November 16, 2018 Docket No. 52-048

U.S. Nuclear Regulatory Commission
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11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Submittal of Changes to Final Safety Analysis Report, Tier 1 Section 2.5, "Module Protection System and Safety Display and Indication System," Tier 2 Sections 14.2, "Initial Plant Test Program," and 14.3, "Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria"

REFERENCES: Letter from NuScale Power, LLC to Nuclear Regulatory Commission, "NuScale Power, LLC Submittal of the NuScale Standard Plant Design Certification Application, Revision 1," dated March 15, 2018 (ML18086A090)

During an October 24, 2018 Public meeting to discuss the NRC Staff's review of NuScale's Initial Test Program, NuScale Power, LLC (NuScale) discussed potential updates to Final Safety Analysis Report (FSAR), Tier 2 Section 14.2. As a result of this discussion, NuScale changed Tier 1 Section 2.5 and Tier 2 Sections 14.2 and 14.3. The Enclosure to this letter provides a mark-up of the FSAR pages incorporating revisions to Tier 1 Section 2.5 and Tier 2 Sections 14.2 and 14.3, in redline/strikeout format. NuScale will include this change as part of a future revision to the NuScale Design Certification Application.

This letter makes no regulatory commitments or revisions to any existing regulatory commitments.

If you have any questions, please feel free to contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
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Enclosure: Changes to NuScale Final Safety Analysis Report Sections Tier 1 Section 2.5, "Module Protection System and Safety Display and Indication System," Tier 2 Sections 14.2, "Initial Plant Test Program," and 14.3, "Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria"

Enclosure:

Changes to NuScale Final Safety Analysis Report Sections Tier 1 Section 2.5, "Module Protection System and Safety Display and Indication System," Tier 2 Sections 14.2, "Initial Plant Test Program," and 14.3, "Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria"

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Table 2.5-7: Module Protection System and Safety Display and Indication System Inspections, Tests, Analyses, and Acceptance Criteria (Continued)

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
		xiii. An analysis will be performed of the output documentation of the System Testing Phase. xiv. An analysis will be performed of the output documentation of the System Installation Phase.	xiii. The output documentation of the MPS Testing Phase satisfies the requirements of the System Testing Phase. xiv. The output documentation of the MPS Installation Phase satisfies the requirements of the System Installation Phase.
2.	~~Protective measures are provided to restrict modifications to the MPS tunable parameters~~Not used.	~~A test will be performed on the access control features associated with MPS tunable parameters~~Not used.	~~Protective measures restrict modification to the MPS tunable parameters without proper configuration and authorization~~Not used.
3.	Physical separation exists between the redundant separation groups and divisions of the MPS Class 1E instrumentation and control current-carrying circuits, and between Class 1E instrumentation and control current-carrying circuits and non-Class 1E instrumentation and control current-carrying circuits.	An inspection will be performed of the MPS Class 1E as-built instrumentation and control current-carrying circuits.	i. Physical separation between redundant separation groups and divisions of MPS Class 1E instrumentation and control current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers. ii. Physical separation between MPS Class 1E instrumentation and control current-carrying circuits and non-Class 1E instrumentation and control current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers.
4.	Electrical isolation exists between the redundant separation groups and divisions of the MPS Class 1E instrumentation and control circuits, and between Class 1E instrumentation and control circuits and non-Class 1E instrumentation and control circuits to prevent the propagation of credible electrical faults.	An inspection will be performed of the MPS Class 1E as-built instrumentation and control circuits.	i. Class 1E electrical isolation devices are installed between redundant separation groups and divisions of MPS Class 1E instrumentation and control circuits. ii. Class 1E electrical isolation devices are installed between MPS Class 1E instrumentation and control circuits and non-Class 1E instrumentation and control circuits.
5.	Electrical isolation exists between the EDSS-MS subsystem non-Class 1E circuits and connected MPS Class 1E circuits to prevent the propagation of credible electrical faults.	i. A type test, analysis, or a combination of type test and analysis will be performed of the Class 1E isolation devices. ii. An inspection will be performed of the MPS Class 1E as-built circuits.	i. The Class 1E circuit does not degrade below defined acceptable operating levels when the non-Class 1E side of the isolation device is subjected to the maximum credible voltage, current transients, shorts, grounds, or open circuits. ii. Class 1E electrical isolation devices are installed between the EDSS-MS Subsystem non-Class 1E circuits and connected MPS Class 1E circuits.

Table 2.5-7: Module Protection System and Safety Display and Indication System Inspections, Tests, Analyses, and Acceptance Criteria (Continued)

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.	~~Communications independence exists between redundant separation groups and divisions of the Class 1E MPS~~Not used.	~~A test will be performed of the Class 1E MPS~~Not used.	~~Communications independence between redundant separation groups and divisions of the Class 1E MPS is provided~~Not used.
7.	Communications independence exists between the Class 1E MPS and non-Class 1E digital systems.	A test will be performed of the Class 1E MPS.	Communications independence between the Class 1E MPS and non-Class 1E digital systems is provided.
8.	~~The MPS automatically initiates a reactor trip signal~~Not used.	~~A test will be performed of the MPS~~Not used.	~~A reactor trip signal is automatically initiated for each reactor trip function listed in Table 2.5-1~~Not used.
9.	~~The MPS automatically initiates an ESF actuation signal~~Not used.	~~A test will be performed of the MPS~~Not used.	~~An ESF actuation signal is automatically initiated for each ESF function listed in Table 2.5-2~~Not used.
10.	~~The MPS automatically actuates a reactor trip.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The RTBs open upon an injection of a single simulated MPS reactor trip signal.~~Not used.
11.	~~The MPS automatically actuates the engineered safety feature equipment.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The ESF equipment automatically actuates to perform its safety-related function listed in Table 2.5-2 upon an injection of a single simulated MPS signal.~~Not used.
12.	~~The MPS manually actuates a reactor trip.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The RTBs open when a reactor trip is manually initiated from the main control room.~~Not used.
13.	The MPS manually actuates the ESF equipment.	A test will be performed of the MPS.	The MPS actuates the ESF equipment to perform its safety-related function listed in ~~Table 2.5-3~~Table 2.5-2 when manually initiated.
14.	~~The reactor trip logic fails to a safe state such that loss of electrical power to a MPS separation group results in a trip state for that separation group.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~Loss of electrical power in a separation group results in a trip state for that separation group.~~Not used.
15.	~~The ESFs logic fails to a safe state such that loss of electrical power to a MPS separation group results in a predefined safe state for that separation group.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~Loss of electrical power in a separation group results in an actuation state for that separation group.~~Not used.

Table 2.5-7: Module Protection System and Safety Display and Indication System Inspections, Tests, Analyses, and Acceptance Criteria (Continued)

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
16.	An MPS signal once initiated (automatically or manually), results in an intended sequence of protective actions that continue until completion, and requires deliberate operator action in order to return the safety systems to normal.	A test will be performed of the MPS reactor trip and engineered safety features signals.	i. Upon initiation of a real or simulated MPS reactor trip signal listed in Table 2.5-1, the RTBs open, and the RTBs do not automatically close when the MPS reactor trip signal clears. ii. Upon initiation of a real or simulated MPS engineered safety feature actuation signal listed in Table 2.5-2, the ESF equipment actuates to perform its safety-related function and continues to maintain its safety-related position and perform its safety-related function when the MPS engineered safety feature actuation signal clears.
17.	The MPS response times from sensor output through equipment actuation for the reactor trip functions and ESF functions are less than or equal to the value required to satisfy the design basis safety analysis response time assumptions.	A test will be performed of the MPS.	The MPS reactor trip functions listed in Table 2.5-1 and ESFs functions listed in Table 2.5-2 have response times that are less than or equal to the design basis safety analysis response time assumptions.
18.	~~The MPS interlocks function as required when associated conditions are met.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The MPS interlocks listed in Table 2.5-4 automatically establish an operating bypass for the specified reactor trip of ESF actuations when the interlock condition is met. The operating bypass is automatically removed when the interlock condition is no longer satisfied.~~Not used.
19.	~~The MPS permissives function as required when associated conditions are met.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The MPS permissives listed in Table 2.5-4 allows the manual bypass of the specified reactor trip or ESF actuations when the permissive condition is met. The operating bypass is automatically removed when the permissive condition is no longer satisfied.~~Not used.
20.	~~The MPS overrides function as required when associated conditions are met.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~The MPS overrides listed in Table 2.5-4 are established when the manual override switch is active and RT-1 interlock is established. The Override switch must be manually taken out of Override when the Override, O-1, is no longer needed.~~Not used.
21.	~~The MPS is capable of performing its safety-related functions when one of its protection channels is placed in maintenance bypass.~~Not used.	~~A test will be performed of the MPS.~~Not used.	~~With a safety function module out of service switch activated, the safety function is placed in trip or bypass based on the position of the safety function module trip/bypass switch.~~Not used.
22.	MPS operational bypasses are indicated in the MCR.	A test will be performed of the MPS.	Each operational MPS manual or automatic bypass is indicated in the MCR.
23.	MPS maintenance bypasses are indicated in the MCR.	A test will be performed of the MPS.	Each maintenance bypass is indicated in the MCR.

Table 2.5-7: Module Protection System and Safety Display and Indication System Inspections, Tests, Analyses, and Acceptance Criteria (Continued)

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
24.	The MPS self-test features detect faults in the system and provide an alarm in the main control room.	A test will be performed of the MPS.	A report exists and concludes that: • Self-testing features verify that faults requiring detection are detected. • Self-testing features verify that upon detection, the system responds according to the type of fault. • Self-testing features verify that faults are detected and responded within a sufficient timeframe to ensure safety function is not lost. • The presence and type of fault is indicated by the MPS alarms and displays.
25.	The PAM Type B and Type C displays are indicated on the SDIS displays in the MCR.	An inspection will be performed for the ability to retrieve the as-built PAM Type B and Type C displays on the SDIS displays in the MCR.	The PAM Type B and Type C displays listed in Table 2.5-5 are retrieved and displayed on the SDIS displays in the MCR.
26.	The controls located on the operator workstations in the MCR operate to perform IHAs.	A test will be performed of the controls on the operator workstations in the MCR.	The IHAs controls provided on the operator workstations in the MCR perform the functions listed in Table 2.5-6.
27.	~~The RTBs are installed and arranged in order to successfully accomplish the reactor trip function under design conditions.~~Not used.	~~An inspection will be performed of the as-built RTBs, including the connections for the shunt and undervoltage trip mechanism and auxiliary contacts.~~Not used.	~~The RTBs have the proper connections for the shunt and undervoltage trip mechanisms and auxiliary contacts, and are arranged as shown in Figure 2.5-2 to successfully accomplish the reactor trip function.~~Not used.
28.	~~Two of the four separation groups and one of the two divisions of RTS and ESFAS will utilize a different programmable technology.~~Not used.	~~An inspection will be performed of the as-built MPS.~~Not used.	~~Separation groups A & C and Division I of RTS and ESFAS utilize a different programmable technology from separation groups B & D and Division II of RTS and ESFAS.~~Not used.
29.	~~The MCR isolation switches that isolate the manual MCR switches from MPS in case of a fire in the MCR are located in the remote shutdown station.~~Not used.	~~An inspection will be performed of the location of the as-built MCR isolation switches.~~Not used.	~~The MCR isolation switches are located in the remote shutdown station.~~Not used.

Table 14.2-2: Pool Cleanup System Test # 2 (Continued)

System Level Test #2-1		
Test Objective	**Test Method**	**Acceptance Criteria**
i. ~~Verify the PCUS demineralizers are protected against high water temperature~~Verify the SFPCS and the RPCS provide design flow rate to the UHS when aligned for PCUS water cleanup. ii. Verify the SFPCS and the RPCS provide design flow rate to the UHS following a PCUS isolation.	i. Place the SFPCS in service to flow through a pool cleanup filter and a demineralizer and return flow to the spent fuel pool. AND Place the RPCS in service to flow through a different pool cleanup filter and demineralizer and return flow to the reactor pool. ii. Simulate a high water temperature upstream of one of the pool cleanup filters.	i. a. The MCR indication for SFPCS pump flow satisfies the design flow rate specified in Table 9.1.3-1a b. The MCR indication for RPCS pump flow satisfies the design flow rate specified in Table 9.1.3-1b ii. a. SFPCS flow and RPCS flow to the pool cleanup filters and demineralizers stop. b. The SFPCS flow is bypassed to the spent fuel pool. c. The RPCS cooling flow is bypassed to the reactor pool. d. The MCR indication for SFPCS pump flow satisfies the design flow rate specified in Table 9.1.3-1a e. The MCR indication for RPCS pump flow satisfies the design flow rate specified in Table 9.1.3-1b

Table 14.2-4: Pool Surge Control System Test # 4

Preoperational test is required to be performed once.		
The pool surge control system (PSCS) is described in Section 9.1.3.2.4 and the function verified by this test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The PSCS supports the UHS by providing surge control for UHS operations.	nonsafety-related	Test #4-1
The PSCS supports the UHS by providing a reactor inspection dry dock makeup and drain capability.	nonsafety-related	Test #4-1
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. For system level test #4-1, the drydock gate can be open or closed.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each PSCS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each PSCS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each PSCS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each PSCS pump can be started and stopped remotely.	Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops.
v. Verify the PSCS automatically responds to mitigate a release of radioactivity.	Initiate a real or simulated high radiation signal in the PSCS tank vent line.	i. The PSCS tank inlet isolation valve is closed. ii. The PSCS tank outlet isolation valve is closed. [ITAAC 03.09.10]
vi. Verify a local grab sample can be obtained from a PSCS grab sample device indicated on the PSC piping and instrumentation diagram.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is successfully obtained.
vii. Verify each PSCS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each PSCS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Test #4-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify PSCS automatic control for dry dock fill and drain.	Align the PSCS for fill and drain of the dry dock. Fill the dry dock to a level that allows operation of the reactor inspection dry dock evacuation pump. i. Start a PSCS pump and simulate the following PSCS conditions: a. Dry dock low level b. PSC tank high level c. High dry dock level	i. a. Pump is stopped and return line to pool surge control tank isolation valve is closed. b. Pump is stopped and return line to PSCS tank isolation valve is closed. c. PSCS tank main discharge line isolation valve is closed.

Table 14.2-5: Ultimate Heat Sink Test # 5

There are no preoperational tests for the UHS.		
The UHS is described in Section 9.2.5. The only active functions for the UHS are to provide PAM Type D instrument signals to the safety display and indication system (SDIS). Refer to Table 14.2-66: Safety Display and Indication test #66 for testing of PAM Type D displays.		
System Function	**System Function Categorization**	**Function Verified by Test #**
~~None~~The UHS supports the DHRS by accepting the heat from the DHR heat exchanger.	~~N/A~~safety-related	~~N/A~~Reactor Trip from 100 Percent Power Test # 104
Prerequisites: N/A		
Component Level Tests		
None		

Table 14.2-8: Chilled Water System Test # 8

Preoperational test is required to be performed once.		
The chilled water system (CHWS) is described in Section 9.2.8 and the function verified by this test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The CHWS supports the following systems by providing cooling water: • Reactor Building HVAC system (RBVS) • normal control room HVAC system (CRVS) • Radioactive Waste Building HVAC system (RWBVS) • liquid radioactive waste system (LRWS) • gaseous radioactive waste system (GRWS)	nonsafety-related	Test #8-1 Test #8-2
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a CHWS flow balance has been performed. iii. Verify a pump curve test has been completed for the CHWS pumps. iv. Chiller performance has been verified by either an Air Conditioning, Heating, and Refrigeration Institute (AHRI) certification or a chiller performance capacity test witnessed at the factory with all test documentation provided.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CHWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each CHWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each CHWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify the speed of each CHWS variable-speed pump can be manually controlled.	Align the CHWS to provide a flow path to operate a selected pump. Vary the CHWS pump speed from minimum to maximum from the MCR.	MCR display indicates the speed of each obtains both minimum and maximum pump speeds. Audible and visible water hammer are not observed when the pump starts.
v. Verify automatic operation of CHWS pumps and CHWS chiller to protect plant equipment.	Align the CHWS to allow for chiller operation. Place a pump in service. Initiate a simulated start signal for the following system conditions. i. Loss of chilled water flow. ii. Loss of SCWS cooling flow to the operating chiller.	MCR display and local, visual observation indicate the following: i. a. Operating pump stops b. Operating chiller stops ii. Operating chiller stops
vi. Verify each CHWS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each CHWS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.

Table 14.2-8: Chilled Water System Test # 8 (Continued)

System Level Test #8-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify CHWS cooling water flow rates satisfy design.	i. Align the CHWS to provide flow to all heat exchangers cooled by the CHWSRVS chiller: RBVS air handling units RBVS fan coil units CRVS air handling units CRVS fan coil units RWBVS air handling units RWBVS fan coil units LRW degasifier condenser GRWS gas coolers ii. Open all CHWS flow control valves.	The CHWS cooling flow to each heat exchanger under test meets the minimum flow rate acceptance criteria contained in the CHWS flow balance report.
System Level Test #8-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify CHWS cooling water flow rates satisfy design flow.	i. Align the CHWS to provide flow to the CRVS air handling units and the CRVS fan coil units cooled by the CHWSRVS standby chiller. ii. Open all CHWS flow control valves.	The CRVS standby CHWS cooling flow to each heat exchanger meets the minimum flow rate acceptance criteria contained in the CHWS flow balance report.

