 3 | From 100'-0" to roof | 2'-0" | Yes |
| Column Line I wall | From 3 to 4 | From 107'-2" to roof | 2'-0" | Yes |
| Column Line I wall | From 4 to 16'-0" south of 5 | From 107'-2" to roof | 2'-0" | No |
| Column Line I wall | From 16'-0" south of 5 to 5 | From 105'-0" to roof | 2'-0" | No |
| Column Line J-1 wall | From 1 to 2 | From 82'-6" to 100'-0" | 2'-0" | Yes |
| Column Line J-1 wall | From 2 to 4 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line J-1 wall | From 2 to 4 | From 135'-3" to 153'-0" | 2'-0" | Yes |
| Column Line J-1 wall | From 4 to shield building | From 66'-6" to 107'-2" | 2'-0" | Yes |
| Column Line J-2 wall | From 2 to 4 | From 66'-6" to 135'-3" | 2'-6" | Yes |
| Column Line J-2 wall | From 4 to intersection with shield building wall | From 66'-6" to 135'-3" | 2'-0" | Yes |
| Column Line K-2 wall | From 2 to 4 | From 66'-6" to 135'-3" | 4'-9" | Yes |
| Column Line L-2 wall | From 2 to 4 | From 66'-6" to 135'-3" | 4'-0" | Yes |
| Column Line N wall | From 1 to 2 | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line N wall | From 1 to 12'-9" north of 1 | From 100'-0" to 125'-0" | 3'-9" | Yes |
| Column Line N wall | From 1 to 12'-9" north of 1 | From 125'-0" to 135'-3" | 2'-0" | Yes |
| Column Line N wall | From 12'-9" north of 1 to 2 | From 100'-0" to 118'-2 1/2" | 3'-0" | Yes |
| Column Line N wall | From 12'-9" north of 1 to 2 | From 118'-2 1/2" to 135'-3" | 2'-0" | Yes |
| Column Line N wall | From 2 to 4 (or to shield building) | From 66'-6" to 98'-1" | 5'-6" | No |
| Column Line N wall | From 2 to 4 (or to shield building) | From 98'-1" to 135'-3" | 5'-6" | Yes |
| Column Line N wall | From 1 to 4 (or to shield building) | From 135'-3" to 180'-0" | 2'-0" | Yes |
| Labyrinth Wall between Col. Line 3 and 4 and J-1 to 7'-3" from J-2 | Not Applicable | From 82'-6" to 92'-6" | 2'-6" | Yes |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|--|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| N-S Shield Wall (low wall) | 5'-7" west of column line K-2 extending 16'-0" from column line 1 north | From 100'-0" to 110'-0" | 2'-6" | Yes |
| N-S Shield Wall | 2'-9" east of column line L-2 extending 12'-9" from column line 1 north | From 100'-0" to 125'-0" | 2'-9" | Yes |
| E-W Shield Wall | Between 1 and 2 extending 16'-3" from column line N east | From 100'-0" to 125'-0" | 2'-9" | Yes |
| Auxiliary Area Basemat | From 1-7.3 and I-N, excluding shield building | From 60'-6" to 66'-6" | 6'-0" | No |
| Floor | From 1 to 2 and I to N | 82'-6" | 2'-0" | Yes |
| Floor | From 2 to 4 and J-1 to J-2 | 82'-6" | 2'-0" | Yes |
| Floor | From 4 north to the shield building ending 17'-4" south of column line 5 and J-1 to J-2 | 82'-6" | 0'-9" | Yes |
| Pipe Chase Floor | From 2 north to the shield building ending 17'-4" south of column line 5 and J-1 to J-2 | 92'-6" | 2'-0" | Yes |
| Floor | From 2 to 3 and J-2 to K-2 | 90'-3" | 3'-0" | Yes |
| Floor | From 3 to 4 and J-2 to K-2 | 92'-6" | 2'-0" | Yes |
| Floor | From 4 to 7.3 and I to J-1 | 82'-6" | 2'-0" | Yes |
| Floor | From 1 to 2 and I to N | 100'-0" | 3'-0" | Yes |
| Floor | From 2 to 4 and K-2 to L-2 | 92'-8 1/2" | 3'-2 1/2" | Yes |
| Floor | From I to J-2 and 4 to shield building and vertical wall 17'-0" south of column line 5 | 107'-2" | 2'-0" | Yes |
| Floor | From I to shield building wall and from intersecting vertical wall before column line 5 to column line 5 | 105'-0" | 0'-9" | Yes |
| Floor | From column line 1 to 10'-0" north of column line 1 and from 2'-9" east of column line L-2 to N | 125'-0" | 3'-0" | Yes |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|--|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Floor | From 12'-9" north of column line 1 to 2 and from 2'-9" east of column line L-2 to N | 118'-2 1/2" | 2'-0" | Yes |
| Floor | From 3 to 4 and J-2 to K-2 | 117'-6" | 2'-0" | Yes |
| Floor | From 2 to 4 and I to J-1 | 153'-0" | 0'-9" | Yes |
| Roof | From 1 to 4 and I to N | 180'-0" to 180'-9" | 1'-3" | Yes |
| Floor | From 4 to 16'-0" south of column line 5 and from I to intersection with shield building wall | 135'-3" | 0'-9" | Yes |
| Floor | From 16'-0" south of column line 5 to column line 5 and from I to intersection with shield building wall | 133'-0" | 0'-9" | Yes |
| Auxiliary Building Walls/Floors Non-Radiologically Controlled | | | | |
| Column Line 11 wall | From I to Q | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line 11 wall | From I to Q | From 100'-0" to 117'-6" | 2'-0" | Yes |
| Column Line 11 wall | From I to L | From 117'-6" to roof | 2'-0" | Yes |
| Column Line 11 wall | From L to M | From 117'-6" to 135'-3" | 4'-0" | Yes |
| Column Line 11 wall | From M to P | From 117'-6" to 135'-3" | 2'-0" | Yes |
| Column Line 11 wall | From P to Q | From 117'-6" to 135'-3" | 4'-0" | Yes |
| Column Line 11 wall | From L to Q | From 135'-3" to roof | 2'-0" | Yes |
| Column Line 7.3 wall | From I to shield building | From 66'-6" to 100'-0" | 3'-0" | Yes |
| Column Line 7.3 wall | From I to shield building | From 100'-0" to roof | 2'-0" | No |
| Column Line I wall | From 7.3 to 11 | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line I wall | From 5 to 11 | From 100'-0" to roof | 2'-0" | No |
| Column Line J wall | From 7.3 to 11 | From 66'-6" to 117'-6" | 2'-0" | No |
| Column Line K wall | From shield building wall to 11 | From 66'-6" to 135'-3" | 2'-0" | Yes |
| Column Line L wall | From shield building wall to 11 | From 66'-6" to roof | 2'-0" | Yes |
| Column Line M wall | From shield building wall to 11 | From 66'-6" to roof | 2'-0" | Yes |

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|--|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Column Line P wall | From shield building wall to 11 | From 66'-6" to roof | 2'-0" | Yes |
| Column Line Q wall | From shield building wall to 11 | From 66'-6" to 100'-0" | 3'-0" | No |
| Column Line Q wall | From shield building wall to 11 | From 100'-0" to roof | 2'-0" | Yes |
| Column Line 9.2 wall | From I to J and K to L | From 117'-6" to 135'-3" | 2'-0" | Yes |
| Labyrinth Wall between Column Line 7.3 and 9.2 and J to K | J to K | From 117'-6" to 135'-3" | 2'-0" | Yes |
| Auxiliary Area Basemat | From 7.3-11 and I-Q, excluding shield building | From 60'-6" to 66'-6" | 6'-0" | No |
| Floor | From 5 to 10'-6" south of 7.3 and I to shield building wall | 100'-0" | 2'-0" | Yes |
| Floor | From 10'-6" south of 7.3 to 7.3 and I to shield building wall | 100'-0" | 3'-0" | Yes |
| Floor | From K to L and shield building wall to column line 10 | 100'-0" | 0'-9" | Yes |
| Main Control Room Floor | From 9.2 to 11 and I to L | 117'-6" | 2'-0" | Yes |
| Floor | Bounded by shield bldg, 7.3, J, 9.2 and L | 117'-6" | 2'-0" | Yes |
| Floor | From shield building to 11 and L to Q | 117'-6" | 2'-0" | Yes |
| Floor | From 5 to 7.3 and from I to intersection with shield building wall | 135'-3" | 0'-9" | Yes |
| Annex Building | | | | |
| Column line 2 wall | From E to H | From 107'-2" to 135'-3" | 19 3/4" | Yes |
| Column line 4 wall | From E to H | From 107'-2" to 162'-6" & 166'-0" | 2'-0" | Yes |
| N-S Shield Wall between E and F | From 2 to 4 | From 107'-2" to 135'-3" | 1'-0" | Yes |
| Column line 4.1 wall | From E to H | From 107'-2" to 135'-3" | 2'-0" | Yes |
| N-S Labyrinth Wall between column line 7.8 and 9 and G to H | Not Applicable | From 100'-0" to 112'-0" | 2'-0" | Yes |
| E-W Labyrinth Wall between column line 7.1 and 7.8 and G to H | Not Applicable | From 100'-0" to 112'-0" | 2'-0" | Yes |

3. Non-System Based Design Descriptions & ITAAC

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| Table 3.3-1 (cont.) Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building⁽¹⁾ | | | | |
|--|---|--|---|---|
| Wall or Section Description | Column Lines⁽⁷⁾ | Floor Elevation or Elevation Range⁽⁷⁾⁽⁸⁾ | Concrete Thickness⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾ | Applicable Radiation Shielding Wall (Yes/No) |
| Column Line 9 wall | From E to connecting wall between G and H | From 107'-2" to 117'-6" | 2'-0" | Yes |
| Column Line E wall | From 9 to 13 | From 100'-0" to 135'-3" | 2'-0" | Yes |
| Column Line 13 wall | From E to I.1 | From 100'-0" to 135'-3" | 2'-0" | Yes |
| Column Line I.1 wall | From 11.09 to 13 | From 100'-0" to 135'-3" | 2'-0" | Yes |
| Corridor Wall between G and H | From 9 to near 13 | From 100'-0" to 117'-6" | 1'-6" | Yes |
| Corridor Wall between G and H | From 9 to 13 | From 117'-6" to 135'-3" | 1'-6" | Yes |
| Column Line 9 wall | From E to H | From 117'-6" to 158'-0" | 2'-0" | Yes |
| Floor | From 2 to 4 and E to H | 135'-3" | 0'-8" | Yes |
| Floor | From 4 to 4.1 and E to H | 135'-3" | 1'-0" | Yes |
| Floor | From 9 to 13 and E to I.1 | 117'-6" | 0'-8" | Yes |
| Floor | From 9 to 13 and E to I.1 | 135'-3" | 0'-8" | Yes |
| Containment Filtration Rms A and B (North Wall) | Between column line E to H | From 135'-3" to 158'-0" | 1'-0" | Yes |
| Containment Filtration Rms A and B (East wall) | Between column line E to F | From 135'-3" to 158'-0" | 1'-0" | Yes |
| Containment Filtration Rm A (West wall) | Between column line G to H | From 135'-3" to 150'-3" | 1'-0" | Yes |
| Containment Filtration Rm A (Floor) | Between column line E to H | 135'-3" | 1'-0" | Yes |
| Containment Filtration Rm B (Floor) | Between column line E to H | 150'-3" | 0'-8" | Yes |
| Containment Filtration Rm B (West wall) | Between column line G to H | From 150'-3" to 158'-0" | 1'-0" | Yes |
| Turbine Building | | | | |
| Wall adjacent to Column Line I.2 | From Col. Line 11.05 to 11.2 | From 100'-0" to 169'-0" | 3'-0" | No |
| Wall along Column Line 11.2 | From near I.2 to near Col. Line R | From 100'-0" to 169'-0" | 2'-0" | No |
| Wall adjacent to Column Line R | From Col. Line 11.2 to Col. Line 11.02 | From 100'-0" to 169'-0" | 3'-0" | No |
| Wall along Column Line 11.02 | From near Col. Line R to near Col. Line Q | From 100'-0" to 169'-0" | 2'-0" | No |
| Wall along Column Line 11.05 | From Col. Line K.4 to near Col. Line I.2 | From 100'-0" to 169'-0" | 2'-0" | No |