Table 14.2-10: Circulating Water System Test # 10

This preoperational test is required to be performed once for each circulating water subsystem.		
The circulating water system (CWS) is described in Section 10.4.5 and the function verified by this test and power ascension testing is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The utility water system (UWS) supports the CWS by providing makeup water to maintain water level in the CWS cooling tower basins.	nonsafety-related	Component-Level Test vi. Ramp Change in Load Demand Test #100
The CWS function verified by another test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The CWS supports the FWS by removing heat from the main condenser.	nonsafety-related	CAR Test #32-1 Ramp Change in Load Demand Test #100 100 Percent Load Rejection Test #103
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests: NPM #1 (#7) The minimum inventory of pumps, fans and valves tested for NPM #1 (#7) is that inventory required for 6A (6B) CWS operation to support operation of NPM #1 (#7). The testing will continue until all 6A (6B) CWS equipment is tested.		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each CWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each CWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each CWS cooling tower fan can be started and stopped remotely	Align the CWS to allow for cooling tower fan operation. Stop and start each cooling tower fan from the MCR.	MCR display and local, visual observation indicate each cooling tower fan starts and stops.
v. Verify each CWS pump can be started and stopped remotely.	Align the CWS to allow for pump operation. Stop and start each pump from the MCR.	i. MCR display and local, visual observation indicate each pump starts and stops. ii. Audible and visible water hammer are not observed when the pump starts. iii. CWS pump cavitation is not observed. iv. Cooling towers do not experience flow surge or overflow.
vi. Verify automatic operation of the CWS cooling tower basin level control valve to maintain CWS cooling tower basin level.	i. Initiate a cooling tower basin low level signal. ii. Initiate a cooling tower basin high level signal.	MCR displays and local, visual observation verifies the following: i. The cooling tower basin level control valve is open. ii. The cooling tower basin level control valve is closed.

Table 14.2-11: Site Cooling Water System Test # 11

Preoperational test is required to be performed for each NPM.		
The site cooling water system (SCWS) is described in Section 9.2.7 and 11.5.2.2.13 and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The SCWS supports the following systems by providing cooling water. • turbine generator system (TGS) • RCCWS • condenser air removal system (CARS) • PSS • CHWS • instrument air system (IAS) • SFPCS • RPCS • FWS • balance-of-plant drain system (BPDS)	nonsafety-related	Test #11-1
The UWS supports the SCWS by providing makeup water to maintain water level in the SCWS cooling tower basins.	nonsafety-related	Component-Level Test vii. Ramp Change in Load Demand Test #100
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify an SCWS flow balance has been performed and the system flow balance records have been approved. iii. Verify a pump curve test has been completed and approved for the SCWS pumps.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each SCWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each SCWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each SCWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each SCWS cooling tower fan can be started and stopped remotely.	Align the SCWS to allow for cooling tower fan operation. Stop and start each cooling tower fan from the MCR.	MCR display and local, visual observation indicate each cooling tower fan starts and stops.
v. Verify each SCWS pump can be started and stopped remotely.	Align the SCWS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
vi. Verify the SCWS standby pump automatically starts to protect plant equipment.	Align the SCWS to allow for pump operation. Place a pump in service. Initiate a simulated start signal for the following system conditions. i. Low pump header pressure signal. ii. Low pump header flow signal.	MCR display and local, visual observation indicate the standby pump discharge valve opens to a throttled position, the pump starts, and then the discharge valve fully opens. Audible and visible water hammer are not observed when the pump starts.

Table 14.2-13: Utility Water System Test # 13

Preoperational test is required to be performed once.		
The UWS is described in Section 9.2.9 and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The UWS supports the circulating water system by providing makeup water to maintain water level in the CW system cooling tower basins.	nonsafety-related	CWS Test #10 Component-Level Test vi. Ramp Change in Load Demand Test #100
2. The UWS supports the SCWS by providing makeup water to maintain water level in the SCWS cooling tower basins.	nonsafety related	SCWS Test #11 Component-Level Test vii. Ramp Change in Load Demand Test #100
3. The UWS supports the following systems by providing makeup water: -demineralized water system (DWS) -fire protection system (FPS) -PWS -CHWS -Reactor Building (RXB) -Turbine Generator Building (TGB) -Radioactive Waste Building (RWB) -Annex Building (ANB) -Control Building (CRB)	nonsafety-related	component-level tests
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a pump curve test has been completed for the UWS pumps.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each UWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each UWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each UWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each UWS pump can be started and stopped remotely.	Align the UWS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify UWS flow capability by automatic start of each UWS pump while in standby mode.	Align the UWS to allow for pump operation. Place a pump in service. Initiate a simulated pump trip.	MCR display and local, visual observation indicate the standby pump starts. Audible and visible water hammer are not observed when the pump starts.
vi. Verify utility water system (UWS) pumps automatically stops to protect plant equipment.	Align the UWS to allow for pump operation. Place a pump in service. Initiate a simulated UWS storage tank low level signal.	MCR display and local, visual observation indicate each pump stops.

Table 14.2-14: Demineralized Water System Test # 14

Preoperational test is required to be performed once.		
The DWS is described in Section 9.2.3 and 11.5.2.2.16 and the function verified by this test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The DWS supports the following systems by providing ~~cooling~~makeup water. • CVCS • boron addition system (BAS) • liquid radioactive waste system (LRWS) • SFPCS • RCCWS • process sampling system (PSS) • FWS • ABS • CRVS • CARS • CES • RBVS • RWBVS • CPS • PCUS • annex building (ANB) • balance of plant drains (BPDS) • turbine building HVAC system (TBVS) • annex building HVAC system • reactor building (RXB) • radioactive waste building (RWB) • feedwater treatment system (FWTS)	nonsafety-related	component-level tests
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a pump curve test has been completed for the DWS pumps.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each DWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control)	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each DWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each DWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify the DWS pump can be started and stopped remotely.	Align the DWS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify DWS flow capability by automatic start of each DWS pump while in standby mode.	Align the DWS to allow for pump operation. Place a pump in service. Initiate a simulated pump trip.	MCR display and local, visual observation indicate the standby pump starts. Audible and visible water hammer are not observed when the pump starts.

Table 14.2-18: Control Room Habitability System Test # 18

Preoperational test is required to be performed once.

The control room habitability system (CRHS) is described in Section 6.4 and the functions verified by this test are:

System Function	**System Function Categorization**	**Function Verified by Test #**
1. The CRHS supports the Control Building (CRB) by providing clean breathing air to the control room envelope (CRE) and maintaining a positive control room pressure during high radiation or loss of offsite power conditions.	nonsafety-related	Test #18-1 Test #18-2 Test #18-3
2. The CRHS supports the CRB by providing high pressure, clean breathing air in air bottles for use.	nonsafety-related	Test #18-1 Test #18-2
3. The CRVS supports the CRB by providing isolation of the CRE from the surrounding areas and outside environment via isolation dampers.	nonsafety-related	Test #18-1
4. The plant protection system (PPS) supports the CRHS by providing actuation and control signals.	nonsafety-related	Test #18-1
5. The CRVS supports the CRB by providing isolation of the CRE from the surrounding areas and outside environment via isolation dampers.	nonsafety-related	Test #18-1
6. The CRVS supports the PPS by providing instrument information signals relating to isolation of the CRE and activation of the CRH system.	nonsafety-related	Test #18-1
7. The CRVS supports the CRB by isolating the CRVS outside air intake ~~when radiation is detected downstream of the charcoal filtration unit.~~from the environment and operating CRVS in recirculation mode to prevent exposure to smoke and toxic gas, or when radiation is detected downstream of the charcoal filtration unit.	nonsafety-related	Test #18-1 (radiation detection) CRVS Test #19-3 (smoke/toxic gas)
8. The PPS supports the CRVS by providing actuation and control signals to the CRE isolation dampers.	nonsafety-related	Test #18-1

Prerequisites

i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.

ii. Verify a CRHS air balance has been performed and the CRHS air balance records have been approved. [This prerequisite is not required for component-level tests.]

iii. Verify CRHS air bottlers are pressurized to their design working pressure. [This prerequisite is not required for component-level tests.]

iv. Component Level Tests i. and ii. must be performed under preoperational test conditions that approximate design-basis temperature, differential pressure, and flow conditions to the extent practicable, consistent with preoperational test limitations.

Table 14.2-18: Control Room Habitability System Test # 18 (Continued)

Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CRHS remotely-operated valve can be operated remotely.	Place the CRHS air bottles in service. Place CRVS in service to supply air to the CRE. Operate each valve from the MCR.	i. MCR workstation display, safety display instrument display and local, visual observation indicate each valve fully opens and fully closes under preoperational temperature, differential pressure, and flow conditions. [ITAAC 03.01.02]
ii. Verify each CRHS solenoid-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place the CRHS air bottles in service. Place CRVS in service to supply air to the CRE. i. Place each valve in its non-safe position. Isolate electrical power to its solenoid.	i. MCR display, safety display instrument display and local, visual observation indicate each valve fails open under preoperational temperature, differential pressure, and flow conditions. [ITAAC 03.01.03]
iii. Verify each CRHS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each CRHS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Test #18-1		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify PPS provides actuation signals for CRHS and CRVS. ii. CRHS realigns to provide breathable air to the CRE under accident conditions. iii. CRVS realigns to isolate outside air dampers and CRE under accident conditions. ~~Verify the CRHS and the CRVS automatically respond to provide breathable air to the CRE under accident conditions.~~	Place the CRVS in automatic operation. Place the CRHS air bottles in service. Place CRVS in service to supply air to the CRE. Start CRVS filter unit. Initiate each of the following real or simulated CRHS actuation signals: • High radiation signal downstream of the CRVS filter unit • Loss of AC power.	i. MCR workstation display and local, visual observation indicate the following: ~~i~~a. The CRVS outside air damper closes. ~~ii~~b. The CRVS filter unit fan stops. ~~iii~~c. The CRVS control room envelope isolation dampers close. ~~iv~~d. The CRHS air supply isolation valves open. ~~v~~e. CRHS pressure relief isolation valves open. ~~vi~~f. CRVS air handling unit stops. ~~vii~~g. CRVS~~E~~ general exhaust fan stops. ~~viii~~h. CRVS battery room exhaust fan stops. [ITAAC 03.09.02] (items i.a. through i.e.~~v~~) i. PPS generates alarms in the MCR for the following: a. High radiation b. Loss of AC power.

Table 14.2-19: Normal Control Room HVAC System Test # 19

Preoperational test is required to be performed once.		
The CRVS is described in Sections 6.4.3.2, 9.4.1, and 11.5.2.2.1, and the functions verified by this test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The CRVS supports the CRB by providing cooling, heating and humidity control to maintain a suitable environment for the safety and comfort of plant personnel.	nonsafety-related	Test #19-1 Test #19-2
2. The CRVS supports the systems located in the CRB by providing cooling, heating and humidity control to maintain a suitable environment for the operation of system components.	nonsafety-related	Test #19-1 Test #19-2
3. ~~The CRVS supports the CRB by maintaining the CRB at a positive pressure with respect to adjacent areas during normal operation.~~The CRVS supports the CRB by isolating the CRVS outside air intake from the environment and operating the CRVS in recirculation mode to prevent exposure to smoke and toxic gas, or when radiation is detected downstream of the charcoal filtration unit.	nonsafety-related	~~Test #19-1~~Test #19-3 (smoke/toxic gas) CRHS Test #18-1 (radiation)
4. The CRVS supports the CRB by maintaining the CRB at a positive ambient pressure relative to the Reactor Building (RXB) and the outside atmosphere to control the ingress of potentially airborne radioactivity from the RXB or the outside atmosphere to the CRB.	nonsafety-related	Test #19-1 (CRB positive pressure) RBVS Test #20-1 (RXB negative pressure)
5. The PPS supports the CRVS by providing actuation and control signals to the outside air isolation dampers.	nonsafety-related	Test #19-3
6. The CRVS supports the CRB by protecting personnel from exposure to radiation during a design basis accident, when power is available, by removing radioactive contamination from outside air via charcoal filtration, as required by radiation dose analyses.	nonsafety-related	Test #19-4
The CRVS functions verified by other tests are:		
The CRVS supports the CRB by isolating the CRVS outside air intake when radiation is detected downstream of the charcoal filtration unit.	nonsafety-related	CRHS Test #18-1
The CRVS supports the CRB by providing isolation of the CRE from the surrounding areas and outside environment via isolation dampers.	nonsafety-related	CRHS Test #18-1

Table 14.2-19: Normal Control Room HVAC System Test # 19 (Continued)

The CRVS supports the PPS by providing instrument information signals relating to isolation of the CRE and activation of the CRHS.	nonsafety-related	CRHS Test #18-1
Prerequisites		
i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
ii. Verify a CRVS air balance has been performed and the CRVS air balance records have been approved. [This prerequisite is not required for component-level tests.]		
iii. Verify CRVS high-efficiency particulate air (HEPA) and charcoal adsorbers have been installed and tested and the test records have been approved. [This prerequisite is not required for component-level tests.]		
iv. Verify CRVS control room isolation dampers have been leak tested and the test records have been approved. [This prerequisite is not required for component-level tests.]		
v. Component Level Tests x. and xi. must be performed under preoperational test conditions that approximate design-basis temperature, differential pressure, and flow conditions to the extent practicable, consistent with preoperational test limitations.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CRVS remotely-operated damper can be operated remotely.	Operate each damper from the MCR and local control panel (if design has local damper control).	MCR display and local, visual observation indicate each damper fully opens and fully closes.
ii. Verify each CRVS air-operated damper fails to its safe position on loss of air.	Place each damper in its non-safe position. Isolate and vent air to the damper.	MCR display and local, visual observation indicate each damper fails to its safe position.
iii. Verify each CRVS air-operated damper fails to its safe position on loss of electrical power to its solenoid.	Place each damper in its non-safe position. Isolate electrical power to its solenoid.	MCR display and local, visual observation indicate each damper fails to its safe position.
iv. Verify CRVS dampers automatically close on associated smoke or fire signals.	Open each damper actuated by a smoke or fire signal. Initiate an alarm signal for each damper.	MCR display and local, visual observation indicate each damper closes.
v. Verify each required CRVS fan stops on actuation of its associated fire or smoke alarm.	Initiate an alarm signal for each fan.	MCR display and local, visual observation indicate each fan stops.
vi. Verify each CRVS pressurization fan starts automatically on the actuation of its associated fire or smoke alarm.	Initiate an alarm signal for each fan.	MCR display and local, visual observation indicate each pressurization fan starts.
vii. Verify the fan speed of each CRVS variable-speed fan can be manually controlled.	Vary the speed of each fan from the MCR and local control panel (if design has local fan control).	MCR display indicates the speed of each fan varies from minimum to maximum speed.
viii. Verify the standby CRVS main supply air handling unit (AHU) starts automatically on the stop of the operating CRVS main supply AHU.	Place an AHU in service. Place the standby AHU in automatic control. Stop the operating AHU.	MCR display and local, visual observation indicate the standby AHU starts.
ix. Verify each standby CRVS fan coil unit (FCU) starts automatically on the stop of the operating CRVS fan coil unit.	Place an FCU in service. Place the standby FCU in automatic control. Stop the operating FCU.	MCR display and local, visual observation indicate the standby FCU starts.
x. Verify each CRVS control room envelope isolation damper fails to its safe position on loss of air.	Place each damper in its non-safe position. Isolate and vent air to the damper.	Each CRVS control room envelope isolation damper fails to its closed position on loss of air under preoperational temperature, differential pressure, and flow conditions while the CRV system is supplying flow to the CRE. [ITAAC 03.02.01]

Table 14.2-19: Normal Control Room HVAC System Test # 19 (Continued)

System Level Test #19-3		
Test Objective	**Test Method**	**Acceptance Criteria**
~~Verify the CRVS isolates makeup air when smoke or toxic gas is detected in the makeup air ductwork~~Verify PPS actuates CRVS outside air dampers when toxic gas or smoke is detected in the makeup air ductwork.	Place the CRVS in automatic operation. i. Initiate a simulated high smoke or toxic gas signal for the makeup air ductwork upstream of the CRVS filter unit.	Outside air dampers ~~is~~ close~~d~~ to isolate makeup air.
System Level Test #19-4		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the CRVS automatically responds to mitigate the consequences of high radiation in the outside air.	Place the CRVS in automatic operation. Initiate a real or simulated high radiation signal for the outside air ductwork upstream of the CRVS filter unit.	i. Outside air is diverted through the CRVS filter unit by closing the CRVS filter unit bypass dampers and opening the CRVS filter unit isolation dampers. ii. The CRVS filter unit fan starts. [ITAAC 03.09.01] (items i. and ii.)

Table 14.2-20: Reactor Building HVAC System Test # 20

Preoperational test is required to be performed once.		
The RBVS is described in Section 9.4.2 and the functions verified by this test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The RBVS supports the RXB by providing cooling, heating and humidity control to maintain a suitable environment for the safety and comfort of plant personnel.	nonsafety-related	Test #20-1 Test #20-2 Reactor Building Ventilation System Capability Test # 96
2. The RBVS supports the systems located in the RXB by providing cooling, heating and humidity control to maintain a suitable environment for the operation of system components.	nonsafety-related	Test #20-1 Test #20-2 Reactor Building Ventilation System Capability Test # 96
3. The RBVS supports the RXB by maintaining the RXB at a negative ambient pressure relative to the outside atmosphere to control the movement of potentially airborne radioactivity from the RXB to the environment.	nonsafety-related	Test #20-1 Test #20-3
4. The CRVS supports the CRB by maintaining the CRB at a positive ambient pressure relative to the Reactor Building (RXB) and the outside atmosphere to control the ingress of potentially airborne radioactivity from the RXB or the outside atmosphere to the CRB.	nonsafety-related	Test #20-1 (RXB negative pressure) CRVS Test #19-1 (CRB positive pressure)
5. The RWBVS supports the RWB by maintaining the RWB at a negative ambient pressure relative to the outside atmosphere to control the movement of potentially airborne radioactivity from the RWB to the environment.	nonsafety-related	Test #20-3 (off-normal RBVS exhaust alignment) RWBVS Test #21-1 (normal RBVS exhaust alignment)
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify an RBVS air balance has been performed and the RBV system air balance records have been approved. [This prerequisite is not required for component-level tests.] iii. RBVS high-efficiency particulate air and charcoal adsorbers have been installed and tested. [This prerequisite is not required for component-level tests.]		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each RBVS remotely-operated damper can be operated remotely.	Operate each damper from the MCR and local control panel (if design has local damper control).	MCR display and local, visual observation indicate each damper fully opens and fully closes.
ii. Verify each RBVS air-operated damper fails to its safe position on loss of air.	Place each damper in its non-safe position. Isolate and vent air to the damper.	MCR display and local, visual observation indicate each damper fails to its safe position.

Table 14.2-23: Radioactive Waste Drain System Test # 23

Preoperational test is required to be performed once.		
The RWDS is described in Section 9.3.3 and the functions verified by this test or another preoperational test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The RWDS supports the RWB by collecting radioactive waste in drain sumps and tanks and transfers it to the LRWS for processing.	nonsafety-related	Test #23-1
2. The RWDS supports the RXB by collecting radioactive waste in drain sumps and tanks and transfers it to the LRWS for processing.	nonsafety-related	Test #23-1
3. The RWDS supports the ANB by collecting radioactive waste in drain sumps and tanks and transfers it to the LRWS for processing.	nonsafety-related	Test #23-1
4. The RWDS supports the UHS by providing detection and monitoring of leakage through the UHS liner and the dry dock liner.	nonsafety-related	Test #23-2
5. The LRWS supports the RWDS by receiving and processing the effluent from the RWB radioactive waste drain sumps.	nonsafety-related	Test #23-1 LRWS Test #35-2
6. The LRWS supports the RWDS by receiving and processing the effluent from the RXB radioactive waste drain sumps.	nonsafety-related	Test #23-1 LRWS Test #35-2
7. The LRWS supports the RWDS by receiving and processing the effluent from the ANB radioactive waste drain sumps.	nonsafety-related	Test #23-1 LRWS Test #35-2
Prerequisites		
Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each RWDS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each RWDS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each RWDS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each RWDS pump can be started and stopped remotely.	Align the RWDS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops.
v. Verify a local grab sample can be obtained from an RWDS grab sample device indicated on the RWDS piping and instrumentation diagram.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is successfully obtained.

Table 14.2-23: Radioactive Waste Drain System Test # 23 (Continued)

vi. Verify each RWDS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each RWDS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Test #23-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify RWDS pumps start and stop automatically and transfer liquid waste to its design location in the LRWS.	Align each RWDS sump or tank to allow water in a selected sump or tank to be pumped to its design location in the LRWS (as indicated by the RWDS piping and instrumentation diagrams). i. Fill the selected sump or tank until a HI water level is obtained to start the first (primary) pump. ii. Continue filling the sump or tank until a HI-HI level starts the second (alternate) pump. iii. Stop filling the sump or tank to allow the primary and alternate pumps to stop on low level. iv. Refill the sump or tank until the alternate pump starts on HI level.	MCR displays and local, visual observation verifies the following: i. The first pump starts on HI level and transfers water to its design location in the LRWS. ii. The second (alternate) pump starts on HI-HI level. iii. Both primary and alternate pumps stop on LO level. iv. The alternate pump starts on HI level.
System Level Test #23-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify each RWDS equipment drain sump alarms on a fill rate that exceeds the pool leakage detection system (PLDS) leakage rate setpoint.	Fill the selected sump at a rate that exceeds the PLDS leakage rate setpoint.	PCS data indicates the sump fill rate alarmed at the PLDS leakage rate setpoint.

RAI 09.03.03-1S2, RAI 14.02-6, RAI 14.02-6S1

Table 14.2-24: Balance-of-Plant Drain System Test # 24

Preoperational test is required to be performed to support sequence of construction turnover of the BPDS system.		
BPDS system is described in Section 9.3.3 and 11.5.2.2.15 and the functions verified by this test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The BPDS supports the condensate polisher demineralizers, the three cooling tower chemical addition systems, and the DWS reverse osmosis units by providing a means to collect and transfer chemical wastes to either the LRWS or to the UWS.	nonsafety-related	Test #24-1 Test #24-7
2. The BPDS supports the two TGBs, the two diesel generators, the auxiliary boiler, the combustion turbine, the Central Utility Building, and the diesel driven firewater pump by providing a means to collect, treat, and transfer the waste water to the either the LRWS or to the UWS.	nonsafety-related	Test #24-1 Test #24-7
3. The BPDS supports the CRB floor drains by providing a means to collect, treat, and transfer the waste water to the UWS.	nonsafety-related	Test #24-1 Test #24-7
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each BPDS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each BPDS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each BPDS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each BPDS pump can be started and stopped remotely.	Align the BPDS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify the pump speed of each BPDS variable-speed pump can be manually controlled.	Vary the speed of each pump from the MCR and local control panel (if design has local pump control).	MCR display indicates the speed of each pump varies from minimum to maximum speed.
vi. Verify each BPDS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each BPDS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.

Table 14.2-24: Balance-of-Plant Drain System Test # 24 (Continued)

System Level Test #24-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify BPDS automatically controlled pumps in sumps and tanks with a fire water removal pump, start and stop automatically and transfer liquid waste to its design location.	Align each BPDS sump or tank to allow water in a selected sump or tank to be pumped to its design location. If the sump fill rate in the following test method is insufficient for automatic start of the alternate pump or fire pump, the primary pump or alternate pump may be temporarily removed from service to allow an increase in the sump level. i. Verify that Pump #1 is set to the primary pump and Pump #2 is set to alternate. Fill the selected sump or tank until a HI water level is obtained to start the primary pump. ii. Continue filling the sump or tank until a HI-HI level starts the alternate pump. iii. Fill the sump or tank until a HI-HI-HI level starts the fire water removal pump. iv. Stop filling the sump or tank to allow the fire water removal pump to stop on HI-HI level. v. Continue (or start) sump or tank dewatering to allow the primary and alternate pumps to stop on LO level. vi. Change pump controls to make Pump #2 the primary pump and Pump #1 the alternate pump, and refill the sump or tank until the primary pump starts on HI level. vii. Continue filling the sump or tank until a HI-HI level starts the alternate pump. Note: Pump #1 and Pump #2 are not the actual names of the pumps, these names are used to differentiate between the two pumps.	MCR displays and local, visual observation verifies the following: i. The primary pump starts on HI level and transfers water to its design location in the LRWS or UWS ~~system~~. ii. The alternate pump starts on HI-HI level. iii. The fire water removal pump starts on HI-HI-HI level. iv. The fire water removal pump stops on HI-HI level. v. Both primary and alternate pumps stop on LO level. vi. The primary pump starts on HI level. vii. The alternate pump starts on HI-HI level.

Table 14.2-24: Balance-of-Plant Drain System Test # 24 (Continued)

System Level Test #24-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the BPDS automatically responds to mitigate a release of radioactivity.	Place a north chemical waste water sump pump in operation. Initiate a real or simulated high radiation signal on the 6A CPS regeneration skid waste effluent. Repeat the test for each pump.	i. The north chemical waste water sump pump stops. ii. North chemical waste collection sump to BPDS collection tank isolation valve is closed. iii. North chemical waste collection sump to LRW high conductivity waste tank isolation valve is closed. [ITAAC 03.17.02] (i through iii)
System Level Test #24-3		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the BPDS automatically responds to mitigate a release of radioactivity.	Place a south chemical waste water sump pump in operation. Initiate a real or simulated high radiation signal on the 6B CPS regeneration skid waste effluent. Repeat the test for each pump.	i. The pump stops. ii. South chemical waste collection sump to BPDS collection tank isolation valve is closed. iii. South chemical waste collection sump to LRW high conductivity waste tank isolation valve is closed. [ITAAC 03.18.02] (i through iii)
System Level Test #24-4		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the BPDS automatically responds to mitigate a release of radioactivity.	Place a north waste water sump pump in operation. Initiate a real or simulated high radiation signal in the BPDS north TGB floor drains. Repeat the test for each pump.	i. The north waste water sump pump stops. ii. North waste water sump discharge to BPDS collection tank isolation valve is closed. iii. North waste water sump discharge to LRW high conductivity waste tank isolation valve is closed. [ITAAC 03.17.03] (i thorugh iii)
System Level Test #24-5		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the BPDS automatically responds to mitigate a release of radioactivity.	Place a south waste water sump pump in operation. Initiate a real or simulated high radiation signal in the BPDS south TGB floor drains. Repeat the test for each pump.	i. The south waste water sump pump stops. ii. South waste water sump discharge to BPDS collection tank isolation valve is closed. iii. South waste water sump discharge to LRW high conductivity waste tank isolation valve is closed. [ITAAC 03.18.03] (i through iii)

Table 14.2-24: Balance-of-Plant Drain System Test # 24 (Continued)

System Level Test #24-6		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the BPDS automatically responds to mitigate a release of radioactivity.	Place a north waste water sump pump in operation. Initiate a real or simulated high radiation signal in the BPDS auxiliary blowdown cooler condensate. Repeat the test for each pump.	i. The north chemical waste water sump pump stops. ii. North chemical waste collection sump to BPDS collection tank isolation valve is closed. iii. North chemical waste collection sump to LRW high conductivity waste tank isolation valve is closed. [ITAAC 03.17.04] (i through iii)
System Level Test #24-7		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify BPDS automatically controlled pumps, in sumps and tanks without a fire water removal pump, start and stop automatically and transfer liquid waste to its design location.	Align each BPDS sump or tank to allow water in a selected sump or tank to be pumped to its design location. If the sump fill rate in the following test method is insufficient for automatic start of the alternate pump, the primary pump may be temporarily removed from service to allow an increase in the sump level. i. Verify that Pump #1 is set to the primary pump and Pump #2 is set to alternate. Fill the selected sump or tank until a HI water level is obtained to start the primary pump. ii. Continue filling the sump or tank until a HI-HI level starts the alternate pump. iii. Stop filling the sump or tank to allow the primary and alternate pumps to stop on LO level. iv. Change pump controls to make Pump #2 the primary pump and Pump #1 the alternate pump, and refill the sump or tank until the primary pump starts on HI level. v. Continue filling the sump or tank until a HI-HI level starts the alternate pump. Note: Pump #1 and Pump #2 are not the actual names of the pumps; these names are used to differentiate between the two pumps.	MCR displays and local, visual observation verifies the following: i. The primary pump starts on HI level and transfers water to its design location in the LRWS or UWS ~~system~~. ii. The alternate pump starts on HI-HI level. iii. Both primary and alternate pumps stop on LO level. iv. The primary pump starts on HI level. v. The alternate pump starts on HI-HI level.

Table 14.2-27: Main Steam System Test # 27

Preoperational test is required to be performed for each NPM.		
The MSS is described in Section 10.3. MS functions are not verified by this test. The MSS functions verified by other tests are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
~~1. The MSS supports the SG by delivering steam to the main condenser.~~	~~nonsafety-related~~	~~TGS Test #33-2~~
~~2~~1. The MSS supports the TGS by providing steam to the TGS.	nonsafety-related	TGS Test #33-2 Ramp Change in Load Test #100
~~3~~2. The MSS supports the CNTS by providing secondary isolation of the main steam lines.	nonsafety-related	MPS Test #63-6
~~4~~3. The MSS supports the DHRS by providing a backup means for required boundary conditions for DHRS operation.	nonsafety-related	MPS Test #63-6
Prerequisites		
i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each MSS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control)	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each MSS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each MSS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify automatic operation of MSS extraction steam to protect the main turbine.	Initiate a simulated signal for the following system conditions. i. feedwater heater high level ii. turbine trip	Any remote display or local verification indicates the following: i. extraction steam block valve closes ii. extraction steam non-return check valve closes
v. Verify each MSS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each MSS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Tests		
None		

Table 14.2-28: Feedwater System Test # 28

Preoperational test is required to be performed for each NPM.		
The FWS is described in Section 10.4.7; Section 9.2.6 (condensate storage tank); Section 10.4.1 (condenser); FWS functions are not verified by FWS tests. FWS functions verified by other tests are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The FWS supports the CPS by providing water for CPS rinse and CPS resin transfer.	nonsafety-related	CPS Test #30-1
2. The FWS supports the TG by cooling superheated steam in the gland steam desuperheater prior to the steam entering the gland seals.	nonsafety-related	TGS Test #33-1 Ramp Change in Load Test #100
3. The FWS supports the containment system (CNTS) by supplying feedwater to the SGs.	nonsafety-related	TGS Test #33-1 Ramp Change in Load Test #100
4. The FWS supports the turbine generator by cooling superheated turbine bypass steam in the turbine bypass desuperheater prior to the steam entering the main condenser.	nonsafety-related	TGS Test #33-1 100 Percent Load Rejection Test #103
5. The FWS supports the turbine generator by accepting turbine bypass steam into the main condenser.	nonsafety-related	TGS Test #33-1 100 Percent Load Rejection Test #103
6. The FWS supports the CNTS by providing secondary isolation of the feedwater lines.	nonsafety-related	MPS Test #63-6
7. The FWS supports the decay heat removal system (DHRS) by providing secondary isolation of the feedwater lines, ensuring required boundary conditions for DHRS operation.	nonsafety-related	MPS Test #63-6
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a pump curve test has been completed for the FWS pumps.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each FWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each FWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each FWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each FWS condensate pump can be started and stopped remotely.	Align the FWS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.

Table 14.2-29: Feedwater Treatment System Test # 29

Preoperational test is required to be performed for the 6A NPMs and for the 6B NPMs.		
The feedwater treatment system (FWTS) is described in Section 10.4.11 and the function verified by this test and power ascension testing is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The FWTS supports the FWS by controlling and maintaining feedwater chemistry.	nonsafety-related	Component-level tests Primary and Secondary Chemistry Test #79
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each FWTS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each FWTS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each FWTS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each FWTS pump can be started and stopped remotely and locally (if designed).	Align the FWTS to allow for pump operation. Stop and start each remotely-controlled pump from the MCR. Stop and start each locally-controlled pump locally.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify the speed of each FWTS variable-speed pump can be manually controlled.	Vary the speed of each pump from the MCR and local control panel (if design has local pump control).	MCR display indicates pump speed varies from minimum to maximum speed.
vi. Verify each FWTS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each FWTS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Tests		
None		

Table 14.2-30: Condensate Polishing System Test # 30 (Continued)

System Level Test #30-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the CPS automatically completes resin regeneration.	Align the FWS to support CPS resin regeneration. Align the ABS to support CPS resin regeneration. i. Automatically transfer the test resin bed from a condensate polisher to the CPS regeneration skid. ii. Initiate an automatic regeneration of the resin. iii. Automatically transfer the test resin bed from the CPS regeneration skid to a condensate polisher.	i. The resin transferred to the regeneration skid. ii. The CPS regeneration cycle completed successfully. iii. The resin transferred to a condensate polisher. iv. ABS steam maintains hot water heater outlet temperature at design setpoint during resin regeneration.

Table 14.2-31: Feedwater Heater Vents and Drains System Test # 31

Preoperational test is required to be performed for each NPM.		
The feedwater heater vents and drains system (HVDS) ~~system~~ is described in Section 10.4.7. and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The HVDS ~~system~~ supports the FWS by venting the feedwater heaters.	nonsafety-related	Component level tests
2. The HVDS ~~system~~ supports the FWS by controlling level in the shell sides feedwater heaters.	nonsafety-related	Component level tests Ramp Change in Load Demand Test #100
Prerequisites		
Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each HVDS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each HVDS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each HVDS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify automatic operation of HVDS valves to protect the turbine on turbine trip.	Initiate a simulated turbine trip.	Any remote display or local verification indicates the following: i. Low, intermediate and high pressure feedwater heater extraction steam supply valves are closed. ii. Low, intermediate and high pressure feedwater heater air assisted check valves are closed. iii. Low, intermediate and high pressure feedwater heater extraction steam dump valves are open.
v. Verify automatic operation of HVDS valves to protect turbine on high feedwater heater level.	Initiate a simulated signal for the following system conditions. i. Low pressure feedwater heater high level. ii. Intermediate pressure feedwater heater high level. iii. High pressure feedwater heater high level	Any remote display or local verification indicates the following: i. Low pressure feedwater heater extraction steam supply valve and low pressure feedwater heater extraction steam dump valve are open. ii. Intermediate pressure feedwater heater extraction steam supply valve and intermediate pressure feedwater heater extraction steam dump valve are open. iii. High pressure feedwater heater extraction steam supply valve and high pressure feedwater heater extraction steam dump valve are open.