| Table 3.3-2 Nuclear Island Building Room Boundaries Required to Have Flood Barrier Floors and Walls | | |
|--|---|--|
| Boundary/ Maximum Flood Level (inches) | Between Room Number to Room Number | |
| | Room with Postulated Flooding Source | Adjacent Room |
| Floor/36 | 12306 | 12211 |
| Floor/3 | 12303 | 12203/12207 |
| Floor/3 | 12313 | 12203/12207 |
| Floor/1 | 12300 | 12201/12202/12207 12203/12204/12205 |
| Floor/3 | 12312 | 12212 |
| Wall/36 | 12306 | 12305 |
| Floor/1 | 12401 | 12301/12302/12303 12312/12313 |
| Wall/1 | 12401 | 12411/12412 |
| Floor/36 | 12404 | 12304 |
| Floor/4 | 12405 | 12305 |
| Floor/36 | 12406 | 12306 |
| Wall/36 | 12404 | 12401 |
| Wall/1 | 12421 | 12452 |
| Floor/3 | 12501 | 12401/12411/12412 |
| Floor/3 | 12555 | 12421/12423/12422 |
| Wall/36 | 12156/12158 | 12111/12112 |

| Table 3.3-3 Class 1E Divisions in Nuclear Island Fire Areas | | | | |
|--|--------------------|-----|-----|-----|
| Fire Area Number | Class 1E Divisions | | | |
| | A | C | B | D |
| Auxiliary Building Radiologically Controlled | | | | |
| 1200 AF 01 | Yes | Yes | – | – |
| 1204 AF 01 | Yes | – | – | – |
| Auxiliary Building Non-Radiologically Controlled | | | | |
| 1200 AF 03 | – | – | Yes | Yes |
| 1201 AF 02 | – | – | Yes | – |
| 1201 AF 03 | – | – | – | Yes |
| 1201 AF 04 | – | – | Yes | Yes |
| 1201 AF 05 | – | – | Yes | Yes |
| 1201 AF 06 | – | – | Yes | Yes |
| 1202 AF 03 | – | Yes | – | – |
| 1202 AF 04 | Yes | – | – | – |
| 1220 AF 01 | – | – | Yes | Yes |
| 1220 AF 02 | – | – | – | Yes |
| 1230 AF 01 | Yes | Yes | – | – |
| 1230 AF 02 | – | – | Yes | Yes |
| 1240 AF 01 | Yes | Yes | – | – |
| 1242 AF 02 | Yes | | – | |

Note: Dash (–) indicates not applicable.

Table 3.3-4 is not used.

| Table 3.3-5 Key Dimensions of Nuclear Island Building Features | | | |
|--|--|--------------------------|------------------|
| Key Dimension | Reference Dimension (Figure 3.3-14) | Nominal Dimension | Tolerance |
| Distance between Outside Surface of walls at Column Line I & N when Measured at Column Line 1 | X1 | 91 ft-0 in | +3 ft -1 ft |
| Distance from Outside Surface of wall at Column Line 1 to Column Line 7 when Measured at Column Line I | X2 | 138 ft-0 in | +3 ft -1 ft |
| Distance from Outside Surface of wall at Column Line 11 to Column Line 7 when Measured at Column Line I | X3 | 118 ft-0 in | +3 ft -1 ft |
| Distance between Outside Surface of walls at Column Line I & Q when Measured at Column Line 11 | X4 | 117 ft-6 in | +3 ft -1 ft |
| Distance from Outside Surface of wall at Column Line Q to Column Line N when Measured at Column Line 11 | X5 | 29 ft-0 in | +3 ft -1 ft |
| Distance between Outside Surface of shield building wall to shield building centerline when Measured on West Edge of Shield Building | X6 | 72 ft-6 in | +3 ft -1 ft |
| Distance between shield building centerline to Reactor Vessel centerline when Measured along Column Line N in North-South Direction | X7 | 7 ft-6 in | ± 3 in |
| Distance from Bottom of Containment Sump to Top Surface of Embedded Containment Shell | – | 2 ft-8 in | ± 3 in |
| Distance from top of Basemat to Design Plant Grade | – | 33 ft-6 in | ± 1 ft |
| Distance of Design Plant Grade (Floor elevation 100'-0") relative to Site Grade | – | 0 ft | ± 3 ft-6 in |
| Distance from Design Plant Grade to Top Surface of Shield Building Roof | – | 229 ft-0 in | ± 1 ft |

| Table 3.3-6 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The physical arrangement of the nuclear island structures and the annex building is as described in the Design Description of this Section 3.3 and Figures 3.3-1 through 3.3-14. The physical arrangement of the radwaste building, the turbine building, and the diesel generator building is as described in the Design Description of this Section 3.3. | An inspection of the nuclear island structures, the annex building, the radwaste building, the turbine building, and the diesel generator building will be performed. | The as-built nuclear island structures, the annex building, the radwaste building, the turbine building, and the diesel generator building conform with the physical arrangement as described in the Design Description of this Section 3.3 and Figures 3.3-1 through 3.3-14. |
| 2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions. | i) An inspection of the nuclear island structures will be performed. Deviations from the design due to as-built conditions will be analyzed for the design basis loads. | <p>i.a) A report exists which reconciles deviations during construction and concludes that the as-built containment internal structures, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.</p> <p>i.b) A report exists which reconciles deviations during construction and concludes that the as-built shield building structures, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.</p> <p>i.c) A report exists which reconciles deviations during construction and concludes that the as-built structures in the non-radiologically controlled area of the auxiliary building, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | <p>i.d) A report exists which reconciles deviations during construction and concludes that the as-built structures in the radiologically controlled area of the auxiliary building, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.</p> |
| | <p>ii) An inspection of the as-built concrete thickness will be performed.</p> | <p>ii.a) A report exists that concludes that the containment internal structures as-built concrete thicknesses conform to the building sections defined in Table 3.3-1.</p> <p>ii.b) A report exists that concludes that the as-built concrete thicknesses of the shield building sections conform to the building sections defined in Table 3.3-1.</p> <p>ii.c) A report exists that concludes that as-built concrete thicknesses of the non-radiologically controlled area of the auxiliary building sections conform to the building sections defined in Table 3.3-1.</p> <p>ii.d) A report exists that concludes that the as-built concrete thicknesses of the radiologically controlled area of the auxiliary building sections conform to the building sections defined in Table 3.3-1.</p> <p>ii.e) A report exists that concludes that the as-built concrete thicknesses of the annex building sections conform with the building sections defined in Table 3.3-1.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | ii.f) A report exists that concludes that the as-built concrete thicknesses of the turbine building sections conform to the building sections defined in Table 3.3-1. |
| 2.b) Site grade level is located relative to floor elevation 100'-0" per Table 3.3-5. | Inspection of the as-built site grade will be conducted. | Site grade is consistent with design plant grade within the dimension defined on Table 3.3-5. |
| 2.c) The containment and its penetrations are designed and constructed to ASME Code Section III, Class MC. ⁽¹⁾ | See Tier 1 Material, Table 2.2.1-3, Items 2a, 2b, 3a, and 3b. . | See Tier 1 Material, Table 2.2.1-3, Items 2a, 2b, 3a, and 3b. . |
| 2.d) The containment and its penetrations retain their pressure boundary integrity associated with the design pressure. | See Tier 1 Material, Table 2.2.1-3, Items 4a and 4b.. | See Tier 1 Material, Table 2.2.1-3, Items 4a and 4b. |
| 2.e) The containment and its penetrations maintain the containment leakage rate less than the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident. | See Tier 1 Material, Table 2.2.1-3, Items 4a, 4b, and 7. | See Tier 1 Material, Table 2.2.1-3, Items 4a, 4b, and 7. |
| 2.f) The key dimensions of nuclear island structures are defined on Table 3.3-5. | An inspection will be performed of the as-built configuration of the nuclear island structures. | A report exists and concludes that the key dimensions of the as-built nuclear island structures are consistent with the dimensions defined on Table 3.3-5. |
| 2.g) The containment vessel greater than 7 feet above the operating deck provides a heat transfer surface. A free volume exists inside the containment shell above the operating deck. | The maximum containment vessel inside height from the operating deck is measured and the inner radius below the spring line is measured at two orthogonal radial directions at one elevation. | The containment vessel maximum inside height from the operating deck is 146'-7" (with tolerance of +12", -6"), and the inside diameter is 130 feet nominal (with tolerance of +12", -6"). |