Table 14.2-32: Condenser Air Removal System Test # 32

Preoperational test is required to be performed for each NPM.		
The condenser air removal system (CARS) is described in Section 10.4.2 and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The CARS supports the condensate and FWS by removing air and non-condensable gases from the main condenser.	nonsafety-related	Test #32-1
2. The circulating water system (CWS) supports the FWS by removing heat from the main condenser.	nonsafety related	Test #32-1 Ramp Change in Load Demand Test #100
3. The ABS supports the turbine generator by supplying gland seal steam.	nonsafety-related	Test #32-1
4. The auxiliary boiler supports the FWS by supplying steam to the condenser for sparging when necessary.	nonsafety-related	Test #32-1
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CARS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each CARS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each CARS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each CARS pump can be started and stopped remotely.	Align the CARS to allow for pump operation. Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify CARS valves automatically operate to maintain CARS seal water separator tank level.	Initiate a simulated signal for the following system conditions. i. CARS seal water separator tank high level. ii. CARS seal water separator tank low level.	Any remote display or local verification indicates the following: i. CARS seal water separator tank makeup valve is closed and drain valve is open. ii. The CARS seal water separator makeup valve is open and drain valve is closed.
vi. Verify a CARS standby pump automatically starts to protect plant equipment.	Align the CARS to allow for pump operation. Place a pump in service. Initiate a simulated main condenser high pressure.	MCR display and local, visual observation indicate the standby pump starts. Audible and visible water hammer are not observed when the pump starts.
vii. Verify a local integrated grab sample can be obtained from the CARS grab sample device.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is obtained.

Table 14.2-32: Condenser Air Removal System Test # 32 (Continued)

viii. Verify each CARS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each CARS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Test #32-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the CARS can maintain main condenser vacuum pressure.	Place the ABS in automatic control to supply gland seal steam. Place the FWS in automatic control to condense the gland seal steam in the gland exhaust condenser. Place the CWS in automatic control to provide cooling to the main condenser. i. Place the CARS in service to establish vacuum in the main condenser. ii. Open the feedwater sparge isolation valves to provide steam sparging to the main condenser.	i. Maintain main condenser design vacuum pressure. ii. The ABS is capable of providing sparging steam to the main condenser as indicated by steam flow. iii. The ABS is capable of supplying gland seal steam to the turbine generator at design pressures.

RAI 10.02-3, RAI 10.02.03-1, RAI 10.02.03-2

Table 14.2-33: Turbine Generator System Test # 33

Preoperational test is required to be performed for each NPM.		
The TGS is described in Sections 10.2, 10.4.3, and 10.4.4. The TGS and other functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The TGS supports the MSS by providing steam bypass from the MSS to the main condenser.	nonsafety-related	Test #33-1 100 Percent Load Rejection Test #103
2. The MHS supports the CVCS by adding heat to primary coolant.	non-safety related	Test #33-1
3. The CVCS supports the reactor coolant system (RCS) by heating primary coolant.	nonsafety-related	Test #33-1
4. The ABS supports the module heatup system (MHS) by supplying steam for heating reactor coolant at startup and shutdown.	nonsafety-related	Test #33-1
5. The FWS supports the CNTS by supplying feedwater to the SGs.	nonsafety-related	Test #33-1 Ramp Change in Load Test #99
6. The FWS supports the TGS by cooling superheated turbine bypass steam in the turbine bypass desuperheater prior to the steam entering the main condenser.	nonsafety-related	Test #33-1 100 Percent Load Rejection Test #103
7. The FWS supports the TGS by accepting turbine bypass steam into the main condenser.	nonsafety-related	Test #33-1 100 Percent Load Rejection Test #103
8. The FWS supports the TGS by cooling superheated steam in the gland steam desuperheater prior to the steam entering the gland seals.	nonsafety-related	Test #33-1 Ramp Change in Load Test #100
9. ~~The MSS supports the SGS by delivering steam to the main condenser.~~The CVCS supports emergency core cooling system (ECCS) valves by providing water to reset the ECCS valves.	nonsafety-related	Test #33-1~~2~~
10. The MSS supports the TGS by providing steam to the TGS.	nonsafety-related	Test #33-2 Ramp Change in Load Test #100
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. The following prerequisites are not required for component testing: ii. Verify Test #32-1 has been completed to verify the CARS can maintain main condenser vacuum pressure (reference test 14.2-32). iii. The SG feedwater flush is complete. iv. The CARS is automatically maintaining main condenser vacuum. v. Initial RCS temperature must be approximately 200°F to allow for hot functional testing to obtain data at an RCS temperature of 200°F and above. vi. The NPM and supporting systems are aligned to increase RCS temperature and pressure.		

Table 14.2-33: Turbine Generator System Test # 33 (Continued)

System Level Test #33-1

Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify the CVCS is capable of supplying water at sufficient pressure to close the ECCS valves. iii. Verify the MHS is capable of heating the RCS to a temperature sufficient to obtain criticality. iiii. Verify the MHS is capable of heating the RCS to establish natural circulation flow sufficient to obtain criticality. iv~~ii~~. Verify the TGS automatically controls turbine bypass flow to the main condenser. ~~i~~v. Verify the FWS automatically controls flow to the SGs to maintain SG inventory. vi. Verify the FWS automatically cools the TGS bypass steam ~~flow~~ in the main steam desuperheater. vii. Verify a local grab sample can be obtained from an MHS system grab sample device. viii. Verify the FWS automatically cools the TGS gland steam in the gland steam desuperheater. ix. Verify hotwell level is automatically controlled while receiving bypass steam.	Close the ECCS valves. Align the plant to cool the RCS via the TGS bypass system. Warm main steam lines. Place the TGS steam bypass valve in automatic control. Place the feedwater regulating valve in steam generator inventory control. Place the MHS and the CVCS in automatic control to heat the RCS. Place the ABS high-pressure system in automatic control to heat the MHS heat exchanger from RCS ambient temperature to the highest temperature achievable by MHS heating. Align the FWS to cool the gland seal steam desuperheater.	i. CVCS pressure is sufficient as indicated by closure of the ECCS valves. iii. a. CVCS supply remains in a sub-cooled state while heating the RCS using the module heatup system as verified by CVCS temperature and pressure. b. RCS temperature is sufficient to obtain criticality. iiii. RCS natural circulation flow is sufficient to obtain criticality. iv~~ii~~. The TGS bypass flow ~~is maintained~~ maintains steam pressure at setpoint. ~~i~~v. The feedwater flow to the steam generator is maintained at setpoint. vi. The cooled TGS bypass ~~flow~~temperature is maintained at setpoint. vii. A local grab sample is successfully obtained at RCS normal operating temperature and pressure. viii. The cooled gland seal steam temperature is maintained at setpoint. ix. Hotwell level is maintained at setpoint while receiving bypass steam.

System Level Test #33-2

This test may be performed after the completion of Test 33-1 when the RCS is at normal operating pressure and the RCS has achieved the maximum temperature achievable by warming the RCS using MHS heating.

Test Objective	**Test Method**	**Acceptance Criteria**
Verify the maximum main turbine speed that can be obtained using the MHS to heat the RCS.	Place the main turbine in service as follows: i. Ensure the RCS is at ~~RCS is at~~ normal operating pressure and ~~the RCS is~~ at maximum temperature achievable by warming the RCS using MHS heating. ii. Place turbine on turning gear with seal steam in service. iii. Warm up turbine to required temperature. iv. Increase main turbine speed.	The maximum main turbine speed is obtained.

Table 14.2-35: Liquid Radioactive Waste System Test # 35

Preoperational test is required to be performed once.		
The LRWS is described in Section 11.2 and 11.5.2.1.5 and the functions verified by this test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The LRWS supports the solid radioactive waste system (SRWS) by receiving and processing liquid radioactive waste from the SRWS dewatering skid.	nonsafety-related	Test #35-1 Test #35-2 Component-level test xi SRWS Test #37-7
2. The LRWS supports the SFPCS by receiving contaminated pool water to aid in the removal of titrated water or boron. Treated liquid radwaste has the option to return to the pool as makeup.	nonsafety-related	Test #35-1 Test #35-2 Component-level tests
3. The LRWS supports the CVCS by receiving and processing primary coolant from CVCS letdown.	nonsafety-related	Test #35-1 Test #35-2 CVCS Test #38-1
4. The LRWS supports the RWDS by receiving and processing the effluent from the RWB radioactive waste drain sumps.	nonsafety-related	Test #35-1 Test #35-2 RWDS Test #23-1
5. The LRWS supports the RWDS by receiving and processing the effluent from the RXB radioactive waste drain sumps.	nonsafety-related	Test #35-1 Test #35-2 RWDS Test #23-1
6. The LRWS supports the RWDS by receiving and processing the effluent from the ANB radioactive waste drain sumps.	nonsafety-related	Test #35-1 Test #35-2 RWDS Test #23-1
7. LRWS supports the CVCS by receiving and processing the noncondensable gases and vapor from the pressurizer.	nonsafety-related	Test #35-1
The LRWS functions verified by other tests are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The LRWS supports the CVCS by receiving and processing primary coolant from CVCS letdown.	nonsafety-related	CVCS Test #38-1
The LRWS supports the RWDS by receiving and processing the effluent from theRWB radioactive waste drain sumps.	nonsafety-related	RWDS Test #23-1
The LRWS supports the RWDS by receiving and processing the effluent from theRXB radioactive waste drain sumps.	nonsafety-related	RWDS Test #23-1
The LRWS supports the RWDS by receiving and processing the effluent from the ANB radioactive waste drain sumps.	nonsafety-related	RWDS Test #23-1
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		

Table 14.2-35: Liquid Radioactive Waste System Test # 35 (Continued)

ix. Verify LRW pumps automatically operate to prevent tank overflow.	Align the LRWS to allow each of the following LRW transfer pumps to automatically transfer effluent to one of its design locations. Degasifier transfer pump A and B LCW collection tank transfer pump A and B HCW collection tank transfer pump A and B LCW sample tank transfer pump A and B HCW sample tank transfer pump A and B Detergent waste collection tank transfer pump Demineralized water break tank transfer pump i. Simulate a HI HI level signal in each of the above tanks. ii. Simulate a low level signal in each of the above tanks.	MCR displays and local, visual observation indicate the following: i. The transfer pump starts and transfers effluent to its design location. ii. The transfer pump stops.
x. Verify a local grab sample can be obtained from a LRWS grab sample device indicated on the LRW piping and instrumentation diagram.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is successfully obtained.
xi. Verify SRWS dewatering skid effluent can be transferred to LRW high-conductivity waste (HCW) collection tanks.	Align SRWS dewatering skid discharge to one of the LRW high-conductivity waste collection tanks. Fill the SRWS dewatering skid high integrity container (HIC) to above the low level pump stop setpoint. Start the SRWS dewatering skid diaphragm pump.	SRWS dewatering skid effluent is transferred to the LRW high-conductivity waste collection tank. The SRWS dewatering skid diaphragm pump is stopped.
xii. Verify each LRWS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each LRWS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.

System Level Test #35-1

This test should be performed after the completion of Test 33-1 when the RCS is at normal operating pressure and the RCS has achieved the maximum temperature achievable by warming the RCS using MHS heating.

Test Objective	Test Method	Acceptance Criteria
i. Verify LRWS can process a gaseous waste stream.	Align LRWS to receive pressurizer gaseous waste from the pressurizer during hot functional testing. Process the pressurizer gaseous waste through the LRW degasifier.	i. The LRW degasifier removes condensable gases and vents waste to the RBVS or GRWS. ii. The LRW degasifier liquid transfer pumps transfer the liquid condensate waste to the low conductivity waste collection tanks.

Table 14.2-36: Gaseous Radioactive Waste System Test # 36

Preoperational test is required to be performed once.		
The GRWS is described in Section 11.3 and 11.5.2.2.6 and the functions verified by this test or another preoperational test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The GRWS supports the LRWS by receiving and / or collecting potentially radioactive and hydrogen-bearing waste gases which require processing prior to release to the environment.	nonsafety-related	Test #36-1
2. The GRWS supports the CES by receiving and / or collecting potentially radioactive and hydrogen-bearing waste gases which require processing prior to release to the environment.	nonsafety-related	Test #36-1 CES Test #41-2
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each GRWS remotely-operated valve can be operated remotely.	Operate each valve from the (main control room) MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each GRWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each GRWS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify GRWS valves automatically operate to maintain vessel volume.	i. Initiate a real or simulated high GRWS moisture separator level. ii. Initiate a real or simulated low GRWS moisture separator level.	MCR display and local, visual observation indicate the following: i. The moisture separator drain valve is open. ii. The moisture separator drain valve is closed.
v. Verify GRWS inlet isolation valves automatically close and nitrogen purge valve opens on high inlet stream oxygen concentration.	Simulate a GRWS inlet stream oxygen concentration high signal.	MCR display and local, visual observation indicate the following: i. The inlet stream isolation valves are closed. ii. The nitrogen purge valve is open.
vi. Verify GRWS isolates upon loss of RWBV exhaust flow.	Simulate a loss of RWBVS exhaust flow.	MCR display and local, visual observation indicate the GRWS isolation valves are closed.
vii. Verify radiation isolation of GRWS charcoal decay beds upon detection of decay bed discharge flow high radiation level.	i. Initiate a real or simulated GRWS train A decay bed discharge flow high radiation signal. ii. Initiate a real or simulated GRWS train B decay bed discharge flow high radiation signal.	MCR display and local, visual observation indicate the following: i. GRWS train A charcoal decay bed discharge isolation valve is closed. [ITAAC 03.09.04] ii. GRWS train B charcoal decay bed discharge isolation valve is closed. [ITAAC 03.09.05]

Table 14.2-37: Solid Radioactive Waste System Test # 37

Preoperational test is required to be performed once.		
The SRWS is described in Section 11.4 and the functions verified by this test or another preoperational test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The SRWS supports the LRWS by receiving spent resin and carbon bed from LRW processing skids.	nonsafety-related	Test #37-1 Test #37-4 Test #37-6 ~~Test #37-7~~
2. The SRWS supports the CVCS by receiving spent resin from CVCS ion exchange vessels.	nonsafety-related	Test #37-2 Test #37-5 ~~Test #37-7~~
3. The SRWS supports the PCUS by receiving spent resin and sludge from PCUS ion exchange vessels.	nonsafety-related	Test #37-3 Test #37-5 ~~Test #37-7~~
4. The SRWS supports the CRVS by receiving exhausted HEPA filters to be compacted and shipped off site.	nonsafety-related	Test #37-8
5. The SRWS supports the RWBVS by receiving exhausted HEPA filters to be compacted and shipped off site.	nonsafety-related	Test #37-8
6. The SRWS supports the RBVS by receiving exhausted HEPA filters and charcoal bed from RXB and normal control room HVAC, to be compacted and shipped off site.	nonsafety-related	Test #37-8
7. The SRWS supports the GRWS by receiving contaminated or exhausted charcoal beds, packaging the waste in approved containers and shipping it to a licensed facility.	nonsafety-related	Test #37-8
8. The SRWS supports portions of the Annex Building HVAC system by receiving, compacting, packaging, and storing exhausted HEPA and charcoal filters for storage and shipment offsite.	nonsafety-related	Test #37-8
9. The LRWS supports the solid radioactive waste system (SRWS) by receiving and processing liquid radioactive waste from the SRWS dewatering skid.	nonsafety-related	Test #37-7 LRWS Test #35-2
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each SRWS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each SRWS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.

Table 14.2-38: Chemical and Volume Control System Test # 38

Preoperational test is required to be performed for each NPM.		
The CVCS is described in Section 9.3.4 and 11.5.2.2.11 and the functions verified by this test, other preoperational tests and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The CVCS supports the RCS by providing primary coolant makeup.	nonsafety-related	Test #38-1 Ramp Change in Load Demand Test #100
2. The CVCS supports the RCS by providing primary coolant letdown.	nonsafety-related	Test #38-1 Ramp Change in Load Demand Test #100
3. The CVCS supports the RCS by providing pressurizer spray flow for RCS pressure control.	nonsafety-related	Test #38-2 Ramp Change in Load Demand Test #100
4. The CVCS supports the RCS by changing the boron concentration of the primary coolant.	nonsafety-related	Test #38-3
5. The BAS supports the CVCS by providing uniformly mixed borated water on demand.	nonsafety-related	Test #38-3
6. The LRWS supports the CVCS by receiving and processing primary coolant from CVCS letdown.	nonsafety-related	Test #38-1 LRWS Test #35-2
The CVCS functions verified by other tests are:		
The CVCS supports emergency core cooling system (ECCS) valves by providing water to reset the ECCS valves.	nonsafety-related	~~MPS Test #63-6~~TGS Test #33-1
The CVCS supports the RCS by heating primary coolant.	nonsafety-related	TGS Test #33-1
The CVCS supports the RCS by isolating dilution sources.	safety-related	MPS Test #63-6
The CVCS supports the RCS by providing primary coolant makeup in beyond design basis events.	nonsafety-related	MPS Test #63-11
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a pump curve test has been completed and approved for the CVCS pumps. iii. Component Level Tests iv., v., and vi. must be performed under preoperational test conditions that approximate design-basis temperature, differential pressure, and flow conditions to the extent practicable, consistent with preoperational test limitations.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CVCS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each CVCS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each CVCS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position

Table 14.2-38: Chemical and Volume Control System Test # 38 (Continued)

System Level Test #38-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify proper operation of the automatic pressurizer level control.	This test will be performed in conjunction with turbine generator test #33-1, which heats the RCS from ambient conditions to no less than 420~~5~~°F but as high as reasonably achievable. i. ~~For pressurizer automatic level control on the low end of the design operating band use~~Place pressurizer level control in automatic operation during RCS heatup to demonstrate automatic letdown. Use the module control system (MCS) data historian to review pressurizer level at maximum-obtained RCS temperature. ii. To raise pressurizer level, use MCS automation and operator permission to increase to a target pressurizer level. Note: Pressurizer letdown level control is automatic; however pressurizer makeup level control is automatic with consent of operator.	i. MCS data indicates that automatic pressurizer ~~level control is maintained within the design operating level band.~~letdown maintained pressurizer level at setpoint. ii. MCS data indicates that the pressurizer level control results in ~~an increased pressurizer level within acceptable limits of the target pressurizer level.~~CVCS makeup to the RCS to increase pressurizer level to the target setpoint.
System Level Test #38-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify proper operation of the automatic pressurizer pressure control.	This test will be performed in conjunction with turbine generator test #33-1 which heats the RCS from ambient conditions to no less than 420~~5~~°F but as high as reasonably achievable. Place pressurizer pressure control in automatic and raise pressure setpoint to the normal operating band. Raise pressurizer pressure to the pressurizer spray valve open setpoint. Use the MCS data historian to review pressurizer pressure at maximum-obtained RCS temperature.	i. MCS data indicates automatic pressurizer heater operation raised pressurizer pressure to the setpoint. ii. MCS data indicates automatic pressurizer spray valve operation lowered pressurizer pressure to the spray valve closure setpoint.~~MCS data indicates that automatic pressurizer pressure control is maintained within the design operating pressure band.~~

Table 14.2-38: Chemical and Volume Control System Test # 38 (Continued)

System Level Test #38-3		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify proper operation of CVCS automatic dilution and boration control.	This test will be performed in conjunction with turbine generator test #33-1 which heats the RCS from ambient conditions to no less than 42~~05~~°F but as high as reasonably achievable. Ensure that RCS low flow rate alarm is clear to ensure adequate mixing for dilution and boration. i. Place the BAS storage tank on recirculation and sample boron concentration. iii. Use the MCS automation and operator permission to decrease to a target RCS boron concentration. iiii. Use the MCS and operator permission to increase to a target RCS boron concentration.	i. BAS storage tank sample boron concentration is within specifications. iii. MCS data indicates that the dilution of the RCS results in a decreased boron concentration within acceptable limits of the target concentration. iiii. MCS data indicates that the boration of the RCS results in a increased boron concentration within acceptable limits of the target concentration.