1. Containment isolation devices are addressed in subsection 2.2.1, Containment System.

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 2.h) The free volume in the containment allows for floodup to support long-term core cooling for postulated loss-of-coolant accidents. | An inspection will be performed of the as-built containment structures and equipment. The portions of the containment included in this inspection are the volumes that flood with a loss-of-coolant accident in passive core cooling system valve/equipment room B (11207). The in-containment refueling water storage tank volume is excluded from this inspection. | A report exists and concludes that the floodup volume of this portion of the containment is less than 73,500 ft ³ to an elevation of 108'. |
| 3. Walls and floors of the nuclear island structures as defined on Table 3.3-1 except for designed openings or penetrations provide shielding during normal operations. | Inspection of the as-built nuclear island structures wall and floor thicknesses will be performed. | <p>a) A report exists and concludes that the shield walls and floors of the containment internal structures as defined in Table 3.3-1, except for designed openings or penetrations, are consistent with the concrete wall thicknesses provided in Table 3.3-1.</p> <p>b) A report exists and concludes that the shield walls of the shield building structures as defined in Table 3.3-1 except for designed openings or penetrations are consistent with the concrete wall thicknesses provided in Table 3.3-1.</p> <p>c) A report exists and concludes that the shield walls and floors of the non-radiologically controlled area of the auxiliary building as defined in Table 3.3-1 except for designed openings or penetrations are consistent with the concrete wall thicknesses provided in Table 3.3-1.</p> <p>d) A report exists and concludes that the shield walls and floors of the radiologically controlled area of the auxiliary building as defined in Table 3.3-1 except for designed openings or penetrations are consistent with the concrete wall thicknesses provided in Table 3.3-1.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4.a) Walls and floors of the annex building as defined on Table 3.3-1 except for designed openings or penetrations provide shielding during normal operations. | Inspection of the as-built annex building wall and floor thicknesses will be performed. | A report exists and concludes that the shield walls and floors of the annex building as defined on Table 3.3-1 except for designed openings or penetrations are consistent with the minimum concrete wall thicknesses provided in Table 3.3-1. |
| 4.b) Walls of the waste accumulation room in the radwaste building except for designed openings or penetrations provide shielding during normal operations. | Inspection of the as-built radwaste building wall thicknesses will be performed. | A report exists and concludes that the shield walls of the waste accumulation room in the radwaste building except for designed openings or penetrations are consistent with the minimum concrete wall thicknesses of 1'-4". |
| 4.c) Walls of the packaged waste storage room in the radwaste building except for designed openings or penetrations provide shielding during normal operations. | Inspection of the as-built radwaste building wall thicknesses will be performed. | A report exists and concludes that the shield walls of the packaged waste storage room in the radwaste building except for the wall shared with the waste accumulation room and designed openings or penetrations are consistent with the minimum concrete wall thicknesses of 2'. |
| 5.a) Exterior walls and the basemat of the nuclear island have a water barrier up to site grade. | An inspection of the as-built water barrier will be performed during construction. | A report exists that confirms that a water barrier exists on the nuclear island exterior walls up to site grade. |
| 5.b) The boundaries between rooms identified in Table 3.3-2 of the auxiliary building are designed to prevent flooding of rooms that contain safety-related equipment. | An inspection of the auxiliary building rooms will be performed. | A report exists that confirms floors and walls as identified on Table 3.3-2 have provisions to prevent flooding between rooms up to the maximum flood levels for each room defined in Table 3.3-2. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 5.c) The boundaries between the following rooms, which contain safety-related equipment – PXS valve/accumulator room A (11206), PXS valve/accumulator room B (11207), and CVS room (11209) – are designed to prevent flooding between these rooms. | An inspection of the boundaries between the following rooms which contain safety-related equipment – PXS Valve/Accumulator Room A (11206), PXS Valve/Accumulator Room B (11207), and CVS Room (11209) – will be performed. | A report exists that confirms that flooding of the PXS Valve/Accumulator Room A (11206), and the PXS Valve/Accumulator Room B (11207) is prevented to a maximum flood level as follows: PXS A 110'-2", PXS B 110'-1"; and of the CVS room (11209) to a maximum flood level of 110'-0". |
| 6.a) The available room volumes of the radiologically controlled area of the auxiliary building between floor elevations 66'-6" and 82'-6" exceed the volume of the liquid radwaste storage tanks (WLS-MT-05A, MT-05B, MT-06A, MT-06B, MT-07A, MT-07B, MT-07C, MT-11). | An inspection will be performed of the as-built radiologically controlled area of the auxiliary building between floor elevations 66'-6" and 82'-6" to define volume. | A report exists and concludes that the as-built available room volumes of the radiologically controlled area of the auxiliary building between floor elevations 66'-6" and 82'-6" exceed the volume of the liquid radwaste storage tanks (WLS-MT-05A, MT-05B, MT-06A, MT-06B, MT-07A, MT-07B, MT-07C, MT-11). |
| 6.b) The radwaste building package waste storage room has a volume greater than or equal to 1293 cubic feet. | An inspection of the radwaste building packaged waste storage room (50352) is performed. | The volume of the radwaste building packaged waste storage room (50352) is greater than or equal to 1293 cubic feet. |
| 7.a) Class 1E electrical cables, communication cables associated with only one division, and raceways are identified according to applicable color-coded Class 1E divisions. | Inspections of the as-built Class 1E cables and raceways will be conducted. | <p>a) Class 1E electrical cables, and communication cables inside containment associated with only one division, and raceways are identified by the appropriate color code.</p> <p>b) Class 1E electrical cables, and communication cables in the non-radiologically controlled area of the auxiliary building associated with only one division, and raceways are identified by the appropriate color code.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | c) Class 1E electrical cables, and communication cables in the radiologically controlled area of the auxiliary building associated with only one division, and raceways are identified by the appropriate color code. |
| 7.b) Class 1E divisional electrical cables and communication cables associated with only one division are routed in their respective divisional raceways. | Inspections of the as-built Class 1E divisional cables and raceways will be conducted. | <p>a) Class 1E electrical cables and communication cables inside containment associated with only one division are routed in raceways assigned to the same division. There are no other safety division electrical cables in a raceway assigned to a different division.</p> <p>b) Class 1E electrical cables and communication cables in the non-radiologically controlled area of the auxiliary building associated with only one division are routed in raceways assigned to the same division. There are no other safety division electrical cables in a raceway assigned to a different division.</p> <p>c) Class 1E electrical cables and communication cables in the radiologically controlled area of the auxiliary building associated with only one division are routed in raceways assigned to the same division. There are no other safety division electrical cables in a raceway assigned to a different division.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|--|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>7.c) Separation is maintained between Class 1E divisions in accordance with the fire areas as identified in Table 3.3-3.</p> | <p>i) Inspections of the as-built Class 1E division electrical cables, communication cables associated with only one division, and raceways located in the fire areas identified in Table 3.3-3 will be conducted.</p> | <p>i.a) Results of the inspection will confirm that the separation between Class 1E divisions in the non-radiologically controlled area of the auxiliary building is consistent with Table 3.3-3.</p> <p>i.b) Results of the inspection will confirm that the separation between Class 1E divisions in the radiologically controlled area of the auxiliary building is consistent with Table 3.3-3.</p> |
| | <p>ii) Inspections of the as-built fire barriers between the fire areas identified in Table 3.3-3 will be conducted.</p> | <p>ii.a) Results of the inspection will confirm that fire barriers exist between fire areas identified in Table 3.3-3 inside the non-radiologically controlled area of the auxiliary building.</p> <p>ii.b) Results of the inspection will confirm that fire barriers exist between fire areas identified in Table 3.3-3 inside the radiologically controlled area of the auxiliary building.</p> |
| <p>7.d) Physical separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables.</p> | <p>Inspections of the as-built Class 1E raceways will be performed to confirm that the separation between Class 1E raceways of different divisions and between Class 1E raceways and non-Class 1E raceways is consistent with the following:</p> <p>i) Within the main control room and remote shutdown room, the minimum vertical separation is 3 inches and the minimum horizontal separation is 1 inch.</p> | <p>Results of the inspection will confirm that the separation between Class 1E raceways of different divisions and between Class 1E raceways and non-Class 1E raceways is consistent with the following:</p> <p>i) Within the main control room and remote shutdown room, the vertical separation is 3 inches or more and the horizontal separation is 1 inch or more.</p> |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | <p>ii) Within other plant areas (limited hazard areas), the minimum separation is defined by one of the following:</p> <ol style="list-style-type: none"> 1) The minimum vertical separation is 5 feet and the minimum horizontal separation is 3 feet. 2) The minimum vertical separation is 12 inches and the minimum horizontal separation is 6 inches for raceways containing only instrumentation and control and low-voltage power cables <2/0 AWG. 3) For configurations that involve exclusively limited energy content cables (instrumentation and control), the minimum vertical separation is 3 inches and the minimum horizontal separation is 1 inch. 4) For configurations involving an enclosed raceway and an open raceway, the minimum vertical separation is 1 inch if the enclosed raceway is below the open raceway. 5) For configuration involving enclosed raceways, the minimum separation is 1 inch in both horizontal and vertical directions. | <p>ii.a) Within other plant areas inside containment (limited hazard areas), the separation meets one of the following:</p> <ol style="list-style-type: none"> 1) The vertical separation is 5 feet or more and the horizontal separation is 3 feet or more except. 2) The minimum vertical separation is 12 inches and the minimum horizontal separation is 6 inches for raceways containing only instrumentation and control and low-voltage power cables <2/0 AWG. 3) For configurations that involve exclusively limited energy content cables (instrumentation and control), the minimum vertical separation is 3 inches and the minimum horizontal separation is 1 inch. 4) For configurations that involve an enclosed raceway and an open raceway, the minimum vertical separation is 1 inch if the enclosed raceway is below the open raceway. 5) For configurations that involve enclosed raceways, the minimum vertical and horizontal separation is 1 inch. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|-------------------------------------|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | <p>ii.b) Within other plant areas inside the non-radiologically controlled area of the auxiliary building (limited hazard areas), the separation meets one of the following:</p> <ol style="list-style-type: none"> 1) The vertical separation is 5 feet or more and the horizontal separation is 3 feet or more except. 2) The minimum vertical separation is 12 inches and the minimum horizontal separation is 6 inches for raceways containing only instrumentation and control and low-voltage power cables < 2/0 AWG. 3) For configurations that involve exclusively limited energy content cables (instrumentation and control), the minimum vertical separation is 3 inches and the minimum horizontal separation is 1 inch. 4) For configurations that involve an enclosed raceway and an open raceway, the minimum vertical separation is 1 inch if the enclosed raceway is below the open raceway. 5) For configurations that involve enclosed raceways, the minimum vertical and horizontal separation is 1 inch. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|-------------------------------------|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | | <p>ii.c) Within other plant areas inside the radiologically controlled area of the auxiliary building (limited hazard areas), the separation meets one of the following:</p> <ol style="list-style-type: none"> 1) The vertical separation is 5 feet or more and the horizontal separation is 3 feet or more except. 2) The minimum vertical separation is 12 inches and the minimum horizontal separation is 6 inches for raceways containing only instrumentation and control and low-voltage power cables < 2/0 AWG. 3) For configurations that involve exclusively limited energy content cables (instrumentation and control), the minimum vertical separation is 3 inches and the minimum horizontal separation is 1 inch. 4) For configurations that involve an enclosed raceway and an open raceway, the minimum vertical separation is 1 inch if the enclosed raceway is below the open raceway. 5) For configurations that involve enclosed raceways, the minimum vertical and horizontal separation is 1 inch. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | iii) Where minimum separation distances are not maintained, the circuits are run in enclosed raceways or barriers are provided. | iii.a) Where minimum separation distances are not met inside containment, the circuits are run in enclosed raceways or barriers are provided. iii.b) Where minimum separation distances are not met inside the non-radiologically controlled area of the auxiliary building, the circuits are run in enclosed raceways or barriers are provided. iii.c) Where minimum separation distances are not met inside the radiologically controlled area of the auxiliary building, the circuits are run in enclosed raceways or barriers are provided. |
| | iv) Separation distances less than those specified above and not run in enclosed raceways or provided with barriers are based on analysis | iv.a) For areas inside containment, a report exists and concludes that separation distances less than those specified above and not provided with enclosed raceways or barriers have been analyzed. iv.b) For areas inside the non-radiologically controlled area of the auxiliary building, a report exists and concludes that separation distances less than those specified above and not provided with enclosed raceways or barriers have been analyzed. iv.c) For areas inside the radiologically controlled area of the auxiliary building, a report exists and concludes that separation distances less than those specified above and not provided with enclosed raceways or barriers have been analyzed. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| | v) Non-Class 1E wiring that is not separated from Class 1E or associated wiring by the minimum separation distance or by a barrier or analyzed is considered as associated circuits and subject to Class 1E requirements. | <p>v.a) For areas inside containment, non-Class 1E wiring that is not separated from Class 1E or associated wiring by the minimum separation distance or by a barrier or analyzed is treated as Class 1E wiring.</p> <p>v.b) For areas inside the non-radiologically controlled area of the auxiliary building, non-Class 1E wiring that is not separated from Class 1E or associated wiring by the minimum separation distance or by a barrier or analyzed is treated as Class 1E wiring.</p> <p>v.c) For areas inside the radiologically controlled area of the auxiliary building, non-Class 1E wiring that is not separated from Class 1E or associated wiring by the minimum separation distance or by a barrier or analyzed is treated as Class 1E wiring.</p> |
| 7.e) Class 1E communication cables which interconnect two divisions are routed and separated such that the Protection and Safety Monitoring System voting logic is not defeated by the loss of any single raceway or fire area. | Inspections of the as-built Class 1E communication cables will be conducted. | Class 1E communication cables which interconnect two divisions are routed and separated such that the Protection and Safety Monitoring System voting logic is not defeated by the loss of any single raceway or fire area. |
| 8. Systems, structures, and components identified as essential targets are protected from the dynamic and environmental effects of postulated pipe ruptures. | Following as-built reconciliation, an inspection will be performed of the as-built high and moderate energy pipe rupture mitigation features for systems, structures, and components identified as essential targets. | An as-built Pipe Rupture Hazard Analysis Report exists and concludes that systems, structures, and components identified as essential targets can withstand the effects of postulated pipe rupture without loss of required safety function. |
| 9. The reactor cavity sump has a minimum concrete thickness as shown in Table 3.3-5 between the bottom of the sump and the steel containment. | An inspection of the as-built containment building internal structures will be performed. | A report exists and concludes that the reactor cavity sump has a minimum concrete thickness as shown on Table 3.3-5 between the bottom of the sump and the steel containment. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 10. The shield building roof and PCS storage tank support and retain the PCS water sources. The PCS storage tank has a stainless steel liner which provides a barrier on the inside surfaces of the tank. Leak chase channels are provided on the tank boundary liner welds. | <p>i) A test will be performed to measure the leakage from the PCS storage tank based on measuring the water flow out of the leak chase collection system.</p> <p>ii) An inspection of the PCS storage tank exterior tank boundary and shield building tension ring will be performed before and after filling of the PCS storage tank to the overflow level. The vertical elevation of the shield building roof will be measured at a location at the outer radius of the roof (tension ring) and at a location on the same azimuth at the outer radius of the PCS storage tank before and after filling the PCS storage tank.</p> | <p>i) A report exists and concludes that total water flow from the leak chase collection system does not exceed 10 gal/hr.</p> <p>ii) A report exists and concludes that inspection and measurement of the PCS storage tank and the tension ring structure, before and after filling of the tank, shows structural behavior under normal loads to be acceptable.</p> |
| | <p>iii) An inspection of the PCS storage tank exterior tank boundary and shield building tension ring will be performed before and after filling of the PCS storage tank to the overflow level. The boundaries of the PCS storage tank and the shield building roof above the tension ring will be inspected visually for excessive concrete cracking.</p> | <p>iii) A report exists and concludes that there is no visible water leakage from the PCS storage tank through the concrete and that there is no visible excessive cracking in the boundaries of the PCS storage tank and the shield building roof above the tension ring.</p> |
| 11. Deleted | | |
| 12. The extended turbine generator axis intersects the shield building. | An inspection of the as-built turbine generator will be performed. | The extended axis of the turbine generator intersects the shield building. |

| Table 3.3-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|---|---|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 13. Separation is provided between the structural elements of the turbine, annex and radwaste buildings and the nuclear island structure. This separation permits horizontal motion of the buildings in the safe shutdown earthquake without impact between structural elements of the buildings. | An inspection of the separation of the nuclear island from the annex, radwaste and turbine building structures will be performed. The inspection will verify the specified horizontal clearance between structural elements of the adjacent buildings, consisting of the reinforced concrete walls and slabs, structural steel columns and floor beams. | The minimum horizontal clearance above floor elevation 100'-0" between the structural elements of the annex and radwaste buildings and the nuclear island is 4 inches. The minimum horizontal clearance above floor elevation 100'-0" between the structural elements of the turbine building and the nuclear island is 4 inches. |
| 14. The external walls, doors, ceiling, and floors in the main control room, the central alarm station, and the secondary alarm station are bullet-resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4. | Type test, analysis, or a combination of type test and analysis will be performed for the external walls, doors, ceilings, and floors in the main control room, the central alarm station, and the secondary alarm station. | A report exists and concludes that the external walls, doors, ceilings, and floors in the main control room, the central alarm station, and the secondary alarm station are bullet-resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4. |
| 15. Deleted. | | |
| 16. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within a vital area. | An inspection will be performed to ensure that the location of the secondary security power supply equipment for alarm annunciator equipment and non-portable communications equipment is within a vital area. | Secondary security power supply equipment for alarm annunciator equipment and non-portable communication equipment is located within a vital area. |
| 17. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area. | An inspection of the as-built vital areas, and central and secondary alarm stations are performed. | Vital areas are locked and alarmed with active intrusion detection systems and intrusion is detected and annunciated in both the central and secondary alarm stations. |
| 18. Deleted. | | |

| <p align="center">Table 3.3-7 Nuclear Island Critical Structural Sections</p> |
|--|
| <p><u>Containment Internal Structures</u></p> <p>South west wall of the refueling cavity</p> <p>South wall of the west steam generator compartment</p> <p>North east wall of the in-containment refueling water storage tank</p> <p>In-containment refueling water storage tank steel wall</p> <p>Column supporting the operating floor</p> |
| <p><u>Auxiliary and Shield Building</u></p> <p>South wall of auxiliary building (column line 1), elevation 66'-6" to elevation 180'-0"</p> <p>Interior wall of auxiliary building (column line 7.3), elevation 66'-6" to elevation 160'-6"</p> <p>West wall of main control room in auxiliary building (column line L), elevation 117'-6" to elevation 153'-0"</p> <p>North wall of MSIV east compartment (column line 11 between lines L and M), elevation 117'-6" to elevation 153'-0"</p> <p>Roof slab at elevation 180'-0" adjacent to shield building cylinder</p> <p>Floor slab on metal decking at elevation 135'-3"</p> <p>2'-0" slab in auxiliary building (tagging room ceiling) at elevation 135'-3"</p> <p>Finned floor in the main control room at elevation 135'-3"</p> <p>Shield building roof, exterior wall of the PCS water storage tank</p> <p>Shield building roof, interior wall of the PCS water storage tank</p> <p>Shield building roof, tension ring and air inlets</p> <p>Divider wall between the spent fuel pool and the fuel transfer canal</p> <p>Shield building SC cylinder</p> <p>Shield building SC to RC connection</p> |
| <p><u>Nuclear Island Basemat Below Auxiliary Building</u></p> <p>Bay between reference column lines 9.1 and 11, and K and L</p> <p>Bay between reference column lines 1 and 2 and K-2 and N</p> |

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-1
Nuclear Island Section A-A

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-2
Nuclear Island Section B-B

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-3
Nuclear Island Plan View at Elevation 66'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-4
Nuclear Island Plan View at Elevation 82'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-5
Nuclear Island Plan View at Elevation 96'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-6
Nuclear Island Plan View at Elevation 100'-0"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-7
Nuclear Island Plan View at Elevation 117'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-8
Nuclear Island Plan View at Elevation 135'-3"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-9
Nuclear Island Plan View at Elevation
153'-3" and 160'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-10
Nuclear Island Plan View at Shield Building Roof

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-11A
Annex Building Plan View at Elevation 100'-0"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-11B
Turbine Building General Arrangement Plan at Elevation 100'-0"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-12
Annex Building Plan View at Elevation 117'-6"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-13
Annex Building Plan View at Elevation 135'-3"

Security-Related Information, Withheld Under 10 CFR 2.390d

Figure 3.3-14
Nuclear Island Dimensions at
Elevation 66'-6"

3.4 Initial Test Program

Design Description

This section represents a commitment that combined license applicants referencing the AP1000 certified design will implement an initial test program.

An initial test program is performed during the initial startup of each AP1000 plant. The initial test program consists of a series of tests categorized as construction and installation, preoperational (prior to fuel load), and startup (during and after fuel load). All ITAAC will be completed prior to fuel load; therefore, no ITAAC are performed during the startup test phase of the initial test program.

Construction and installation tests are performed to verify the adequacy of construction, installation, and preliminary operation of components and systems. Various electrical and mechanical tests are performed including cleaning and flushing, hydrostatic testing, electrical checks, operability checks, and instrumentation calibration. The completion of the construction and installation test program demonstrates that the system is ready for preoperational testing.

Preoperational tests are performed for each system after construction and installation tests, but prior to initial fuel loading to demonstrate that equipment and systems perform in accordance with design criteria so that initial fuel loading, initial criticality, and subsequent power operation can be safely undertaken. Preoperational tests include, as appropriate, logic and interlock tests, control and instrumentation functional tests, component functional tests, operational and performance tests, and expansion, vibration, and dynamic effects tests.

Startup tests begin with the initial fuel loading and are performed to demonstrate the capability of individual systems, as well as the integrated plant, to meet performance requirements. Startup testing is conducted in four categories: tests related to initial fuel loading, tests performed after initial fuel loading but prior to initial criticality, tests related to initial criticality and those performed at low power (less than 5 percent), and tests performed at power levels greater than 5 percent (ascension to power tests). Startup tests include a controlled fuel load, reactor core and component performance tests, initial criticality, control and protection system operational tests, and plant system performance tests.

Preoperational and startup tests are performed using test specifications and test procedures. The test procedures delineate the test methods to be used in the conduct of the Initial Test Program and the applicable acceptance criteria against which performance is evaluated. Test specifications and procedures are developed and reviewed by qualified personnel. Copies of the test specifications and test procedures for preoperational tests are available to NRC personnel prior to the scheduled performance of these tests. Copies of the test specifications and test procedures for startup tests are provided to NRC inspection personnel prior to the scheduled fuel loading date. Administrative procedures are used to control the conduct of the test program; the review, evaluation and approval of test results; and test record retention.

3.5 Radiation Monitoring

Design Description

Radiation monitoring is provided for those plant areas where there is a significant potential for airborne contamination, for those process and effluent streams where contamination is possible, and in accessible areas to provide indication of unusual radiological events as identified in Tables 3.5-1, 3.5-2, 3.5-3, 3.5-4, and 3.5-5. The radiation monitoring component locations are as shown in Table 3.5-7.

1. The seismic Category I equipment identified in Table 3.5-1 can withstand seismic design basis loads without loss of safety function.
2. The Class 1E equipment identified in Table 3.5-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
3. Separation is provided between system Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
4. Safety-related displays identified in Table 3.5-1 can be retrieved in the main control room (MCR).
5. The process radiation monitors listed in Table 3.5-2 are provided.
6. The effluent radiation monitors listed in Table 3.5-3 are provided.
7. The airborne radiation monitors listed in Table 3.5-4 are provided.
8. The area radiation monitors listed in Table 3.5-5 are provided.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.5-6 specifies the inspections, tests, analyses, and associated acceptance criteria for radiation monitoring.

| Table 3.5-1 | | | | | |
|---|----------------|-----------------------|-----------------|-------------------------------|-------------------------------|
| Equipment Name | Tag No. | Seismic Cat. I | Class 1E | Qual. for Harsh Envir. | Safety-Related Display |
| Containment High Range Monitor | PXS-RE160 | Yes | Yes | Yes | Yes |
| Containment High Range Monitor | PXS-RE161 | Yes | Yes | Yes | Yes |
| Containment High Range Monitor | PXS-RE162 | Yes | Yes | Yes | Yes |
| Containment High Range Monitor | PXS-RE163 | Yes | Yes | Yes | Yes |
| MCR Radiation Monitoring Package A ⁽¹⁾ | VBS-JS01A | Yes | Yes | No | No |
| MCR Radiation Monitoring Package B ⁽¹⁾ | VBS-JS01B | Yes | Yes | No | No |
| Containment Atmosphere Monitor (Gaseous) | PSS-RE026 | Yes | No | No | No |
| Containment Atmosphere Monitor (particulate, for RCS pressure boundary leakage detection) | PSS-RE027 | Yes | No | No | No |

Notes: (1) Each MCR Radiation Monitoring Package includes particulate, iodine and gaseous radiation monitors.

| Table 3.5-2 Process Radiation Monitors | |
|---|----------------------|
| Equipment List | Equipment No. |
| Steam Generator Blowdown | BDS-RE010 |
| Steam Generator Blowdown | BDS-RE011 |
| Component Cooling Water | CCS-RE001 |
| Main Steam Line ⁽¹⁾ | SGS-RY026 |
| Main Steam Line ⁽¹⁾ | SGS-RY027 |
| Service Water Blowdown | SWS-RE008 |
| Primary Sampling System Liquid Sample | PSS-RE050 |
| Primary Sampling System Gaseous Sample | PSS-RE052 |
| Containment Air Filtration Exhaust | VFS-RE001 |
| Gaseous Radwaste Discharge | WGS-RE017 |

Note:

- Each main steam line monitor includes a noble gas detector and primary-to-secondary side leak detector.

| Table 3.5-3 Effluent Radiation Monitors | |
|--|----------------------|
| Equipment List | Equipment No. |
| Plant Vent (Normal Range Particulate) | VFS-RE101 |
| Plant Vent (Normal Range Iodine) | VFS-RE102 |
| Plant Vent (Normal Range Radiogas) | VFS-RE103 |
| Plant Vent (Mid Range Radiogas) | VFS-RE104A |
| Plant Vent (High Range Radiogas) | VFS-RE104B |
| Turbine Island Vent ⁽¹⁾ | TDS-RE001 |
| Liquid Radwaste Discharge | WLS-RE229 |
| Wastewater Discharge | WWS-RE021 |

Note:

- The turbine island vent includes a low and a high range detector.

| Table 3.5-4 Airborne Radiation Monitors | |
|---|----------------------|
| Equipment List | Equipment No. |
| Fuel Handling Area Exhaust Radiation Monitor | VAS-RE001 |
| Auxiliary Building Exhaust Radiation Monitor | VAS-RE002 |
| Annex Building Exhaust Radiation Monitor | VAS-RE003 |
| Health Physics and Hot Machine Shop Exhaust Radiation Monitor | VHS-RE001 |
| Radwaste Building Exhaust Radiation Monitor | VRS-RE023 |

| Table 3.5-5 Area Radiation Monitors | |
|--|-----------|
| Primary Sampling Room | RMS-RE008 |
| Containment Area – Personnel Hatch Operating Deck (135'-3" Elevation) | RMS-RE009 |
| Main Control Room | RMS-RE010 |
| Chemistry Laboratory | RMS-RE011 |
| Fuel Handling Area 1 | RMS-RE012 |
| Rail Car Bay/Filter Storage Area (Auxiliary Building Loading Bay) | RMS-RE013 |
| Liquid and Gaseous Radwaste Area ⁽¹⁾ | RMS-RY014 |
| Control Support Area | RMS-RE016 |
| Radwaste Building Mobile Systems Facility | RMS-RE017 |
| Hot Machine Shop | RMS-RE018 |
| Annex Staging and Storage Area | RMS-RE019 |
| Fuel Handling Area 2 | RMS-RE020 |
| Containment Area – Personnel Hatch Maintenance Level (100'-0" Elevation) | RMS-RE021 |