Table 14.2-39: Boron Addition System Test # 39

Preoperational test is required to be performed for each NPM.		
The boron addition system (BAS) is described in Section 9.3.4. The BAS function verified by this test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The BAS supports the SFPCS by providing borated water to the RXB pools.	nonsafety-related	~~component-level test xiii~~Test #39-1
The BAS function verified by other test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The BAS supports the CVCS by providing uniformly mixed borated water on demand.	nonsafety-related	CVCS Test #38-3
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a pump curve test has been completed and approved for the BAS pumps.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each BAS remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each BAS air-operated valve fails to its safe position on loss of air.	Place each valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each BAS air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each valve in its non-safe position. Isolate electrical power to each air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify the BAS transfer pump can be started and stopped remotely.	Align the BAS to allow for pump operation. Stop and start the transfer pump from the MCR.	MCR display and local, visual observation indicate the pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
v. Verify the BAS supply pump can be started and stopped remotely.	Align the BAS to allow for pump operation. Start and stop the supply pump from the MCR.	MCR display and local, visual observation indicate the pump starts and stops. Audible and visible water hammer are not observed when the pump starts.
vi. Verify the speed of the BAS variable-speed pumps can be manually controlled.	Align the BAS to provide a flow path to operate a selected pump. Vary the BAS pump speed from minimum to maximum from the MCR.	MCR display indicates the speed of each pump obtains both minimum and maximum pump speeds. Audible and visible water hammer are not observed when the pump starts.
vii. Verify BAS valves automatically operate to protect plant equipment.	i. Initiate a real or simulated high BAS batch tank level signal. ii. Initiate a real or simulated high BAS storage tank level signal.	MCR display and local, visual observation indicate the following: i. The batch tank fill and return valves are fully closed. ii. The storage tank fill and recirculation valves are fully closed.

Table 14.2-39: Boron Addition System Test # 39 (Continued)

viii. Verify the BAS transfer pump stops automatically to protect plant equipment.	Align the BAS to allow for pump operation. i. Place the BAS transfer pump in service on recirculation to the BAS batch tank. Initiate a simulated a low batch tank level signal. ii. Place the BAS transfer pump in service on recirculation to the BAS storage tank. Simulate a low storage tank level signal.	MCR display and local, visual observation indicate the following: i. The transfer pump stops. ii. The transfer pump stops.
ix. Verify BAS supply pumps stop automatically to protect plant equipment.	Align the BAS to allow for pump operation. i. Place a BAS supply pump in service on recirculation to the BAS batch bank. Initiate a simulated a low batch tank level signal. ii. Place a supply pump in service on recirculation to the BAS storage tank. Initiate a simulated low storage tank level signal.	MCR display and local, visual observation indicate the following: i. The supply pump stops. ii. The supply pump stops.
x. Verify BAS flow capability by automatic start of each BAS supply pump while in standby mode.	Align the BAS to allow for pump operation. Place a supply pump in service. Initiate a simulated pump trip signal.	MCR display and local, visual observation indicate the standby pump starts. Audible and visible water hammer are not observed when the pump starts.
xi. Verify supply pump low flow protection.	Align the BAS to allow a BAS supply pump flow sufficient to close the pump recirculation valve to the storage tank. i. Manually throttle a valve in the pump flow path until the flow rate reaches the pump minimum flow setpoint. ii. Open the throttled valve	MCR displays and local, visual observation verifies the following: i. The pump recirculation valve is open. ii. The pump recirculation valve is closed.
xii. Verify a local grab sample can be obtained from a BAS grab sample device.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is successfully obtained.
~~xiii. Verify the BAS automatically adds a specified quantity of borated water from the BAS batch tank to the RXB pools.~~	~~i. Verify the BAS batch tank contains a sufficient volume of water to conduct this test.~~ ~~ii. Align the BAS and the SFPCS to supply water from the BAS to the SFPCS pump suction.~~ ~~iii. Enter a BAS batch tank target level to terminate batch operation to the spent fuel pool.~~	~~MCR displays and local, visual observation verifies the following:~~ ~~i. The BAS to SFPCS valve initially opens to supply water from the BAS to the SFPCS pump suction.~~ ~~ii. The BAS to SFPCS valve automatically closes when the BAS batch tank obtains the target level.~~
xiii~~v~~. Verify each BAS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each BAS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.

Table 14.2-39: Boron Addition System Test # 39 (Continued)

System Level Tests		
~~None~~**System Level Test #39-1**		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify the BAS automatically adds a specified quantity of borated water from the BAS batch tank to the RXB pools.	i. Verify the BAS batch tank contains a sufficient volume of water to conduct this test. ii. Align the BAS and the SFPCS to supply water from the BAS to the SFPCS pump suction. iii. Enter a BAS batch tank target level to terminate batch operation to the spent fuel pool.	MCR displays and local, visual observation verifies the following: i. The BAS to SFPCS valve initially opens to supply water from the BAS to the SFPCS pump suction. ii. The BAS to SFPCS valve automatically closes when the BAS batch tank obtains the target level.

Table 14.2-41: Containment Evacuation System Test # 41

Preoperational test is required to be performed for each NPM.		
The CES is described in Sections 9.3.6, 11.5.2.2.7 and 5.2.5 and the functions verified by this test or another preoperational test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The CES supports the CNTS by removing water vapor from the containment vessel (CNV).	nonsafety-related	Test #41-1 Test #41-2 Test #41-3
2. The CES supports the CNTS by condensing water vapor removed from the CNV in the containment evacuation condenser.	nonsafety-related	Test #41-1 Test #41-2 Test #41-3
3. The CES supports the CNTS by removing non-condensable gases from the CNV.	nonsafety-related	Test #41-1 Test #41-2 Test #41-3
4. The CES supports CNTS by providing leak-before-break leak detection monitoring capability.	nonsafety-related	Test #41-4
5. The CES supports the RCS by providing RCS leak detection monitoring capability.	nonsafety-related	Test #41-3
6. The GRWS supports the CES by receiving and / or collecting potentially radioactive and hydrogen-bearing waste gases which require processing prior to release to the environment.	nonsafety-related	Test #41-2 GRWS Test #36-1
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each CES remotely-operated valve can be operated remotely.	Operate each valve from the MCR and local control panel (if design has local valve control).	MCR display and local, visual observation indicate each valve fully opens and fully closes.
ii. Verify each CES air-operated valve fails to its safe position on loss of air.	Place each CES valve in its non-safe position. Isolate and vent air to the valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iii. Verify each CES air-operated valve fails to its safe position on loss of electrical power to its solenoid.	Place each CES valve in its non-safe position. Isolate electrical power to each CES air-operated valve.	MCR display and local, visual observation indicate each valve fails to its safe position.
iv. Verify each CES pump can be started and stopped remotely.	Stop and start each pump from the MCR.	MCR display and local, visual observation indicate each pump starts and stops.
v. Verify the speed of each CES variable-speed pump can be manually controlled.	Vary the speed of each pump from the MCR and local control panel (if design has local pump control).	MCR display indicates pump speed varies from minimum to maximum speed.
vi. Verify each CES pump automatically stops to protect plant equipment.	Place a pump in operation. Initiate a real or simulated signal for each pump trip condition.	MCR displays and local, visual observation verifies the pump stops.
vii. Verify each CES pump suction and discharge valve automatically closes to protect the CES equipment.	Open the pump suction and discharge valves. Initiate a real or simulated signal for each valve close conditions.	Each pump suction and discharge valve closes on each real or simulated valve close condition.

Table 14.2-41: Containment Evacuation System Test # 41 (Continued)

viii. Verify a local grab sample can be obtained from a CES grab sample device indicated on the CES piping and instrumentation diagram.	Place the system in service to allow flow through the grab sampling device.	A local grab sample is successfully obtained.
ix. Verify each CES instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each CES transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Test #41-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the automatic operation of the CES to establish and maintain design vacuum for the CNV.	After the containment flooding and drain system (CFDS) completes draindown of the CNV and the NPM is in hot functional testing, place the CES in automatic operation.	The automated control establishes and maintains vacuum in the CNV.
System Level Test #41-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify radiation isolation and flow diversion on high radiation level in the CES.	The NPM is in hot functional testing with the RCS at normal operating pressure. The CES is operating in automatic control with a CNV steady-state vacuum pressure indicating the noncondensable gases have been removed from the CNV. Initiate a real or simulated high radiation signal for the CES vacuum pump discharge.	i. The CES effluent flow path to the RBVS is isolated and diverted to GRWS. [ITAAC 02.07.01] ii. The CES effluent to process sample panel isolation valve is closed. [ITAAC 02.07.01] iii. The CES purge air solenoid valves to the vacuum pumps are closed. [ITAAC 02.07.01] iv. The automated control maintains vacuum in the CNV.

Table 14.2-48: Decay Heat Removal System Test # 48

Preoperational test is required to be performed for each NPM.		
The DHRS is described in Section 6.3. DHRS functions are not verified by DHRS tests. DHRS functions verified by other tests are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The DHRS supports the RCS by opening the DHRS actuation valves for DHRS operation.	safety-related	MPS Test #63-6 Reactor Trip from 100 Percent Power Test # 104
2. The DHRS supports the MPS by providing MPS actuation instrument information signals.	safety-related	MPS Test #63-1
3. The DHRS supports the MPS by providing PAM instrument information signals.	nonsafety-related	SDIS Test #66-2
4. The UHS supports the DHRS by accepting the heat from the DHRS heat exchanger.	safety-related	Reactor Trip from 100 Percent Power Test # 104
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each DHRS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each DHRS transmitter.	The instrument signal is displayed on an MCS or PCS display, or is recorded by the applicable control system historian.
System Level Tests		
None		

Table 14.2-49: In-core Instrumentation System Test # 49

Preoperational test is required to be performed for each NPM.		
The in-core instrumentation system (ICIS) is described in Section 7.0.4.7 and the function verified by this test and power ascension testing is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The ICIS supports the MPS by providing reactor core (RXC) temperature information.	nonsafety-related	Test #49-1 Reactor Coolant System Temperature Instrument Calibration Test #93
The ICIS functions verified by another test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The ICIS supports the MPS by providing RXC temperature information.	nonsafety-related	SDIS Test #66-2
Prerequisites i. The ICIS instrument strings are inserted into the core. ii. Verify an instrument calibration has been performed on all ICIS thermocouples by cross-calibrating the thermocouple to the RCS narrow range resistance temperature detectors (RTDs) prior to RCS heatup.		
Component Level Tests		
None		
System Level Test #49-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify proper temperature indication is obtained from the ICIS thermocouples.	Heat the RCS from ambient conditions to ~~normal operating temperature~~the maximum RCS temperature that can be obtained by the Module Heating System. Use the MCS data historian to cross-check the ICIS thermocouples to each other and the RCS narrow-range and wide range RTDs.	MCS data indicates that the ICIS thermocouples respond properly.

Table 14.2-53: Process Sampling System Test # 53 (Continued)

System Level Test #53-3		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify sampling capability of the secondary sampling points.	i. The NPM is in hot functional testing with the RCS at normal operating pressure and the maximum operating temperature achievable by heating the RCS with the MHS. The FWS and MSS are in service. Align the FWS, MSS, PSS, and ABS~~PSS~~ to provide continuous sampling flow to the PSS secondary sampling system feedwater/main steam sample panel. ii. Open the manual feedwater/main steam ion chromatography analysis panel valve to obtain a feedwater to SG sample. iii. Open the manual feedwater/main steam ion chromatography analysis panel valve to obtain an SG-1 steam sample. iv. Open the manual feedwater/main steam ion chromatography analysis panel valve to obtain a SG-2 steam sample. v. Open the manual feedwater/main steam ion chromatography analysis panel valve to obtain a condensate pump discharge sample.	i. The PSS secondary sampling system feedwater/main steam sample panel instruments provide indication of the water and steam analysis. ii. The feedwater/main steam ion chromatography analysis panel monitors the programmed ion. iii. The feedwater/main steam ion chromatography analysis panel monitors the programmed ion. iv. The feedwater/main steam ion chromatography analysis panel monitors the programmed ion. v. The feedwater/main steam ion chromatography analysis panel monitors the programmed ion.

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Table 14.2-57: Highly Reliable DC Power System Test # 57

Component level tests are required to be performed for each NPM, and once for the EDSS common channels. System Level Test #57-1 and Test #57-2 are required to be performed once. System Level Test #57-1 and Test #57-2 may be performed concurrently. System Level Test #57-3 is required to be performed once for each NPM.		
The EDSS is described in Sections 8.1.2.2, 8.1.4.2 and 8.3.2.1.1, and the functions verified by this test are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The highly reliable DC power system (EDSS) supports the following systems by providing DC electrical power. • MPS • neutron monitoring system (NMS) • fixed area radiation monitoring system (RMS) • plant lighting system (PLS) • PPS • safety display information system (SDIS) • CRVS	nonsafety-related	All functions are verified by component-level tests. System level tests provide additional verification as follows: PLS - Test #57-1 SDIS - Test #57-2 MPS - Test #57-3
EDS system functions verified by other tests are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. EDSS supports the MPS by providing EDSS module-specific operating parameter information signals.	nonsafety-related	~~Reference 14.2-66~~SDIS Test #66, Component-level test: Module-Specific test iii. ~~Component level test~~
2. EDSS supports the PPS by providing EDSS common operating parameter information signals.	nonsafety-related	~~Reference 14.2-66~~SDIS Test #66, Component-level test: Common test iii. ~~Component level test~~
Prerequisites i. Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. ii. Verify a valve-regulated lead-acid battery acceptance tests has been performed on all EDSS batteries to confirm battery capacity in accordance with IEEE Standard 1188 Sections 6 and 7. iii. Verify battery charger performance testing has been completed by the manufacturer or a site acceptance test has been completed in accordance with manufacturer instructions.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each EDSS bus can be powered by its associated batteries.	Configure the EDSS batteries and battery chargers associated with an EDSS bus such that one of the batteries is the only source of power to the bus. Repeat the test using the other battery associated with the EDSS bus under test as the only power source. Repeat the test for the remaining EDSS channels.	EDSS bus voltage is within design limits.

Table 14.2-57: Highly Reliable DC Power System Test # 57 (Continued)

ii. Verify each EDSS bus can be powered by its associated battery chargers. (Test may be performed as part of site acceptance testing.)	Configure the EDSS batteries and battery chargers associated with an EDSS bus such that one of the battery chargers is the only source of power to the bus. Repeat the test using the other battery charger associated with the EDSS bus under test as the only power source. Repeat the test for the remaining EDSS channels.	EDSS bus voltage is within design limits.
iii. Verify each EDSS instrument is available on an MCS or PCS display. (Test not required if the instrument calibration verified the MCS or PCS display.)	Initiate a single real or simulated instrument signal from each EDSS transmitter.	The instrument signal is displayed on an MCS or PCS display, or recorded by the applicable control system historian.
System Level Tests		
System Level Test #57-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the EDSS common buses provide independent power to the main control room (MCR) emergency lighting. (RG 1.41 Independence Test)	i. With both EDSS common buses energized and providing power to MCR emergency lighting, de-energize the EDSS Division I common bus. ii. With both EDSS common buses energized and providing power to MCR emergency lighting, de-energize the EDSS Division II common bus.	i. The MCR lighting designed to be powered by the EDSS Division I common bus is de-energized, and the MCR emergency lighting designed to be powered by the EDSS Division II common bus is energized. ii. The MCR emergency lighting designed to be powered by the EDSS Division II common bus is de-energized, and the MCR emergency lighting designed to be powered by the EDSS Division I common bus is energized.
System Level Test #57-2		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the EDSS common buses provide independent power to all SDIS MCR displays. (RG 1.41 Independence Test)	i. With EDSS Division I and Division II common buses energized verify power is available in the MCR for all SDIS displays. ii. De-energize the EDSS Division I common bus. iii. Re-energize the EDSS Division I common bus and de-energize the EDSS Division II common bus.	i. Power is available in the MCR for SDIS displays. ii.a. Power is not available in the MCR for SDIS Division I displays. ii.b. Power is available in the MCR for SDIS Division II displays. iii.a. Power is not available in the MCR for SDIS Division II displays. iii.b. Power is available in the MCR for SDIS Division I displays.

Table 14.2-63: Module Protection System Test #63

Preoperational test is required to be performed for each NPM.		
The MPS is described in Sections 7.0, 7.1, and 7.2 and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The MPS supports the CNTS by removing electrical power to the trip solenoids of the following CIVs on a containment system isolation actuation signal: • RCS injection containment isolation valves • RCS discharge containment isolation valves • Pressurizer spray containment isolation valves • RPV high point degasification containment isolation valves • Feedwater containment isolation valves • Main steam containment isolation valves • Main steam bypass valves • CES containment isolation valves • RCCWS containment isolation valves • CFDS containment isolation valves	safety-related	~~Test #63-4~~ Test #63-6
2. The MPS supports the CNTS by removing electrical power to the trip solenoids of the following valves on a DHRS actuation signal. • ~~DHRS actuation valves~~ • Main steam isolation valves • Main steam bypass isolation valves • Feedwater isolation valves	safety-related	~~Test #63-4~~ Test #63-6
3. The MPS supports the ECCS by removing electrical power to the trip solenoids of the following valves on an ECCS actuation signal. • Reactor vent valves • Reactor recirculation valves	safety-related	~~Test #63-4~~ Test #63-6

Table 14.2-63: Module Protection System Test #63 (Continued)

4. The MPS supports the CNTSontainment system by removing electrical power to the trip solenoids of the following containment isolation valves on a CVCS isolation actuation signal: • RCS injection containment isolation valves • RCS discharge containment isolation valves • PZR pressurizer spray CIVs • RPV high point degasification containment isolation valves	safety-related	~~Test #63-4~~ Test #63-6
5. The MPS supports the CVCS by removing electrical power to the trip solenoids of the DWS supply isolation valves on a DWS isolation actuation signal.	safety-related	~~Test #63-4~~ Test #63-6
6. The MPS supports the ECCS by removing electrical power to the trip solenoids of the reactor vent valves on an LTOP actuation signal.	safety-related	~~Test #63-4~~ Test #63-6
7. The MPS supports the ELVS by removing electrical power to the pressurizer heaters on a pressurizer heater trip actuation signal.	safety-related	~~Test #63-4~~ Test #63-6
8. The MPS supports the EDNS by removing electrical power to the CRDS for a reactor trip.	safety-related	~~Test #63-4~~ Test #63-5
9. The DHRS supports the RCS by opening the DHRS actuation valves on a DHRS actuation signal for DHRS operation.	safety-related	Test #63-6
10. The CNTS supports the DHRS by closing CIVs for the main steam and feedwater systems when actuated by the MPS.	safety-related	Test #63-6
11. The CNTS supports the RCS by closing the CIVs for pressurizer spray, RCS injection, RCS letdown, and RPV high point degasification when actuated by the MPS.	safety-related	Test #63-6
12. The CNTS supports the RXB by providing a barrier to contain mass, energy, and fission product release by closure of the CIVs upon a containment isolation signal.	safety-related	Test #63-6
13. The ECCS supports the RCS by opening the ECCS reactor vent valves and reactor recirculation valves when their respective trip valve is actuated by the MPS.	safety-related	Test #63-6

Table 14.2-63: Module Protection System Test #63 (Continued)

14. The ECCS supports the RCS by providing recirculated coolant from the containment to the RPV for the removal of core heat.	safety-related	Test #63-6
15. The ECCS supports the RCS by providing LTOP for maintaining the reactor coolant pressure boundary.	safety-related	Test #63-6
16. The CVCS supports the RCS by isolating dilution sources.	safety-related	Test #63-6
17. The FWS supports the CNTS by providing secondary isolation of the feedwater lines.	nonsafety-related	Test #63-6
18. The MSS supports the CNTS by providing secondary isolation of the main steam lines.	nonsafety-related	Test #63-6
19. The FWS supports the DHRS by providing secondary isolation of the feedwater lines, ensuring required boundary conditions for DHRS operation.	nonsafety-related	Test #63-6
20. The NMS supports the MPS by providing neutron flux data for various reactor trips.	safety-related	Test #63-14 Neutron Monitoring System Power Range Flux Calibration Test #92
21. ECCS supports MPS by providing instrumentation information signals.	nonsafety-related	Test #63-1
22. The DHRS supports the MPS by providing MPS actuation instrument information signals.	safety-related	Test #63-1
23. The RCS supports the MPS by providing instrument information signals.	nonsafety-related	Test #63-1
24. The RCS supports the MPS by providing instrument information signals for LTOP actuation	safety-related	Test #63-1
25. The CVCS supports the RCS by providing primary coolant makeup in beyond design basis events.~~ECCS valves by providing water to reset the ECCS valves.~~	nonsafety-related	Test #63-11~~6~~
26. The CFDS supports the RCS by providing borated coolant inventory for the removal of core heat during a beyond design basis accident.	nonsafety-related	Test #63-11
27. The MPS supports the DHRS by removing electrical power to the trip solenoids of the DHRS actuation valves on a DHRS actuation signal.	safety-related	Test #63-6
28. The MPS supports the CNTS by providing power to sensors.	safety-related	Test #63-1
29. The MPS supports the DHRS by providing power to sensors.	safety-related	Test #63-1
30. The MPS supports the RCS by providing power to sensors.	safety-related	Test #63-1

Table 14.2-63: Module Protection System Test #63 (Continued)

Prerequisite		
Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test. A complete staging and testing of system hardware and software configurations will be conducted. This factory acceptance testing will be conducted in accordance with a written test procedure for testing the software and hardware of the MPS prior to installation in the plant. Following installation, site acceptance testing shall be completed in accordance with developed procedures to ensure the MPS is installed and fully functional as designed. This testing must be completed and approved prior to performing preoperational testing.		
Component Level Tests		
None		
System Level Test #63-1		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the instrument signals of MPS monitored variables are displayed in the MCR.	Table 7.1-2 lists all of sensors which input to MPS. This test may be performed concurrently with safety display and indication system (SDIS) test #66 -2 for PAM Type B and Type C testing described in Section 14.2.12. Inject a single signal as close as practical for each sensor listed in Table 7.1-2 and monitor its response on an MCR workstation and the module-specific safety display instrument panel (if designed for safety display instrument display). If the sensor signal is designed to be disconnected when the NPM is moved then it will be necessary to test the signal from the sensor to the disconnect and then from the disconnect to the MCR display.	Each MPS monitored signal is displayed on an MCR workstation and the module-specific safety display instrument panel (if designed for safety display instrument display).
System Level Test #63-2 (Not used)		
~~**Test Objective**~~	~~**Test Method**~~	~~**Acceptance Criteria**~~
~~i. Verify the reactor trip logic fails to a safe state such that loss of electrical power to an MPS separation group results in a reactor trip state for that separation group.~~ ~~ii. Verify the ESF logic fails to a safe state such that loss of electrical power to an MPS separation group results in a predefined safe state for that separation group.~~	~~This test will verify initiation of a trip state for MPS separation groups on loss of power to that separation group. Component actuation is not required or verified.~~ ~~i. Remove power from one separation group of one reactor trip function listed in Table 7.1-3 to provide a trip state for that separation group.~~ ~~Repeat tests for all separation groups for all reactor trip functions.~~ ~~ii. Remove power from one separation group of one ESF actuation function listed in Table 7.1-4 to provide a predefined state for that separation group.~~ ~~Repeat tests for all separation groups for all ESF actuation functions.~~	~~i. Loss of electrical power in a separation group results in a reactor trip state for that separation group.~~ ~~[ITAAC 02.05.14]~~ ~~ii. Loss of electrical power in a separation group results in the predefined state for that separation group.~~ ~~[ITAAC 02.05.15]~~

Table 14.2-63: Module Protection System Test #63 (Continued)

System Level Test #63-3		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify each ECCS reactor vent valve (RVV) and reactor recirculation valve (RRV) operates to satisfy its ESF-actuated design stroke time. i. Verify MPS operating bypass interlocks are automatically established when the associated interlock condition is satisfied and automatically removed when the condition is not satisfied. ii. Verify MPS operating bypasses can be manually established when the associated permissive condition is satisfied and automatically removed when the condition is not satisfied. iii. Verify MCR alarms when operating bypasses are established.	This test will verify the stroke time of each RRV and RVV by actuating the valves with RCS pressure below the inadvertent actuation block setpoint.operation of each operating bypass interlock and operating bypass permissive. Component actuation is not required or verified. i. Close all RVVs and RRVs. ii. Verify RCS pressure is below the inadvertent actuation block setpoint specified in Technical Specifications. iii. Actuate ECCS using the manual ECCS actuation switches in the MCR. Table 7.1-5 contains the following information: • The identification of each operating bypass interlock and operating bypass permissive and their logic. • The function of the operating bypass i. a. Simulate the logic for an operating bypass interlock. b. Remove the logic. Repeat test for all operating bypass interlocks. ii. a. Simulate the logic for an operating bypass permissive and manually establish the operating bypass. b. Remove the logic. Repeat test for all operating bypass permissives.	Each ECCS RRV and RVV travels from fully closed to fully open in less than or equal to the time specified in Technical Specifications. i. a. The operating bypasses are automatically established. b. The operating bypasses are automatically removed. [ITAAC 02.05.18] ii. a. The operating bypasses can be manually established. b. The operating bypasses are automatically removed. [ITAAC 02.05.19] iii. Each established operating bypass is alarmed in the MCR. [ITAAC 02.05.22]

Table 14.2-63: Module Protection System Test #63 (Continued)

System Level Test #63-4 Test #63-4 is performed concurrently with Test #63-6 which operates all of the ESF actuation valves during hot functional testing. Test #63-4 records the stroke times of DHRS actuation valves as they travel to their ESF-actuated position with the RCS pressure at normal operating pressure.		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify each DHRS actuation valve operates to satisfy its ESF-actuated design stroke time. i. Verify the MPS automatically initiates a reactor trip signal. ii. Verify the MPS automatically initiates an ESF actuation signal.	Time the operation of all DHRS actuation valves as they actuate to their ESF position during the manual ESF actuation testing in Test #63-6.This test verifies initiation of reactor trip signals and ESF actuation signals only. Component actuation is not required or verified. Test #63-1 is completed in order to use the associated test signals. Real or simulated CNTS level, reactor trip breaker position, RCS temperature and NMS signals may be required to provide the necessary bypass interlock status for either the reactor trip or ESF actuation to be available. i. Initiate an automatic reactor trip signal by simulating a reactor trip function for each function listed in Table 7.1-3. All combinations of the 2 out of 4 logic are tested for each reactor trip function. ii. Initiate an automatic ESF actuation signal by simulating an ESF actuation function for each function listed in Table 7.1-4. All combinations of the 2 out of 4 logic must be actuated for each ESF function.	Each DHRS actuation valve travels from fully closed to fully open in less than or equal to the time specified in Technical Specifications. i. A reactor trip signal is displayed in the MCR for all 2 out of 4 logic combinations of each reactor trip function. [ITAAC 02.05.08] ii. An ESF actuation signal is displayed in the MCR for all 2 out of 4 logic combinations each reactor ESF actuation function. [ITAAC 02.05.09]
System Level Test #63-5 (Not used)		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify the MPS manually actuates a reactor trip. ii. Verify the MPS automatically actuates a reactor trip.	This test will verify the automatic and manual reactor trips. Reactor trip actuation is verified by reactor trip breaker actuation. Only one trip function is required to perform the automatic reactor trip, i. Initiate a manual reactor trip from the MCR. ii. Initiate an automatic reactor trip signal by simulating any single reactor trip function.	i. The reactor trip breakers open. [ITAAC 02.05.12] ii. The reactor trip breakers open. [ITAAC 02.05.10]

Table 14.2-63: Module Protection System Test #63 (Continued)

System Level Test #63-6

Test 63-6 is performed at hot functional testing concurrently with TGS test #33-1 (reference 14.2.12.33) to allow testing of ESF actuations at normal operating pressure and elevated temperatures. Test #33-1 heats the RCS from ambient conditions to the highest temperature achievable by MHS heating. These hot functional testing conditions provide the highest differential pressure and temperature conditions that can be achieved prior to fuel load.

Test Objective	Test Method	Acceptance Criteria
i. Verify the MPS can manually actuate ESF equipment from the MCR. ii. Verify deliberate operator action is required to return the ESF actuated equipment to its non-actuated position. ~~iii. Verify the MPS can automatically actuate ESF equipment from all ESF actuation signals.~~	~~Figure 7.1-1 identifies all ESF actuation signals such as CVCS isolation and CNTS isolation.~~ Table 7.1-4 lists all of the ESF functions. ~~This test will verify the design response of ESF actuation signals using both a single manual ESF signal and a single ESF function to provide an automatic ESF actuation signal.~~ All ~~manual and automatic~~ ESF <u>functions</u>~~actuation signals~~ are tested. The RCS is at normal operating pressure supplying bypass steam to the condenser. i. Initiate a manual ESF actuation signal from the MCR. ii. a. Attempt to operate the actuated ESF equipment from the MCR. b. Remove the manual ESF actuation signal and attempt to operate the actuated ESF equipment from the MCR. c. Use the MCR enable nonsafety control switch to allow operation of the ESF actuated equipment from the MCR. Repeat for all MCR manual ESF actuations. ~~iii. Initiate an automatic ESF actuation signal. The test may be performed with the RCS at ambient conditions.~~ ~~Repeat for all ESF actuation signals.~~	i. The MPS actuates the ESF equipment to perform its safety-related function as described in Table 7.1-4. Each ECCS valve opens after receipt of an ESF signal and after RCS pressure is decreased to the threshold pressure for operation of the inadvertent actuation block described in ~~described in~~ Section 6.3.2.2. [ITAAC 02.01.13] [ITAAC 02.01.14] [ITAAC 02.01.15] [ITAAC 02.01.18] [ITAAC 02.01.19] [ITAAC 02.01.20] [ITAAC 02.05.13] [ITAAC 02.05.16] ii. a. The actuated equipment cannot be operated from the MCR. b. The actuated equipment cannot be operated from the MCR. c. The ESF equipment can be operated from the MCR. [ITAAC 02.01.13] [ITAAC 02.01.14] [ITAAC 02.01.15] [ITAAC 02.05.16] ~~iii. The MPS automatically actuates the ESF equipment to perform its safety-related function as described in Table 7.1-4.~~ ~~[ITAAC 02.01.13]~~ ~~[ITAAC 02.01.14]~~ ~~[ITAAC 02.01.15]~~ ~~[ITAAC 02.01.18]~~ ~~[ITAAC 02.01.20]~~ ~~[ITAAC 02.05.11]~~ ~~[ITAAC 02.05.16]~~

Table 14.2-63: Module Protection System Test #63 (Continued)

<table>
<tr><td colspan="3">System Level Test #63-7
Test #63-7 is performed concurrently with Test #63-6 which operates all of the ESF actuation valves during hot functional testing.
Test #63-7 records the stroke times of containment isolation valves (CIVs) as they travel to their ESF-actuated position with the RCS pressure at normal operating pressure.</td></tr>
<tr><td>Test Objective</td><td>Test Method</td><td>Acceptance Criteria</td></tr>
<tr><td>Verify the CIVs operate to satisfy their ESF-actuated design stroke time.</td><td>Table 6.2-5 contains the design closure time for containment isolation valves.

Time the operation of all CIVs as they actuate to their ESF position during the manual ESF actuation testing in Test #63-6.</td><td>i. Each containment isolation valve travels from fully open to fully closed in less than or equal to the time listed in Table 6.2-5~~Section 6.2.4.3~~ after receipt of a containment isolation signal.
[ITAAC 02.01.08]
[ITAAC 02.05.17]</td></tr>
<tr><td colspan="3">System Level Test #63-8
This test will verify the time response of MPS reactor trip and ESF actuation signals. The reactor trip test verifies response time through reactor trip breaker actuation. The ESF response time is tested through the de-energization of the associated solenoid valve or the opening of the pressurizer heater supply breaker. ESF valve response times are tested in Test #63-7.</td></tr>
<tr><td>Test Objective</td><td>Test Method</td><td>Acceptance Criteria</td></tr>
<tr><td>Verify the MPS response times from sensor output through:
i. reactor trip breaker actuation for the reactor trip function.
ii. de-energization of the associated solenoid valve for ESF-actuated valves.
iii. opening of the pressurizer heater supply breaker for the pressurizer heater trip.</td><td>Section 7.1.4 contains a description of design basis event actuation delays assumed in the plant safety analysis and listed in Table 7.1-6. The actuation delays do not include ESF actuated component delays for actuated valves.

Perform a time response test for the actuation signals listed in Table 7.1-6.

~~Response time testing for ESF actuated CNTS, DHRS, ECCS and DWS valves are found in Test #63-7.~~</td><td>The MPS reactor trip functions listed in Table 7.1-3 and ESF functions listed in Table 7.1-4 have response times that are less than or equal to the design basis safety analysis response time assumptions in Table 7.1-6.