Note:

1. This monitor includes multiple detectors to monitor the areas of interest.

| Table 3.5-6 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>1. The seismic Category I equipment identified in Table 3.5-1 can withstand seismic design basis loads without loss of safety function.</p> | <p>i) Inspection will be performed to verify that the seismic Category I equipment identified in Table 3.5-1 is located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>iii) Inspection will be performed for the existence of a report verifying that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> | <p>i) The seismic Category I equipment identified in Table 3.5-1 is located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.</p> <p>iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p> |
| <p>2. The Class 1E equipment identified in Table 3.5-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p> | <p>i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.</p> <p>ii) Inspection will be performed of the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.</p> | <p>i) A report exists and concludes that Class 1E equipment identified in Table 3.5-1 as being located in a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p> <p>ii) A report exists and concludes that the as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 3.5-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p> |
| <p>3. Separation is provided between system Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.</p> | <p>See Tier 1 Material, Table 3.3-6, item 7.d).</p> | <p>See Tier 1 Material, Table 3.3-6, item 7.d).</p> |

| Table 3.5-6 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 4. Safety-related displays identified in Table 3.5-1 can be retrieved in the MCR. | Inspection will be performed for retrievability of the displays in the MCR. | Safety-related displays identified in Table 3.5-1 can be retrieved in the MCR. |
| 5. The process radiation monitors listed in Table 3.5-2 are provided. | Inspection for the existence of the monitors will be performed. | Each of the monitors listed in Table 3.5-2 exists. |
| 6. The effluent radiation monitors listed in Table 3.5-3 are provided. | Inspection for the existence of the monitors will be performed. | Each of the monitors listed in Table 3.5-3 exists. |
| 7. The airborne radiation monitors listed in Table 3.5-4 are provided. | Inspection for the existence of the monitors will be performed. | Each of the monitors listed in Table 3.5-4 exists. |
| 8. The area radiation monitors listed in Table 3.5-5 are provided. | Inspection for the existence of the monitors will be performed. | Each of the monitors listed in Table 3.5-5 exists. |

| Table 3.5-7 | | |
|---|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Containment High Range Radiation Monitor | PXS-RE160 | Containment |
| Containment High Range Radiation Monitor | PXS-RE161 | Containment |
| Containment High Range Radiation Monitor | PXS-RE162 | Containment |
| Containment High Range Radiation Monitor | PXS-RE163 | Containment |
| MCR Radiation Monitoring Package A | VBS-RY01A | Auxiliary Building |
| MCR Radiation Monitoring Package B | VBS-RY01B | Auxiliary Building |
| Containment Atmosphere Radiation Monitor (Gaseous) | PSS-RE026 | Auxiliary Building |
| Containment Atmosphere Radiation Monitor (particulate, for RCS pressure boundary leakage detection) | PSS-RE027 | Auxiliary Building |
| Steam Generator Blowdown Radiation Monitor | BDS-RE010 | Turbine Building |
| Steam Generator Blowdown Radiation Monitor | BDS-RE011 | Turbine Building |
| Component Cooling Water Radiation Monitor | CCS-RE001 | Turbine Building |
| Main Steam Line Radiation Monitor | SGS-RY026 | Auxiliary Building |
| Main Steam Line Radiation Monitor | SGS-RY027 | Auxiliary Building |
| Service Water Blowdown Radiation Monitor | SWS-RE008 | Turbine Building |
| Primary Sampling System Liquid Sample Radiation Monitor | PSS-RE050 | Auxiliary Building |
| Primary Sampling System Gaseous Sample Radiation Monitor | PSS-RE052 | Auxiliary Building |
| Containment Air Filtration Exhaust Radiation Monitor | VFS-RE001 | Annex Building |
| Gaseous Radwaste Discharge Radiation Monitor | WGS-RE017 | Auxiliary Building |
| Plant Vent (Normal Range Particulate) Radiation Monitor | VFS-RE101 | Auxiliary Building |
| Plant Vent (Normal Range Iodine) Radiation Monitor | VFS-RE102 | Auxiliary Building |
| Plant Vent (Normal Range Radiogas) Radiation Monitor | VFS-RE103 | Auxiliary Building |
| Plant Vent (Mid Range Radiogas) Radiation Monitor | VFS-RE104A | Auxiliary Building |
| Plant Vent (High Range Radiogas) Radiation Monitor | VFS-RE104B | Auxiliary Building |
| Turbine Island Vent Radiation Monitor | TDS-RE001 | Turbine Building |

| Table 3.5-7 (cont.) | | |
|---|----------------|---------------------------|
| Component Name | Tag No. | Component Location |
| Liquid Radwaste Discharge Monitor | WLS-RE229 | Radwaste Building |
| Wastewater Discharge Radiation Monitor | WWS-RE021 | Turbine Building |
| Fuel Handling Area Exhaust Radiation Monitor | VAS-RE001 | Auxiliary Building |
| Auxiliary Building Exhaust Radiation Monitor | VAS-RE002 | Auxiliary Building |
| Annex Building Exhaust Radiation Monitor | VAS-RE003 | Auxiliary Building |
| Health Physics and Hot Machine Shop Exhaust Radiation Monitor | VHS-RE001 | Annex Building |
| Radwaste Building Exhaust Radiation Monitor | VRS-RE023 | Radwaste Building |
| Primary Sampling Room | RMS-RE008 | Auxiliary Building |
| Containment Area – Personnel Hatch – Operating Deck | RMS-RE009 | Auxiliary Building |
| Main Control Room | RMS-RE010 | Auxiliary Building |
| Chemistry Laboratory | RMS-RE011 | Auxiliary Building |
| Fuel Handling Area 1 | RMS-RE012 | Auxiliary Building |
| Rail Car Bay/Filter Storage Area (Auxiliary Building Loading Bay) | RMS-RE013 | Auxiliary Building |
| Liquid and Gaseous Radwaste Area | RMS-RY014 | Radwaste Building |
| Control Support Area | RMS-RE016 | Annex Building |
| Radwaste Building Mobile Systems Facility | RMS-RE017 | Radwaste Building |
| Hot Machine Shop | RMS-RE018 | Annex Building |
| Annex Staging and Storage Area | RMS-RE019 | Annex Building |
| Fuel Handling Area 2 | RMS-RE020 | Auxiliary Building |
| Containment Area – Personnel Hatch – Maintenance Level | RMS-RE021 | Auxiliary Building |

3.6 Reactor Coolant Pressure Boundary Leak Detection

Design Description

The reactor coolant pressure boundary leakage detection monitoring provides a means of detecting and quantifying the reactor coolant leakage. To detect unidentified leakage inside containment, the following diverse methods are provided to quantify and assist in locating the leakage:

- Containment Sump Level
- Reactor Coolant System Inventory Balance
- Containment Atmosphere Radiation

Leakage detection monitoring is accomplished using instrumentation and other components of several systems.

1. The diverse leak detection methods provide the nonsafety-related function of detecting small leaks when RCS leakage indicates possible reactor coolant pressure boundary degradation.

Inspection, Tests, Analyses, and Acceptance Criteria

Table 3.6-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the leak detection equipment.

| Table 3.6-1 Inspections, Tests, Analyses, and Acceptance Criteria | | |
|---|--|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| <p>1. The diverse leak detection methods provide the nonsafety-related function of detecting small leaks when RCS leakage indicates possible reactor coolant pressure boundary degradation.</p> | <p>See Tier 1 Material sections:</p> <p>i) See Tier 1 Material, Table 2.3.10-4, Item 7a for the sump level measuring instruments WLS-034 and WLS-035.</p> <p>ii) See Tier 1 Material, Table 3.5-6, Item 1 for the containment atmosphere radioactivity monitor PSS-RE027.</p> <p>iii) See Tier 1 Material, Table 2.1.2-4, Items 5a, 7a, and 10 for the pressurizer level measuring instruments RCS-195A, RCS-195B, RCS-195C, and RCS-195D.</p> <p>iv) See Tier 1 Material, Table 2.1.2-4, Items 5a and 7a for the RCS hot and cold leg temperature instruments RCS-121A, RCS-121B, RCS-121C, RCS-121D, RCS-122A, RCS-122B, RCS-122C, RCS-122D, RCS-131A, RCS-131B, RCS-131C, RCS-131D, RCS-132A, RCS-132B, RCS-132C, and RCS-132D.</p> <p>v) See Tier 1 Material, Table 2.1.2-4, Items 5a, 7a, and 10 for the RCS pressure instruments RCS-140A, RCS-140B, RCS-140C, and RCS-140D.</p> <p>vi) See Tier 1 Material, Table 2.3.2-4, Item 13 for the letdown and makeup flow instruments CVS-001 and CVS-025.</p> <p>vii) See Tier 1 Material, Table 2.3.10-4, Item 10 for the reactor coolant drain tank level instrument WLS-002.</p> | <p>See Tier 1 Material sections:</p> <p>i) See Tier 1 Material, Table 2.3.10-4, Item 7a for the sump level measuring instruments WLS-034 and WLS-035.</p> <p>ii) See Tier 1 Material, Table 3.5-6, Item 1 for the containment atmosphere radioactivity monitor PSS-RE027.</p> <p>iii) See Tier 1 Material, Table 2.1.2-4, Items 5a, 7a, and 10 for the pressurizer level measuring instruments RCS-195A, RCS-195B, RCS-195C, and RCS-195D.</p> <p>iv) See Tier 1 Material, Table 2.1.2-4, Items 5a and 7a for the RCS hot and cold leg temperature instruments RCS-121A, RCS-121B, RCS-121C, RCS-121D, RCS-122A, RCS-122B, RCS-122C, RCS-122D, RCS-131A, RCS-131B, RCS-131C, RCS-131D, RCS-132A, RCS-132B, RCS-132C, and RCS-132D.</p> <p>v) See Tier 1 Material, Table 2.1.2-4, Items 5a, 7a, and 10 for the RCS pressure instruments RCS-140A, RCS-140B, RCS-140C, and RCS-140D.</p> <p>vi) See Tier 1 Material, Table 2.3.2-4, Item 13 for the letdown and makeup flow instruments CVS-001 and CVS-025.</p> <p>vii) See Tier 1 Material, Table 2.3.10-4, Item 10 for the reactor coolant drain tank level instrument WLS-002.</p> |

3.7 Design Reliability Assurance Program

The Design Reliability Assurance Program (D-RAP) is a program that will be performed during the detailed design and equipment specification phase prior to initial fuel load. The D-RAP evaluates and sets priorities for the structures, systems, and components (SSCs) in the design, based on their degree of risk significance. The risk-significant components are listed in Table 3.7-1.

The objective of the D-RAP program is to provide reasonable assurance that risk-significant SSCs (Table 3.7-1) are designed such that: (1) assumptions from the risk analysis are utilized, (2) SSCs (Table 3.7-1) when challenged, function in accordance with the assumed reliability, (3) SSCs (Table 3.7-1) whose failure results in a reactor trip, function in accordance with the assumed reliability, and (4) maintenance actions to achieve the assumed reliability are identified.

1. The D-RAP ensures that the design of SSCs within the scope of the reliability assurance program (Table 3.7-1) is consistent with the risk insights and key assumptions (e.g., SSC design, reliability, and availability).