[ITAAC 02.05.17]</td></tr>
<tr><td colspan="3">System Level Test #63-9 (Not used)</td></tr>
<tr><td>~~Test Objective~~</td><td>~~Test Method~~</td><td>~~Acceptance Criteria~~</td></tr>
<tr><td>~~Verify protective measures are provided to restrict modifications to the MPS tunable parameters.~~</td><td>~~Section 7.2.9.1 provides the manual actions required to modify tunable parameters.~~

~~A test will be performed to verify that all manual actions described in Section 7.2.9.1 are required to modify tunable parameters.~~</td><td>~~All actions described in Section 7.2.9.1 are required to modify tunable parameters.~~

~~[ITAAC 02.05.02]~~</td></tr>
</table>

Table 14.2-63: Module Protection System Test #63 (Continued)

System Level Test #63-10		
Test Objective	**Test Method**	**Acceptance Criteria**
i. ~~Verify the MPS is capable of performing its safety-related functions when one of its separation groups is placed in maintenance bypass.~~Verify MCR alarms when automatic operating bypasses are established. ii. Verify MCR alarms when manual operating bypasses are established. iii. Verify MPS maintenance bypasses are indicated in the main control room.	~~Section 7.2.4.2 discusses the operation of the MPS maintenance bypass operation for the MPS safety function module (SFM).~~The purpose of this test is to verify MCR alarms, not to verify the logic of the operating bypasses. Any signal that establishes the bypass can be used. Table 7.1-5 contains a list of operating bypasses. i. For automatically established operating bypasses perform the following: a..Simulate the logic required to establish the operating bypass. b..Remove the logic. c..Repeat for each automatically established operating bypass. i. For manually established operating bypasses perform the following: a..Simulate the logic required to allow the operating bypass to be established. b..Manually establish the operating bypass. c..Repeat the logic. d..Repeat for each manually established operating bypass. ii. a. Place an SFM in maintenance bypass by using the out of service and trip/bypass switches associated with the SFM. b. Repeat tests for all SFMs.	i. ~~a. The SFM out of service provides a no trip to the respective scheduling and voting module.~~Each automatic operating bypass is alarmed in the MCR. [ITAAC 02.05.22] ii. ~~b. There is no change to the 2 out of 4 voting logic for the separation group.~~Each manual operating bypass is alarmed in the MCR. [ITAAC 02.05.2~~1~~2] iii. The inoperable status of the SFM is provided in the MCR. [ITAAC 02.05.23]

Table 14.2-63: Module Protection System Test #63 (Continued)

System Level Test #63-11		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify the controls located on the operator workstations in the MCR operate to perform important human actions.	Test is performed to verify operation of redundant trains and divisions. i. Use MPS Division I controls, BAS supply pump A train, and CVCS makeup pump A train to perform the following:A test will be performed to verify the CVCS can add water to the RCS after a containment isolation signal using the O-1 override switch and MCR controls. a. Insert a manual containment isolation signal. b. Override the containment isolation signal using the CNTS isolation override switch. c. Enable nonsafety controls using the enable nonsafety control switch. d. Using an operator workstation in the MCR, align the BAS, CVCS, and CNTS to add inventory to the RCS. ii. Use MPS Division II controls, BAS supply pump B train, and CVCS makeup pump B train to perform the following:A test will be performed to verify the CFDS can add water to containment after a containment isolation signal using the O-1 override switch and MCR controls. a. Insert a manual containment isolation signal. b. Override the containment isolation signal using the CNTS isolation override switch. c. Enable nonsafety controls using the enable nonsafety control switch. d. Using an operator workstation in the MCR, align the BAS, CVCS, and CNTS to add inventory to the RCS. iii. Use MPS Division I controls and CFDS pump A train to perform the following: a. Insert a manual containment isolation signal. b. Override the containment isolation signal using the CNTS isolation override switch.	i. Water is added to the RCS. ii. Water is added to the RCS. iii. Water is added to containment. iv. Water is added to containment. [ITAAC 02.05.20] [ITAAC 02.05.26] (i., and ii., iii., and iv.)

Table 14.2-63: Module Protection System Test #63 (Continued)

	c. Enable nonsafety controls using the enable nonsafety control switch. d. Using an operator workstation in the MCR, align the CFDS and CNTS to add inventory to containment. iv. Use MPS Division II controls and CFDS pump B train to perform the following: a. Insert a manual containment isolation signal. b. Override the containment isolation signal using the CNTS isolation override switch. c. Enable nonsafety controls using the enable nonsafety control switch. d. Using an operator workstation in the MCR, align the CFDS and CNTS to add inventory to containment.	

Table 14.2-65: Neutron Monitoring System Test # 65

Preoperational test is required to be performed for each NPM.		
The NMS is described in Section 7.0.4.2 and the functions verified by this test and power ascension testing are:		
System Function	**System Function Categorization**	**Function Verified by Test #**
1. The NMS supports the MPS by providing neutron flux data for various reactor trips.	safety-related	Test #63-41 Neutron Monitoring System Power Range Flux Calibration Test #92
2. The NMS supports the MPS by providing information signals for PAM.	nonsafety-related	Test #66-2
3. The NMS supports the MPS by providing information signals for PAM during CNV flooded conditions.	nonsafety-related	Test #66-2
Prerequisites Prerequisites associated with NMS testing are identified in the referenced test abstract cited under the “Function Verified by Test #” heading.		
Component Level Tests		
None		
System Level Tests		
None		

Table 14.2-66: Safety Display and Indication System Test # 66 (Continued)

System Level Test #66-1 Test 66-1 is conducted concurrently with TGS test# 33-1 which warms the RCS from ambient conditions to the highest temperature achievable by MHS heating.		
Test Objective	**Test Method**	**Acceptance Criteria**
Verify that the output signals from the NPM level, pressure, temperature and flow instruments listed in Table 7.1-2 properly trend while increasing RCS temperature and pressure. Note: This is not a verification of instrument calibrations.	Increase RCS temperature from ambient to the highest temperature achievable by MHS heating. Using the MCS historian record the engineering values for the output of the instruments described in the test objective. Record data at approximately 50 °F intervals from ambient temperature to the maximum RCS temperature. Note: Instrument signals are provided to the module-specific SDIS display and the main control room workstations.	~~Trended data shows agreement between the two divisional instruments or the four safety group instruments monitoring the same variable.~~All instruments track within acceptable design limits. (Use Technical Specification channel check limits, when applicable)
System Level Test #66-2		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify PAM Type B and C variables are displayed on the module-specific SDIS displays in the MCR. ii. Verify alarms associated with PAM Type B and C variables are retrieved in the MCR. iii. Verify module-specific PAM Type D variables are displayed on the module-specific SDIS displays in the MCR.	i. Simulate an injection signal for the PAM Type B and C variables listed in Table 7.1-7. ii. Increase or decrease a simulated injection signal for the PAM Type B and C variables listed in Table 7.1-7 to obtain its associated alarm. iii. Simulate an injection signal for the PAM Type D variables listed in Table 7.1-7	i. The PAM Type B and C variables listed in Table 7.1-7 are retrieved and displayed on the SDI displays in the MCR. [ITAAC 02.05.25] ii. The alarms associated with the PAM Type B and C variables listed in Table 7.1-7 are retrieved and displayed on the SDI displays in the MCR. iii. The PAM Type D variables listed in Table 7.1-7 are retrieved and displayed on the SDIS displays in the MCR.

Table 14.2-67: Fixed-Area Radiation Monitoring System Test # 67

Preoperational test is required to be performed once.		
The fixed-area radiation monitoring system is described in Section 12.3.4 and the function verified by this test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The **fixed-area radiation monitoring system** supports the following buildings by monitoring radiation levels: • ANB • CRB • RWB • TGB • RXB	nonsafety-related	Component-level test
RMS function verified by another test is:		
System Function	**System Function Categorization**	**Function Verified by Test #**
The RMS supports the RXB by monitoring radiation levels in the building in proximity of the bioshield.	nonsafety-related	SDIS Test #66-2
Prerequisites Verify an instrument calibration has been completed, with approved records and within all calibration due dates, for all instruments required to perform this test.		
Component Level Tests		
Test Objective	**Test Method**	**Acceptance Criteria**
i. Verify each fixed airborne radiation monitor's response to an alarm condition ~~known source~~.	Actuate the check source on a fixed airborne radiation monitor listed in Table 12.3-11~~0~~. Repeat test for the remainder of fixed airborne radiation monitors.	MCR display and local, visual observation indicate the following: i. The main control room audible and visual alarms are received. ii. The local readout, audible alarm and visual alarm are received.
ii. Verify each fixed area radiation monitor's response to an alarm condition ~~known source~~.	Actuate the check source on a fixed area radiation monitor listed in Table 12.3-12~~1~~. Repeat test for the remainder of fixed area radiation monitors.	MCR display and local, visual observation indicate the following: i. The main control room audible and visual alarms are received. ii. The local readout, audible alarm and visual alarm are received.
System Level Tests		
None		

Table 14.2-70: Hot Functional Testing Test # 70

Preoperational testing is required to be performed once for each NPM.			
The following identifies the tests employed in support of the performance of hot functional testing.			
Hot Functional Testing Tests	**Test Objective**	**Verified by Test #**	**Tested Function Categorization**
CES	i. Verifies the automatic operation of the CES to establish and maintain design vacuum for the CNV. ii. Verify radiation isolation on high radiation level in the ABS. iii. Verifies the CES supports RCS leakage detection. iv. Verifies the CES level and pressure instrumentation support leak-before-break leakage detection.	i. CES Test #41-1 ii. CES Test #41-2 iii. CES Test #41-3 iv. CES Test #41-4	nonsafety-related
CVCS	i. Verifies CVCS automatic operation to maintain pressurizer level. ii. Verifies automatic pressurizer pressure control. iii. Verifies CVCS automatic boration and dilution of the RCS.	i. CVCS Test #38-1 ii. CVCS Test #38-2 iii. CVCS Test #38-3	nonsafety-related
ECCS	i. Each ECCS valve opens after receipt of an ESF signal and after RCS pressure is decreased to the threshold pressure for operation of the inadvertent actuation block.	i. MPS Test #63-6	nonsafety-related
FWS	i. Verifies the FWS automatically controls flow to the SGs to maintain SG inventory. ii. Verifies the FWS automatically cools the turbine generator bypass steam flow in the main steam desuperheater.	i. TGS Test #33-1 ii. TGS Test #33-1	nonsafety-related
ICIS	i. Verifies proper temperature indication is obtained from the ICIS thermocouples.	i. ICIS Test #49-1	nonsafety-related
LRWS	i. Verifies the LRWS receives and processes a gaseous stream from the pressurizer.	i. LRWS Test #35-1	nonsafety-related

Table 14.2-70: Hot Functional Testing Test # 70 (Continued)

MHS	i. Verifies the MHS is capable of heating the RCS to a temperature sufficient to obtain criticality. ii. Verifies the MHS is capable of heating the RCS to establish natural circulation flow sufficient to obtain criticality. iii. Verifies a local grab sample can be obtained from an MHS grab sample device indicated on the MHS piping and instrumentation diagram.	i. TGS Test #33-1 ii. TGS Test #33-1 iii. TGS Test #33-1	nonsafety-related
MPS	i. Verifies design responses to manual ESF signals. ii. Verifies containment isolation valves closure times. ~~iii. Verifies the ECCS valves closes when the CVCS provides water to reset the ECCS valves.~~	i. MPS Test #63-6 ii. MPS Test #63-7 ~~iii. MPS Test #63-6~~	safety-related
PSS	i. Verifies sampling capability of the primary sampling points. ii. Verifies sampling capability of the containment sampling points. ii. Verifies sampling capability of the secondary sampling points.	i. PSS Test #53-1 ii. PSS Test #53-2 iii. PSS Test #53-3	nonsafety-related
SDIS	i. Verify that the output signals from the NPM level, pressure, temperature, and flow instruments listed in Table 7.1-2 properly trend while increasing RCS temperature and pressure.	i. SDIS Test #66-1	nonsafety-related
TGS	i. Verifies the TGS automatically controls turbine bypass flow to the main condenser. ii. Verify the maximum main turbine speed that can be obtained using the MHS to heat the RCS. iii. Verifies the ECCS valves close when the CVCS provides water to reset the ECCS valves.	i. TGS Test #33-1 ii. TGS Test #33-2 iii. TGS Test #33-1	nonsafety-related
Prerequisites Prerequisites associated with performing hot functional testing are identified in the referenced test abstract cited under the "Verified by Test #" heading.			

Table 14.2-76: Initial Fuel Load Test # 76

The Initial Fuel Load Test is required to be performed for each NPM.
This test is performed prior to initial fuel load.
Test Objectives
i. Conduct initial fuel load with no inadvertent criticality. ii. Install fuel assemblies and control components at the locations specified by the design of the initial RXC.
Prerequisites
i. Plant systems required for initial fuel loading have completed preoperational testing. ii. Plant systems required for initial fuel loading have been aligned per operations procedures. iii. The design of the initial RXC that specifies the final core configuration of fuel assemblies and control components is completed. iv. A core load sequence has been approved. v. Neutron monitoring data from a previous NPM initial fuel loading or calculations showing the predicted response of monitoring channels are available for evaluating monitoring data. vi. The lower RPV is installed in the RPV support stand. vii. Control room communications are established. viii. RXB radiation monitors are functional. ix. Boron concentration in the pool is within Technical Specification limits.
Test Method
i. The overall process of initial fuel loading will be supervised by a licensed senior reactor operator with no other concurrent duties. ii. Install fuel and control components per approved procedures. iii. Monitor boron concentration inside the RPV periodically during fuel load to ensure it satisfies TS. iv. Monitor neutron counts during the load of each fuel assembly and plot an independent inverse count rate ratio for each source range detector after each fuel load assembly is loaded. v. Verify neutron count data are consistent with calculations showing the predicted response. For fuel loading of the second NPM and all subsequent NPMs use data obtained from previous fuel loadings. vi. Demonstrate the inverse count rate ratio does not show significant approach to criticality. vii. Maintain the status of the core loading. viii. Maintain communication between fuel handling personnel and the MCR.
Acceptance Criterion
i. Each fuel assembly and control component is installed in the location specified by the design of the initial RXC. ii. There is no indication of inadvertent criticality.

Table 14.2-79: Primary and Secondary System Chemistry Test # 79

Startup test is required to be performed for each NPM.
This test is performed at approximately 25, 50, 75, and 100 percent reactor thermal power.
Test Objective
Verify water quality in the primary system and secondary system using the PSS.
Prerequisites
i. The PSS instruments have been calibrated. ii. The NPM is fully assembled. iii. The RCS is at hot zero power (RCS at normal operating pressure and RCS temperature at the maximum temperature obtainable when heated only by the MHS).
Test Method
i. Use the PSS to sample the normal primary system sample points listed in Table 9.3.2-1. ii. Use the PSS to sample the normal secondary system sample points listed in Table 9.3.2-3. iii. To the extent practical, responses of PSS radiation monitors should be verified by laboratory analyses of grab samples taken at the same process location. iv. Conduct the test at steady-state condition at approximately 25, 50, 75, and 100 percent reactor thermal power.
Acceptance Criterion
The sample analyses~~is~~ satisfy~~ies~~ the limits specified in plant procedures.

Table 14.2-82: Pressurizer Spray Bypass Flow Test # 82

Startup test is required to be performed for each NPM.
This test is performed after initial fuel loading but prior to initial criticality.
Test Objective
Verify the pressurizer spray bypass flow rate is adequate to prevent thermal fatigue of the spray line components and provide sufficient mixing in the pressurizer to maintain pressurizer water chemistry similar to the rest of the RCS while avoiding unnecessary energization of the pressurizer heaters.
Prerequisites
i. The core is installed. ii. The NPM is fully assembled. iii. The RCS is at hot zero power (RCS at normal operating pressure and RCS temperature at the maximum temperature obtainable when heated only by the MHS).
Test Method
i. With the automatic pressurizer spray valve closed, adjust the manual spray bypass valve to maintain a continuous spray bypass flow of approximately one gpm. ii. If the continuous bypass spray flow requires the operation of the pressurizer backup heaters to maintain the pressurizer pressure setpoint, throttle close the bypass valve until pressurizer pressure is maintained by the proportional heaters.
Acceptance Criterion
The spray bypass valve ~~is throttled to maintain the required bypass flow~~flow satisfies design requirements.

Table 14.2-90: Power-Ascension Test # 90

Startup test is required to be performed for each NPM.
This test is performed prior to power-ascension testing.
Test Objective
Identify the sequence for the following power-ascension tests. a. Core Power Distribution Map Test #91 b. Neutron Monitoring System Power Range Flux Calibration Test #92 c. Reactor Coolant System Temperature Instrument Calibration Test #93 d. Reactor Coolant System Flow Calibration Test #94 e. Radiation Shield Survey Test #95 f. Reactor Building Ventilation System Capability Test #96 g. Thermal Expansion Test #97 h. Control Rod Assembly Misalignment Test #98 i. Steam Generator Level Control System Test #99 j. Ramp Change in Load Demand Test #100 k. Step Change in Load Demand Test #101 l. Loss of Feedwater Heater Test #102 m. 100 Percent Load Rejection Test #103 n. Reactor Trip from 100 Percent Power Test #104 o. Island Mode Test for the First NuScale Power Module (Test #105) p. Island Mode Test for Multiple NuScale Power Modules (Test #106) q. ~~Remote Shutdown Workstation Test #107~~NuScale Power Module Vibration Test #108 ~~r.~~ ~~NuScale Power Module Vibration Test #108~~
Prerequisites
None
Test Method
i. Identify the specific plant conditions required for each power-ascension test procedure to maintain technical specification operability. ii. Identify the prerequisites required for each power-ascension test procedure. iii. Determine the test sequence for power-ascension testing based on technical specification requirements and test prerequisites.
Acceptance Criterion
The sequence for power-ascension testing has been determined.