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.7-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the D-RAP.

| Table 3.7-1 Risk-Significant Components | |
|---|--|
| Equipment Name | Tag No. |
| Component Cooling Water System (CCS) | |
| Component Cooling Water Pumps | CCS-MP-01A/B |
| Containment System (CNS) | |
| Containment Vessel | CNS-MV-01 |
| Hydrogen Igniters | VLS-EH-1 through -64 |
| Chemical and Volume Control System (CVS) | |
| Makeup Pumps | CVS-MP-01A/B |
| Makeup Pump Suction and Discharge Check Valves | CVS-PL-V113 CVS-PL-V160A/B |
| Letdown Discharge Isolation Valves | CVS-PL-V045 CVS-PL-V047 |
| Diverse Actuation System (DAS) | |
| DAS Processor Cabinets and Control Panel (used to provide automatic and manual actuation) | DAS-JD-001 DAS-JD-002 DAS-JD-003 DAS-JD-004 OCS-JC-020 |

| Table 3.7-1 (cont.) Risk-Significant Components | |
|--|--|
| Equipment Name | Tag No. |
| Annex Building UPS Distribution Panels (provide power to DAS) | EDS1-EA-1, EDS1-EA-14, EDS2-EA-1, EDS2-EA-14 |
| Rod Drive MG Sets (Field Breakers) | PLS-MG-01A/B |
| Containment Isolation Valves Controlled by DAS | CVS-PL-V045, -V047 VFS-PL-V003, -V004, -V009, -V010 WLS-PL-V055, -V057 |
| Main ac Power System (ECS) | |
| Reactor Coolant Pump Switchgear | ECS-ES-31, -32, -41, -42, -51, -52, -61, -62 |
| Ancillary Diesel Generators | ECS-MS-01, -02 |
| 6900 Vac Buses | ECS-ES-1, -2 |
| Main and Startup Feedwater System (FWS) | |
| Startup Feedwater Pumps | FWS-MP-03A/B |
| General I&C | |
| IRWST Level Sensors | PXS-045, -046, -047, -048 |
| RCS Hot Leg Level Sensors | RCS-160A/B |
| Pressurizer Pressure Sensors | RCS-191A/B/C/D |
| Pressurizer Level Sensors | RCS-195A/B/C/D |
| Steam Generator Narrow-Range Level Sensors | SGS-001, -002, -003, -004, -005, -006, -007, -008 |
| Steam Generator Wide-Range Level Sensors | SGS-011, -012, -013, -014, -015, -016, -017, -018 |
| Main Steam Line Pressure Sensors | SGS-030, -031, -032, -033, -034, -035, -036, -037 |
| Main Feedwater Wide-Range Flow Sensors | FWS-050B/D/F, -051B/D/F |
| Startup Feedwater Flow Sensors | SGS-055A/B, -056A/B |
| CMT Level Sensors | PXS-011A/B/C/D, -012A/B/C/D, -013A/B/C/D, -014A/B/C/D |
| Class 1E dc Power and Uninterruptible Power System (IDS) | |
| 250 Vdc 24-Hour Batteries | IDSA-DB-1A/B, IDSB-DB-1A/B, IDSC-DB-1A/B, IDSD-DB-1A/B |

| Table 3.7-1 (cont.) Risk-Significant Components | |
|--|---|
| Equipment Name | Tag No. |
| 250 Vdc 24-Hour Buses | IDSA-DS-1, IDSB-DS-1 IDSC-DS-1, IDSD-DS-1 |
| 250 Vdc 24-Hour Battery Chargers | IDSA-DC-1, IDSB-DC-1, IDSC-DC-1, IDSD-DC-1 |
| 250 Vdc and 120 Vac Distribution Panels | IDSA-DD-1, IDSA-EA-1/-2, IDSB-DD-1, IDSB-EA-1/-2/-3, IDSC-DD-1, IDSC-EA-1/-2/-3, IDSD-DD-1, IDSD-EA-1/-2 |
| Fused Transfer Switch Boxes | IDSA-DF-1, IDSB-DF-1/-2, IDSC-DF-1/-2, IDSD-DF-1 |
| 250 Vdc Motor Control Centers | IDSA-DK-1, IDSB-DK-1, IDSC-DK-1, IDSD-DK-1 |
| 250 Vdc 24-Hour Inverters | IDSA-DU-1, IDSB-DU-1, IDSC-DU-1, IDSD-DU-1 |
| Passive Containment Cooling System (PCS) | |
| Recirculation Pumps | PCS-MP-01A/B |
| PCCWST Drain Isolation Valves | PCS-PL-V001A/B/C |
| Plant Control System (PLS) | |
| PLS Actuation Software (used to provide control functions) | Refer to Table 3.7-2 |
| PLS Actuation Hardware (used to provide control functions) | Refer to Table 3.7-2 |
| Protection and Monitoring System (PMS) | |
| PMS Actuation Software (used to provide automatic control functions) | Refer to Tables 2.5.2-2 and 2.5.2-3 |
| PMS Actuation Hardware (used to provide automatic control functions) | Refer to Tables 2.5.2-2 and 2.5.2-3 |
| MCR 1E Displays and System Level Controls | OCS-JC-010, -011 |
| Reactor Trip Switchgear | PMS-JD-RTS A01/02, B01/02, C01/02, D01/02 |
| Passive Core Cooling System (PXS) | |
| IRWST Vents | PXS-MT-03 |
| IRWST Screens | PXS-MY-Y01A/B/C |
| Containment Recirculation Screens | PXS-MY-Y02A/B |

| Table 3.7-1 (cont.) Risk-Significant Components | |
|--|--|
| Equipment Name | Tag No. |
| CMT Discharge Isolation Valves | PXS-PL-V014A/B, -V015A/B |
| CMT Discharge Check Valves | PXS-PL-V016A/B, -V017A/B |
| Accumulator Discharge Check Valves | PXS-PL-V028A/B, -V029A/B |
| PRHR HX Control Valves | PXS-PL-V108A/B |
| Containment Recirculation Squib Valves | PXS-PL-V118A/B, -V120A/B |
| IRWST Injection Check Valves | PXS-PL-V122A/B, -V124A/B |
| IRWST Injection Squib Valves | PXS-PL-V123A/B, -V125A/B |
| IRWST Gutter Bypass Isolation Valves | PXS-PL-V130A/B |
| Reactor Coolant System (RCS) | |
| ADS Stage 1/2/3 Valves (MOVs) | RCS-PL-V001A/B, -V011A/B RCS-PL-V002A/B, -V012A/B RCS-PL-V003A/B, -V013A/B |
| ADS Stage 4 Valves (Squibs) | RCS-PL-V004A/B/C/D |
| Pressurizer Safety Valves | RCS-PL-V005A/B |
| Reactor Vessel Insulation Water Inlet and Steam Vent Devices | RCS-MN-01 |
| Reactor Cavity Doorway Damper | — |
| Fuel Assemblies | 157 assemblies with tag numbers beginning with RXS-FA |
| Normal Residual Heat Removal System (RNS) | |
| Residual Heat Removal Pumps | RNS-MP-01A/B |
| RNS Motor-Operated Valves | RNS-PL-V011, -V022, -V023, -V055 |
| RNS Stop Check Valves RNS Check Valves | RNS-PL-V015A/B RNS-PL-V017A/B |
| RNS Check Valves | RNS-PL-V007A/B, -V013, -V056 |
| Spent Fuel Cooling System (SFS) | |
| Spent Fuel Cooling Pumps | SFS-MP-01A/B |
| Steam Generator System (SGS) | |

| Table 3.7-1 (cont.) Risk-Significant Components | |
|--|--|
| Equipment Name | Tag No. |
| Main Steam Safety Valves | SGS-PL-V030A/B, -V031A/B, -V032A/B, -V033A/B, -V034A/B, -V035A/B |
| Main Steam Line Isolation Valves | SGS-PL-V040A/B |
| Main Feedwater Isolation Valves | SGS-PL-V057A/B |
| Service Water System (SWS) | |
| Service Water Cooling Tower Fans | SWS-MA-01A/B |
| Service Water Pumps | SWS-MP-01A/B |
| Nuclear Island Nonradioactive Ventilation System (VBS) | |
| MCR Ancillary Fans | VBS-MA-10A/B |
| I&C Room B/C Ancillary Fans | VBS-MA-11, -12 |
| Containment Air Filtration System (VFS) | |
| Containment Purge Isolation Valves | VFS-PL-V003 VFS-PL-V004 VFS-PL-V009 VFS-PL-V010 |
| Chilled Water System (VWS) | |
| Air Cooled Chiller Pumps | VWS-MP-02, -03 |
| Air Cooled Chillers | VWS-MS-02, -03 |
| Liquid Radwaste System (WLS) | |
| Sump Containment Isolation Valves | WLS-PL-V055 WLS-PL-V057 |
| Onsite Standby Power System (ZOS) | |
| Engine Room Exhaust Fans | VZS-MY-V01A/B, -V02A/B |
| Onsite Diesel Generators | ZOS-MS-05A/B |

Note: Dash (-) indicates not applicable.

| Table 3.7-2 PLS D-RAP Control Functions | |
|--|--|
| | CVS Reactor Makeup RNS Reactor Injection from cask loading pit Startup Feedwater from CST Spent Fuel Cooling Component Cooling of RNS and SFS Heat Exchangers Service Water Cooling of CCS Heat Exchangers Onsite Diesel Generators Hydrogen Igniters |

| Table 3.7-3 Inspections, Tests, Analyses and Acceptance Criteria | | |
|--|---|--|
| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
| 1. The D-RAP ensures that the design of SSCs within the scope of the reliability assurance program (Table 3.7-1) is consistent with the risk insights and key assumptions (e.g., SSC design, reliability, and availability). | An analysis will confirm that the design of RAP SSCs identified in Table 3.7-1 has been completed in accordance with applicable D-RAP activities. | <p>An analysis report documents that safety-related SSCs identified in Table 3.7-1 have been designed in accordance with a 10 CFR 50 Appendix B quality program.</p> <p>An analysis report documents that non-safety-related SSCs identified in Table 3.7-1 have been designed in accordance with a program that satisfies quality assurance requirements for SSCs important to investment protection.</p> |

4.0 Interface Requirements

The 10 CFR 52.47 (a)(1)(vii) requires identification of the interface requirements to be met by those portions of the plant for which the application does not seek certification. The 10 CFR 52.47 (a)(1)(viii) requires justification that these interfaces be verifiable through inspection, testing (either in the plant or elsewhere), or analysis. An applicant for a combined license (COL) that references the Certified Design must provide design features or characteristics that comply with the interface requirements for the plant design and inspections, tests, analyses, and acceptance criteria (ITAAC) for the site-specific portion of the facility design, in accordance with 10 CFR 52.79 (c).

No Tier 1 interfaces were identified for the AP1000 standard plant design.

5.0 Site Parameters

Table 5.0-1 identifies the key site parameters that are specified for the design of safety-related aspects of structures, systems, and components for the AP1000. An actual site is acceptable if its site characteristics fall within the AP1000 plant site design parameters in Table 5.0-1.

Structures, systems, and components for the AP1000 are evaluated for generic envelope response spectra with high frequency seismic input. The spectra shown in Figure 5.0-3 and Figure 5.0-4 provide hard rock high frequency (HRHF) envelope response spectra at the foundation level for both the horizontal and vertical directions for 5% damping. An actual site is acceptable if its site-specific GMRS falls within the AP1000 HRHF parameters in Figures 5.0-3 and 5.0-4. No additional design or analyses are required for the structures, systems, and components for sites that fall within the AP1000 HRHF parameters.

| Table 5.0-1 Site Parameters | |
|---|---|
| Maximum Ground Water Level | Plant elevation 98 ft |
| Maximum Flood Level | Plant elevation 100 ft (design grade elevation) |
| Precipitation | |
| Rain | 20.7 in/hr [1-hr 1-mi ² PMP] |
| Snow/Ice | Ground snow load of 75 lb/ft ² with exposure factor of 1.0 and importance factor of 1.2 |
| Air Temperature | Limits based on historical data excluding peaks of less than 2 hours duration Maximum temperature of 115° dry bulb/86.1°F coincident wet bulb Maximum wet bulb 86.1°F (noncoincident) Minimum temperature of -40°F |
| Tornado | |
| Wind Speed | Maximum wind speed of 300 mph |
| Maximum Pressure Differential | Maximum pressure differential of 2.0 lb/in ² |
| Tornado Missile Spectra | 4000-lb automobile at 105 mph horizontal, 74 mph vertical 275-lb, 8-in. shell at 105 mph horizontal, 74 mph vertical 1-in.-diameter steel ball at 105 mph in the most damaging direction |
| Soil | |
| Average Allowable Static Soil Bearing Capacity | The allowable bearing capacity, including a factor of safety appropriate for the design load combination, shall be greater than or equal to the average bearing demand of 8,900 lb/ft ² over the footprint of the nuclear island at its excavation depth. |
| Minimum Soil Angle of Internal Friction | The minimum soil angle of internal friction is greater than or equal to 35 degrees below the footprint of the nuclear island at its excavation depth. If the minimum soil angle of internal friction is below 35 degrees, a site-specific analysis shall be performed using the site-specific soil properties to demonstrate stability. |
| Dynamic Bearing Capacity for Normal Plus Safe Shutdown Earthquake (SSE) | The allowable bearing capacity, including a factor of safety appropriate for the design load combination, shall be greater than or equal to the maximum bearing demand of 35,000 lb/ft ² at the edge of the nuclear island at its excavation depth, or site-specific analyses demonstrate factor of safety appropriate for normal plus safe shutdown earthquake loads. |

| Table 5.0-1 (cont.) Site Parameters | |
|--|--|
| Soil (cont.) | |
| Limits of Acceptable Settlement Without Additional Evaluation ⁽¹⁾ | <p>Differential across nuclear island foundation mat 1/2 inch in 50 feet</p> <p>Total for nuclear island foundation mat 6 inches</p> <p>Differential between nuclear island and turbine building⁽²⁾ 3 inches</p> <p>Differential between nuclear island and other buildings⁽²⁾ 3 inches</p> |
| Lateral Variability | <p>Soils supporting the nuclear island should not have extreme variations in subgrade stiffness. This may be demonstrated by one of the following:</p> <ol style="list-style-type: none"> 1. Soils supporting the nuclear island are uniform in accordance with Regulatory Guide 1.132 if the geologic and stratigraphic features at depths less than 120 feet below grade can be correlated from one boring or sounding location to the next with relatively smooth variations in thicknesses or properties of the geologic units, or 2. Site-specific assessment of subsurface conditions demonstrates that the bearing pressures below the footprint of the nuclear island do not exceed 120% of those from the generic analyses of the nuclear island at a uniform site, or 3. Site-specific analysis of the nuclear island basemat demonstrates that the site specific demand is within the capacity of the basemat. |

Notes:

1. Additional evaluation may include evaluation of the impact of the elevated estimated settlement values on the critical components of the AP1000, determining a construction sequence to control the predicted settlement behavior, or developing an active settlement monitoring system throughout the entire construction sequence as well as a long-term (plant operation) plan.
2. Differential settlement is measured at the center of the nuclear island and the center of adjacent structures.

| Table 5.0-1 (cont.) Site Parameters | |
|--|---|
| Soil (cont.) | |
| Lateral Variability (cont.) | <p>As an example of sites that are considered uniform, the variation of shear wave velocity in the material below the foundation to a depth of 120 feet below finished grade within the nuclear island footprint and 40 feet beyond the boundaries of the nuclear island footprint meets the criteria in the case outlined below.</p> <p>Case 1: For a layer with a low strain shear wave velocity greater than or equal to 2500 feet per second, the layer should have approximately uniform thickness, should have a dip not greater than 20 degrees, and should have less than 20 percent variation in the shear wave velocity from the average velocity in any layer.</p> |
| Shear Wave Velocity | Greater than or equal to 1000 ft/sec based on minimum low-strain soil properties over the footprint of the nuclear island at its excavation depth |
| Liquefaction Potential | No liquefaction considered beneath the seismic Category I and seismic Category II structures and immediate surrounding area. The immediate surrounding area includes the effective soil supporting media associated with the seismic Category I and seismic Category II structures. |
| Seismic | |
| CSDRS | <p>CSDRS free field peak ground acceleration of 0.30g with modified Regulatory Guide 1.60 response spectra (See Figures 5.0-1 and 5.0-2). The SSE is now referred to as CSDRS. Seismic input is defined at finished grade except for sites where the nuclear island is founded on hard rock. If the site-specific spectra exceed the response spectra in Figures 5.0-1 and 5.0-2 at any frequency, or if soil conditions are outside the range evaluated for AP1000 design certification, a site-specific evaluation can be performed. This evaluation will consist of a site-specific dynamic analysis and generation of in-structure response spectra at key locations to be compared with the floor response spectra of the certified design at 5-percent damping. The site is acceptable if the floor response spectra from the site-specific evaluation do not exceed the AP1000 spectra for each of the locations or the exceedances are justified.</p> |

| Table 5.0-1 (cont.) Site Parameters | |
|---|--|
| Seismic (cont.) CSDRS (cont.) | The hard rock high frequency (HRHF) envelope response spectra are shown in Figure 5.0-3 and Figure 5.0-4 defined at the foundation level for 5% damping. The HRHF envelope response spectra provide an alternative set of spectra for evaluation of site-specific GMRS. A site is acceptable if its site-specific GMRS falls within the AP1000 HRHF envelope response spectra. Evaluation of a site for application of the HRHF envelope response spectra includes consideration of the limitation on shear wave velocity identified for use of the HRHF envelope response spectra. This limitation is defined by a shear wave velocity at the bottom of the basemat equal to or higher than 7,500 fps, while maintaining a shear wave velocity equal to or above 8,000 fps at the lower depths. |
| Fault Displacement Potential | No potential fault displacement considered beneath the seismic Category I and seismic Category II structures and immediate surrounding area. The immediate surrounding area includes the effective soil supporting media associated with the seismic Category I and seismic Category II structures. |
| Atmospheric Dispersion Factors (χ/Q) | |
| Site Boundary (0-2 hr) | $\leq 5.1 \times 10^{-4} \text{ sec/m}^3$ |
| Site Boundary (annual average) | $\leq 2.0 \times 10^{-5} \text{ sec/m}^3$ |
| Low Population Zone Boundary | |
| 0 - 8 hr | $\leq 2.2 \times 10^{-4} \text{ sec/m}^3$ |
| 8 - 24 hr | $\leq 1.6 \times 10^{-4} \text{ sec/m}^3$ |
| 24 - 96 hr | $\leq 1.0 \times 10^{-4} \text{ sec/m}^3$ |
| 96 - 720 hr | $\leq 8.0 \times 10^{-5} \text{ sec/m}^3$ |

| Table 5.0-1 (cont.) Site Parameters | | | | | | |
|--|---|---|---|---------------------------------|---|--|
| Control Room Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis | | | | | | |
| χ/Q (s/m ³) at HVAC Intake for the Identified Release Points ⁽³⁾ | | | | | | |
| | Plant Vent or PCS Air Diffuser ⁽⁵⁾ | Ground Level Containment Release Points ⁽⁶⁾ | PORV and Safety Valve Releases ⁽⁷⁾ | Steam Line Break Releases | Fuel Handling Area ⁽⁸⁾ | Condenser Air Removal Stack ⁽⁹⁾ |
| 0 - 2 hours | 3.0E-3 | 6.0E-3 | 2.0E-2 | 2.4E-2 | 6.0E-3 | 6.0E-3 |
| 2 - 8 hours | 2.5E-3 | 3.6E-3 | 1.8E-2 | 2.0E-2 | 4.0E-3 | 4.0E-3 |
| 8 - 24 hours | 1.0E-3 | 1.4E-3 | 7.0E-3 | 7.5E-3 | 2.0E-3 | 2.0E-3 |
| 1 - 4 days | 8.0E-4 | 1.8E-3 | 5.0E-3 | 5.5E-3 | 1.5E-3 | 1.5E-3 |
| 4 - 30 days | 6.0E-4 | 1.5E-3 | 4.5E-3 | 5.0E-3 | 1.0E-3 | 1.0E-3 |
| χ/Q (s/m ³) at Annex Building Door for the Identified Release Points ⁽⁴⁾ | | | | | | |
| 0 - 2 hours | 1.0E-3 | 1.0E-3 | 4.0E-3 | 4.0E-3 | 6.0E-3 | 2.0E-2 |
| 2 - 8 hours | 7.5E-4 | 7.5E-4 | 3.2E-3 | 3.2E-3 | 4.0E-3 | 1.8E-2 |
| 8 - 24 hours | 3.5E-4 | 3.5E-4 | 1.2E-3 | 1.2E-3 | 2.0E-3 | 7.0E-3 |
| 1 - 4 days | 2.8E-4 | 2.8E-4 | 1.0E-3 | 1.0E-3 | 1.5E-3 | 5.0E-3 |
| 4 - 30 days | 2.5E-4 | 2.5E-4 | 8.0E-4 | 8.0E-4 | 1.0E-3 | 4.5E-3 |

Notes:

- These dispersion factors are to be used 1) for the time period preceding the isolation of the main control room and actuation of the emergency habitability system, 2) for the time after 72 hours when the compressed air supply in the emergency habitability system would be exhausted and outside air would be drawn into the main control room, and 3) for the determination of control room doses when the nonsafety ventilation system is assumed to remain operable such that the emergency habitability system is not actuated.
- These dispersion factors are to be used when the emergency habitability system is in operation and the only path for outside air to enter the main control room is that due to ingress/egress.
- These dispersion factors are used for analysis of the doses due to a postulated small line break outside of containment. The plant vent and PCS air diffuser are potential release paths for other postulated events (loss-of-coolant accident, rod ejection accident, and fuel handling accident inside the containment); however, the values are bounded by the dispersion factors for ground level releases.
- The listed values represent modeling the containment shell as a diffuse area source, and are used for evaluating the doses in the main control room for a loss-of-coolant accident, for the containment leakage of activity following a rod ejection accident, and for a fuel handling accident occurring inside the containment.

7. The listed values bound the dispersion factors for releases from the steam line safety and power-operated relief valves. These dispersion factors would be used for evaluating the doses in the main control room for a steam generator tube rupture, a main steam line break, a locked reactor coolant pump rotor, and the secondary side release from a rod ejection accident.
8. The listed values bound the dispersion factors for releases from the fuel storage and handling area. The listed values also bound the dispersion factors for releases from the fuel storage area in the event that spent fuel boiling occurs and the fuel building relief panel opens on high temperature. These dispersion factors are used for the fuel handling accident occurring outside containment and for evaluating the impact of releases associated with spent fuel pool boiling.
9. This release point is included for information only as a potential activity release point. None of the design basis accident radiological consequences analyses model release from this point.

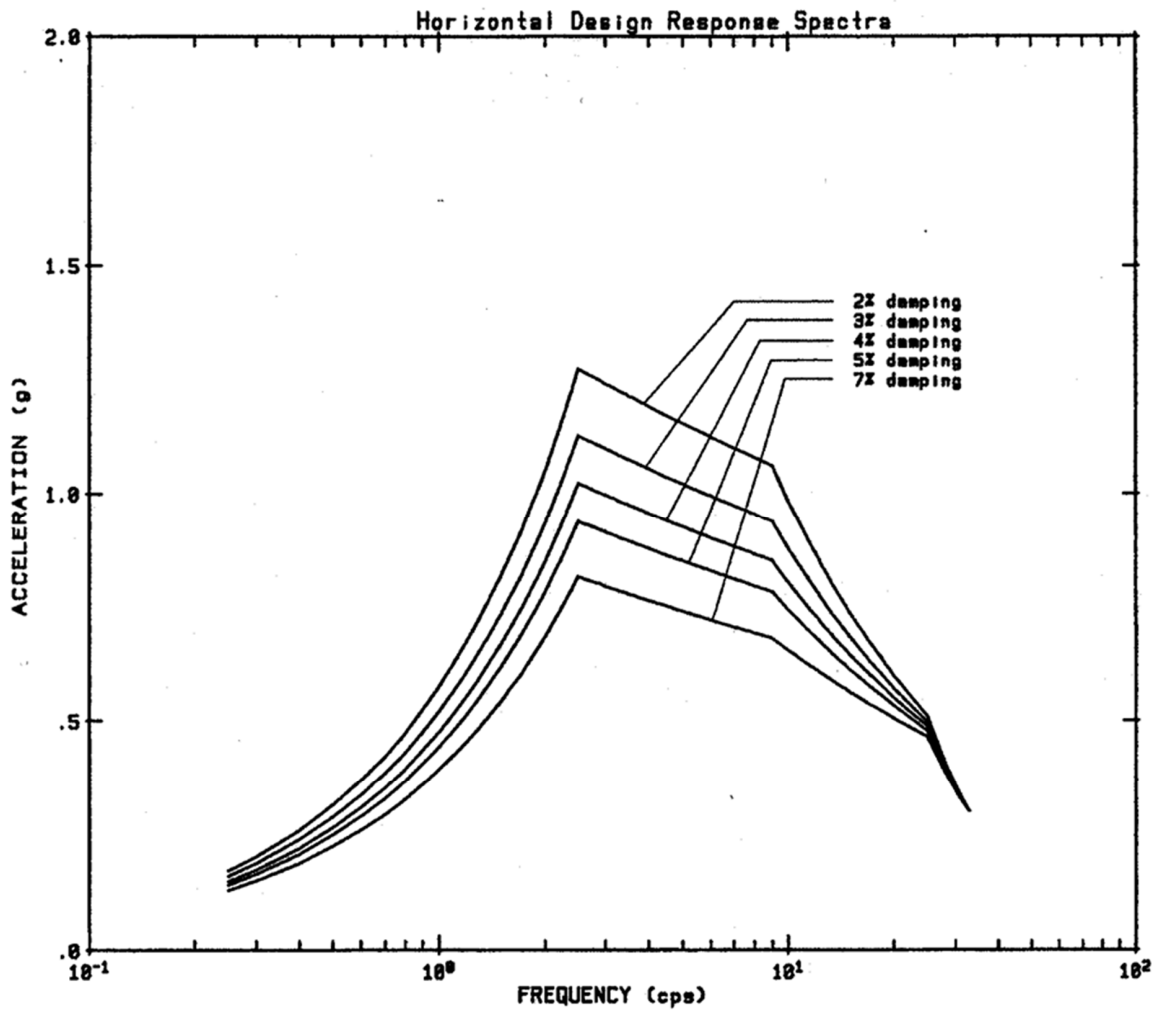


Figure 5.0-1
Horizontal Design Response Spectra
Safe Shutdown Earthquake

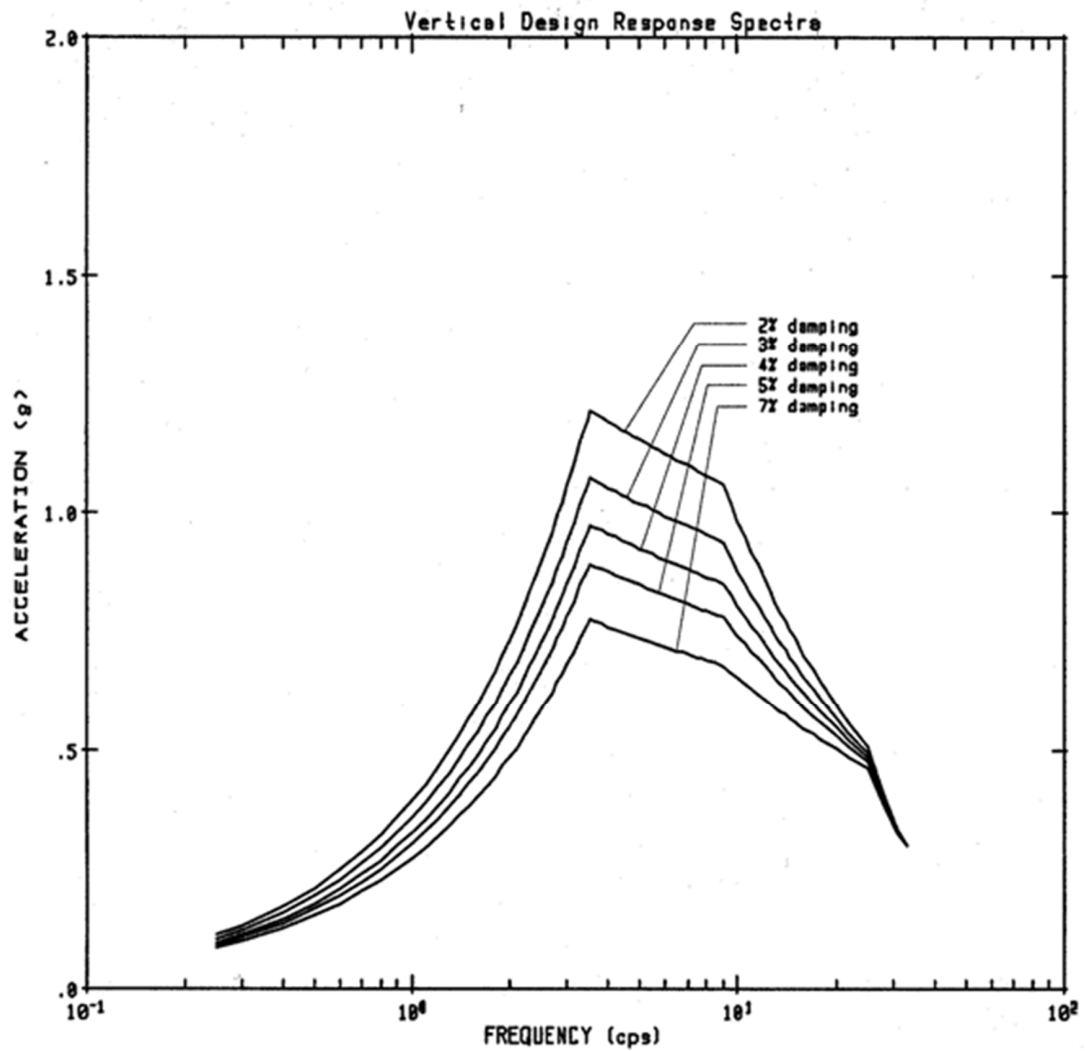


Figure 5.0-2
Vertical Design Response Spectra
Safe Shutdown Earthquake

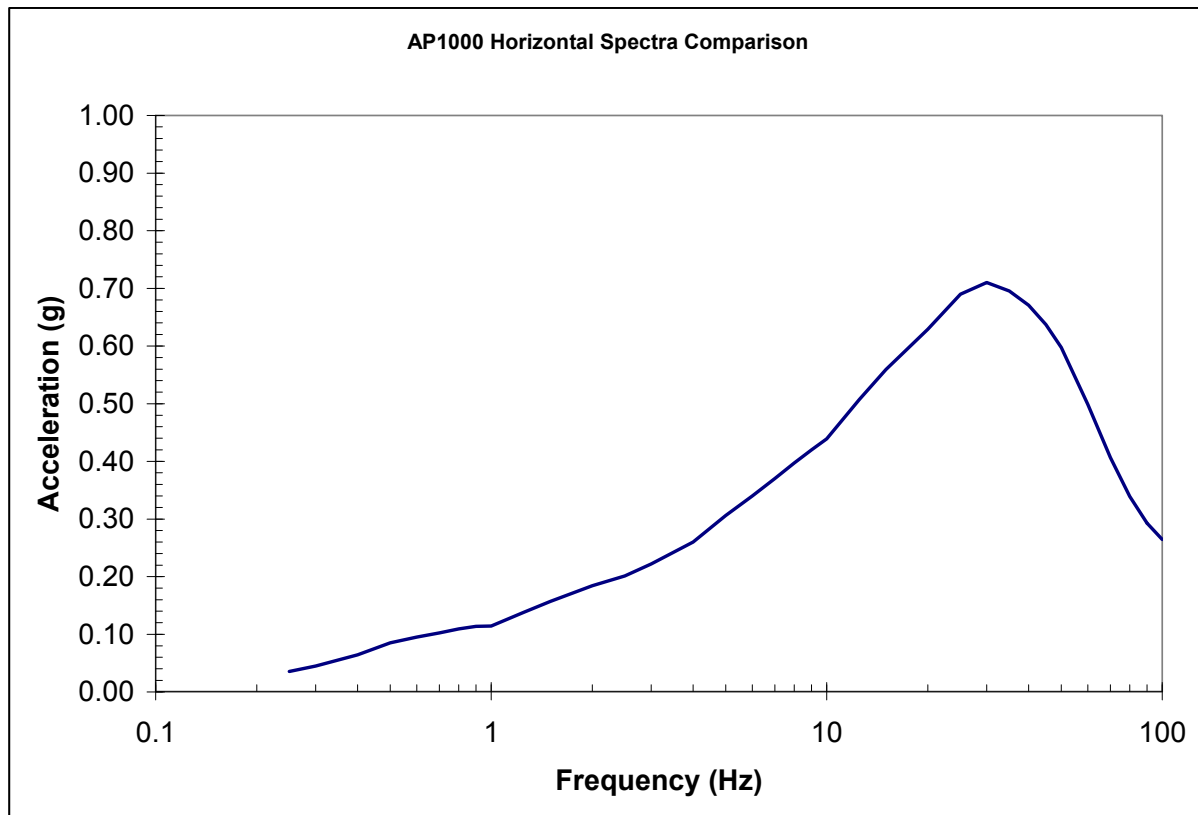


Figure 5.0-3
Horizontal HRHF Envelope Response Spectra
Safe Shutdown Earthquake

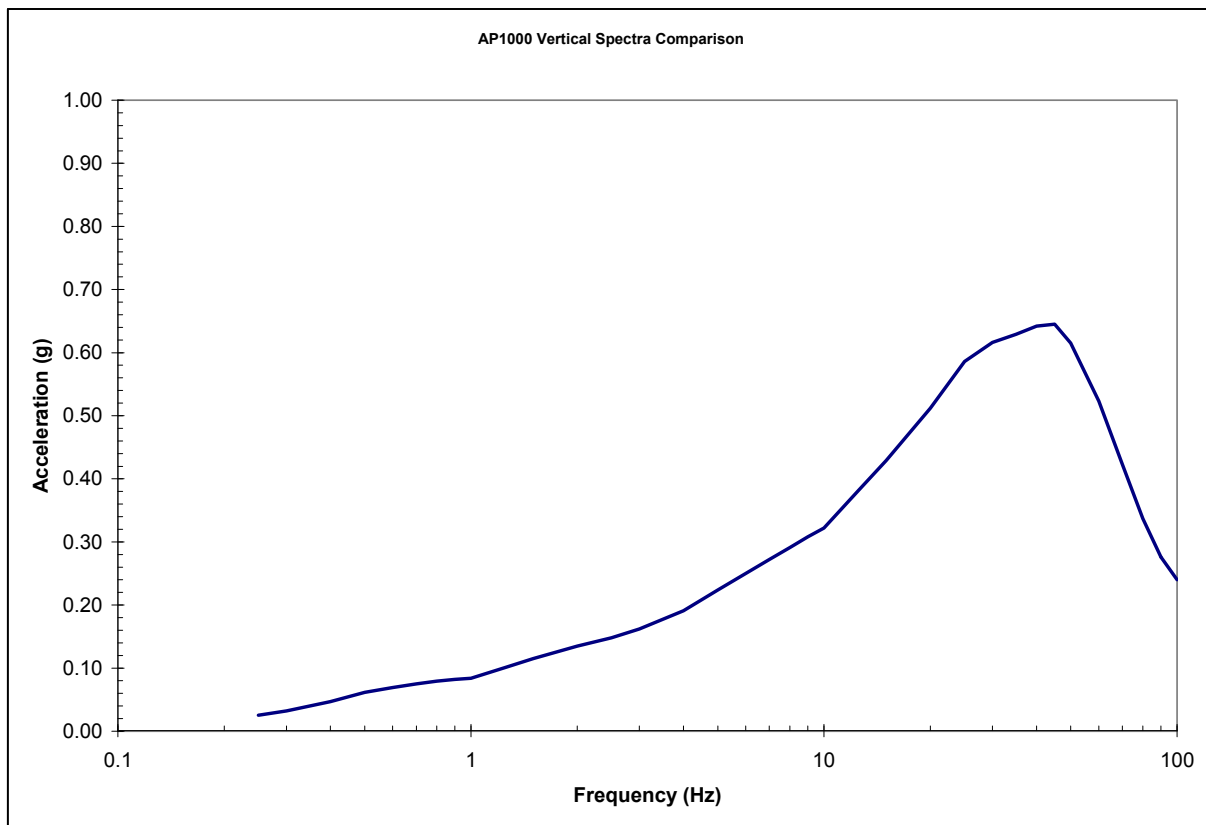


Figure 5.0-4
Vertical HRHF Envelope Response Spectra
Safe Shutdown Earthquake