Table 14.2-97: Thermal Expansion Test # 97

Startup test is required to be performed for each NPM.
This test is performed during plant heatup and cooldown.
Test Objectives
i. Verify that ASME Code Class 1, 2, and 3 system piping can expand without obstruction and that expansion is within design limits. All ASME Code Class 1, 2, and 3 system piping is within the RXB. ii. Verify that high-energy piping inside the RXB can expand without obstruction and that expansion is within design limits.
Prerequisite
Temporary instrumentation is installed on piping outside the NPM as required to monitor the deflections for the piping under test.
Test Method
i. Thermal expansion testing is performed in accordance with ASME OM Standard, Part 7 as discussed in Section 3.9.2.1.~~2.~~ ii. Record deflection data during plant heatup and cooldown. iii. Identify support movements by recording hot and cold positions of the supports. (Note: piping testing will be determined in COL Item 3.9-13) ~~iv. All tested piping is within the RXB.~~ ~~v. All tested piping is outside the NPM.~~ ~~vi. All tested piping is contained within the MSS, FWS, ABS, PSS, and CVCS.~~
Acceptance Criteria
In accordance with ASME OM Standard, Part 7, ~~F~~for the piping systems tested: i. There is no evidence of blocking of the thermal expansion of piping or component, other than by installed supports, restraints, and hangers. ii. Spring hanger movements must remain within the hot and cold setpoints and supports must not become fully retracted or extended. iii. Piping and components return to their approximate baseline cold position.

Table 14.2-99: Steam Generator Level Control Test # 99

Startup test is required to be performed for each NPM.
This test is performed at approximately 25, 50, 75, and 100 percent reactor thermal power.
Test Objective
i. Verify the ability of SG inventory control systems to sustain a ramp increase in load demand. ii. Assess the dynamic response of SG inventory for ramp increase in load demand.Verify the stability of the automatic SG level control system by introducing simulated transients at various power levels during the ascension to full power.
Prerequisite
i. The feedwater system is operating in steam generator inventory pressure control (Feedwater regulating valves in automatic control).The NPM is operating in a steady-state condition at the specified power level.
Test Method
i. Raise reactor thermal power to approximately 25 percent.Simulate an SG level transient by changing the level setpoint at approximately 25, 50, 75, and 100 percent reactor thermal power. ii. Use the main control room turbine controls to provide a 5 percent of full power per minute load increase in demand at approximately 25, 50, and 75 percent reactor thermal power.Record the steam generator level control response when the control system is returned to automatic control. iii. Use the main control room turbine controls to provide a 5 percent of full power per minute load decrease in demand at approximately 25, 50, and 75, and 100 percent reactor thermal power.Adjustments to the control systems are made, if necessary, prior to proceeding to the next power plateau.
Acceptance Criteria
i. The SG inventory control systems, with no manual intervention, maintain the following parameters within design limits during and following the transient:During recovery from a simulated steam generator level transient, SG level control response is consistent with the design for the following: a. SG superheatovershoot or undershoot to the new level. b. SG pressuretime required to achieve the new level. c. SG inventoryerror between the actual level and control setpoint. d. Feed pump speedfeedwater pump discharge pressure oscillations. ii. SG inventory control systems response is reviewed and compared to expected performance. Necessary adjustments to the control systems have been made prior to proceeding to the next power plateau.Water hammer indications: a. Audible indications of water hammer are not observed. b. No damage to pipe supports or restraints. c. No damage to equipment. d. No equipment leakage as a result of the steam generator level transient.

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Table 14.2-100: Ramp Change in Load Demand Test # 100

Startup test is required to be performed for each NPM.
This test is performed at approximately 25, 50, 75, and 100 percent reactor thermal power.
Test Objectives
i. Verify the ability of the plant automatic control systems to sustain a ramp increase in load demand. ii. Assess the dynamic response of the plant for ramp increase in load demand.
Prerequisites
i. The NPM is operating in a steady-state condition at the designated power level. ii. The plant's electrical distribution system is aligned for normal operation. iii. The following control systems are in automatic control:~~Reactor, turbine, and secondary control systems are in automatic mode.~~ a. Reactivity control b. RCS temperature control c. Pressurizer pressure control d. Pressurizer level control e. Turbine control f. Feedwater level control g. CWS basin level control h. SCWS basin level control i. Feedwater heater level control j. Hotwell level control iv. If required, verify instrumentation is installed for piping vibration testing.
Test Method
i. Use the main control room turbine controls to provide a 5 percent of full power per minute load increase in demand at approximately 25, 50, and 75 percent reactor thermal power. ii. Use the main control room turbine controls to provide a 5 percent of full power per minute load decrease in demand at approximately 25, 50, and 75, and 100 percent reactor thermal power. iii. Conduct piping vibration testing, as required, during power changes.

Table 14.2-100: Ramp Change in Load Demand Test # 100 (Continued)

Acceptance Criteria

i. The turbine does not trip.

ii. The reactor does not trip.

iii. The main steam safety valves do not open.

iv. The turbine does not overspeed.

v. The plant automatic control systems, with no manual intervention, maintain the following parameters within design limits during and following the transient:~~The primary and secondary control systems, with no manual intervention, maintain reactor power, reactor coolant system temperatures, pressurizer pressure and level, and SG levels and pressures within acceptable ranges during and following the transient.~~

   a. Reactor Power
   b. RCS temperature
   c. Pressurizer pressure
   d. Pressurizer level
   e. SG superheat
   f. SG pressure
   g. SG inventory
   h. Gland seal temperature
   i. CWS basin level
   j. SCWS basin level
   k. Feedwater heater level
   l. Main condenser hotwell level
   m. Main condenser vacuum
   n. Outlet temperature of turbine bypass desuperheater

vi. Control system response is reviewed and compared to expected performance. Necessary adjustments to the control systems have been made prior to proceeding to the next power plateau.

vii. Water hammer indications

   a. Audible indications of water hammer are not observed.
   b. No damage to pipe supports or restraints.
   c. No damage to equipment.
   d. No equipment leakage as a result of the ramp change.

viii. Piping vibration - System specific steady state and transient vibration testing criteria are established by the piping designer. Actual acceptance criteria will depend on the selected test method, but may include:

   a. Limits for stresses calculated based on the observed/measured vibration response of the system.
   b. No permanent deformation or damage is observed in the piping system or supports.
   c. Vibration displacements are not excessive, would not potentially cause the piping to come in contact with surrounding SSC, and are such that the movement of supports and flexible joints is within their allowable limits.

Table 14.2-101: Step Change in Load Demand Test # 101

Startup test is required to be performed for each NPM.
This test is performed at approximately 25, 50, 75, and 100 percent reactor thermal power.
Test Objectives
i. Verify the ability of the plant automatic control systems to sustain step load increases and step load decreases in demand. ii. Assess the dynamic response of the plant for a load step demand.
Prerequisites
i. The NPM is operating in a steady-state condition at the specified power level. ii. The plant's electrical distribution system is aligned for normal operation. iii. The following control systems are in automatic control:~~Reactor, turbine, and secondary control systems are in automatic mode.~~ a. Reactivity control b. RCS temperature control c. Pressurizer pressure control d. Pressurizer level control e. Turbine control f. Feedwater level control g. CWS basin level control h. SCWS basin level control i. Feedwater heater level control j. Hotwell level control
Test Method
i. Use the MCR turbine controls to provide a 10 percent step load increase in demand at approximately 25, 50, and 75 percent reactor thermal power. ii. Use the MCR turbine controls to provide a 10 percent step load decrease in demand at approximately 25, 50, 75, and 100 percent reactor thermal power.

Table 14.2-101: Step Change in Load Demand Test # 101 (Continued)

Acceptance Criteria
i. The turbine does not trip. ii. The reactor does not trip. iii. The main steam safety valves do not open. iv. The turbine does not overspeed. v. The plant automatic control systems, with no manual intervention, maintain the following parameters within design limits during and following the transient:The primary and secondary control systems, with no manual intervention, maintain reactor power, RCS temperatures, pressurizer pressure and level, and SG levels and pressures within acceptable ranges during and following the transient. a. Reactor Power b. RCS temperature c. Pressurizer pressure d. Pressurizer level e. SG superheat f. SG pressure g. SG inventory h. Gland seal temperature i. CWS basin level j. SCWS basin level k. Feedwater heater level l. Main condenser hotwell level m. Main condenser vacuum n. Outlet temperature of turbine bypass desuperheater vi. Control system response is reviewed and compared to expected performance. Necessary adjustments to the control systems have been made prior to proceeding to the next power plateau. vii. Water hammer indications a. Audible indications of water hammer are not observed. b. No damage to pipe supports or restraints. c. No damage to equipment. d. No equipment leakage as a result of the step load change.

Table 14.2-102: Loss of Feedwater Heater Test # 102

Startup test is required to be performed for each NPM.
This test is performed at approximately 50 and 90 percent reactor thermal power.
Test Objectives
i. Verify the ability of the plant automatic control systems to sustain a loss of the high pressure feedwater heater during power operation. ii. Assess the dynamic response of the plant for the loss of the high pressure feedwater heater.
Prerequisites
i. The NPM is operating in a steady-state condition at the specified power level. ii. The plant's electrical distribution system is aligned for normal operation. iii. The following control systems are in automatic control:~~Reactor, turbine, and secondary control systems are in automatic mode.~~ a. Reactivity control b. RCS temperature control c. Pressurizer pressure control d. Pressurizer level control e. Turbine control f. Feedwater level control g. CWS basin level control h. SCWS basin level control i. Feedwater heater level control j. Hotwell level control
Test Method
Close the turbine generator extraction steam supply isolation valve to the high pressure feedwater heater from the main control room at approximately 50 and 90 percent reactor thermal power.
Acceptance Criteria
i. The reactor does not trip. ii. The turbine does not trip. iii. The main steam safety valves do not open. iv. The plant automatic control systems, with no manual intervention, maintain the following parameters within design limits during and following the transient: a. Reactor Power b. RCS temperature c. Pressurizer pressure d. Pressurizer level e. SG superheat f. SG pressure g. SG inventory h. Gland seal temperature i. CWS basin level j. SCWS basin level k. Feedwater heater level l. Main condenser hotwell level m. Main condenser vacuum n. Outlet temperature of turbine bypass desuperheater

Table 14.2-103: 100 Percent Load Rejection Test # 103

Startup test is required to be performed for each NPM.
This test is performed at approximately 100 percent reactor thermal power.
Test Objectives
i. Verify the ability of the plant automatic control systems to sustain a 100 percent load rejection from full power. ii. Assess the dynamic response of the plant for a 100 percent power load rejection.
Prerequisites
i. The NPM is operating in a steady-state condition at full reactor thermal power. ii. The plant's electrical distribution system is aligned for normal operation. iii. The following control systems are in automatic control:~~Reactor, turbine, and secondary control systems are in automatic mode.~~ a. Reactivity control b. RCS temperature control c. Pressurizer pressure control d. Pressurizer level control e. Turbine control f. Feedwater level control g. CWS basin level control h. SCWS basin level control i. Feedwater heater level control j. Hotwell level control
Test Method
Manually trip the generator output breaker to provide a 100 percent load rejection.
Acceptance Criteria
i. The turbine trips. ii. The reactor does not trip. iii. The main steam safety valves do not open. iv. The turbine does not overspeed beyond design limits. v. The plant automatic control systems, with no manual intervention, maintain the following parameters within design limits during and following the transient:~~The turbine generator bypass valve opens and modulates steam flow to the condenser to maintain steam generator pressure.~~ a. Reactor Power b. RCS temperature c. Pressurizer pressure d. Pressurizer level e. SG superheat f. SG pressure g. SG inventory h. Gland seal temperature i. CWS basin level j. SCWS basin level k. Feedwater heater level l. Main condenser hotwell level m. Main condenser vacuum n. Outlet temperature of turbine bypass desuperheater ~~vi. The FWS automatically provides the necessary feedwater flow to the steam generator.~~ vi~~i~~. Water hammer indications a. Audible indications of water hammer are not observed. b. No damage to pipe supports or restraints. c. No damage to equipment. d. No equipment leakage as a result of the load rejection.

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Table 14.2-104: Reactor Trip from 100 Percent Power Test # 104

Startup test is required to be performed for each NPM.

This test is performed at 100 percent reactor thermal power.

Test Objectives

~~i. Verify the ability of the NPM to sustain a reactor trip from 100 percent reactor thermal power and automatically cool the RCS to mode 3 (all RCS temperatures < 420 °F).~~

~~i~~i. Assess the dynamic response of the plant to ~~the~~a reactor trip.

~~i~~ii. Verify each fully withdrawn CRA satisfies the CRA drop time acceptance criteria at full flow conditions.

iii. Verify the ability of DHRS to cool the RCS to Mode 3 (all RCS temperatures < 420 °F).

Prerequisites

i. The NPM is operating in a steady-state condition at full reactor thermal power.

ii. The plant's electrical distribution system is aligned for normal operation.

Test Method

i. Manually trip the reactor from the MCR.

ii. Measure the drop time for each fully withdrawn CRA.

iii. Allow the RCS temperature trends to stabilize.

iv. Manually initiate DHRS.

v~~iii~~. Allow the RCS to cool to mode 3 after DHR actuation.

Acceptance Criteria

Acceptance criteria to be verified after manual reactor trip:

i.The reactor trips.

~~ii. The CIVs close.~~

~~iii. The decay heat removal valves open.~~

ii~~v~~. The turbine generator bypass valve operates to prevent opening of the main steam safety valve.

iii~~v~~. The turbine trips~~speed does not exceed overspeed design limits~~.

~~vi. The reactor vent valves do not open.~~

iv~~ii~~. Water hammer indications

a. Audible indications of water hammer are not observed.
b. No damage to pipe supports or restraints.
c. No damage to equipment.
d. No equipment leakage as a result of the reactor trip.

Acceptance criteria to be verified after DHR actuation:

v. a. DHRS actuation valves open.
b. MSIVs close.
c. FWIVs close.
d. Feedwater regulating valves close
e. Secondary main steam isolation valves close
f. Secondary main steam bypass isolation valves close
g. Pressurizer heater breakers trip

vi~~ii~~. The RCS cools to a stable condition in mode 3 (all RCS temperatures < 420 °F) without operator intervention.

vii. RCS cooldown rate is within Technical Specification limits.

viii~~x~~.Each fully withdrawn CRA drop time is within Technical Specification limits.

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Table 14.2-105: Island Mode Test for the First NuScale Power Module (Test # 105)

This startup test is required to be performed for the first NPM in power operation. No other NPMs are in power operation. Test #105 is performed once per facility. Startup Test #106 tests island mode for multiple NPMs.
This test is performed at 100 percent reactor thermal power. Island mode operation is described in Section 8.3.1.1.1
Test Objective for the first NPM in power operation
i. Verify the first NPM in power operation can operate independently from an offsite transmission grid after transition from the transmission grid to island mode. ii. Verify plant electrical loads may be transitioned from island mode to an offsite transmission grid without interruption to the operation of the first NPM in power operation.
Prerequisites
The first NPM in power operation is in normal operation at 100 percent reactor thermal power.
Test Method
Simulate a loss of the transmission grid by opening the switchyard supply breakers (reference Figures 8.3-2a and 8.3-2b).
Acceptance Criteria
i. a. The ~~turbine generator associated with the NPM~~service unit generator ~~under test~~ does not trip and changes from droop mode control to isochronous mode to control the loads on site. b. The first NPM in power operation remains at approximately 100 percent reactor thermal power using turbine generator bypass operation. c. Electrical power to plant loads is uninterrupted without loss of voltage or automatic bus transfers. d. The auxiliary AC power source starts automatically but does not automatically load its associated bus. ii. The plant electrical loads are transitioned back to the external offsite grid connection when it becomes available.

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Table 14.2-106: Island Mode Test for Multiple NuScale Power Modules (Test # 106)

This startup test is required to be performed once with multiple (at least two) NPMs in operation. Test #106 is performed once per facility. Startup Test #105 tests island mode for a single NPM. **COL Item 14.2-7: A COL applicant that references the NuScale Power Plant design certification will select the plant configuration to perform the Island Mode Test (number of NuScale Power Modules in service).**
This test is performed at 100 percent reactor thermal power for all NPMs under test. Island mode operation is described in Section 8.3.1.1.1
Test Objective for multiple NPM in operation:
i. Verify all NPMs under test can operate independently from an offsite transmission grid after transition from the transmission grid to island mode. ii. Verify plant electrical loads may be transitioned from island mode to an offsite transmission grid without interruption to the operation of the service unit NPM.
Prerequisites
The NPMs selected for test are in normal operation at 100 percent reactor thermal power.
Test Method
Simulate a loss of the transmission grid by opening the switchyard supply breakers (reference Figures 8.3-2a and 8.3-2b).
Acceptance Criteria
i. a. The service unit turbine generator transitions to island mode by changing from droop mode control to isochronous mode control to control the load on the 13.8kV bus it is supplying. b. The service unit NPM remains at approximately 100 percent reactor thermal power using turbine generator bypass operation. c. The non-service unit turbine generators trip. d. The non-service unit NPMs power reduces to approximately 95 percent reactor thermal power using turbine generator bypass operation. e. Electrical power to plant loads is uninterrupted without loss of voltage or automatic bus transfers. fd. The auxiliary AC power source starts automatically but does not automatically load its associated bus. ii. The plant electrical loads are successfully transitioned back to an external offsite grid connection when it becomes available.

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Table 14.2-107: Not UsedRemote Shutdown Workstation Test # 107

Startup test is required to be performed for each NPM.
This test is performed at approximately 10 - 20 percent reactor thermal power.
Test Objectives
i. Verify the NPM safety-related controls can be disabled at the remote shutdown station. ii. Verify the NPM nonsafety-related controls are functional at the remote shutdown station. iii. Verify each fully withdrawn CRA satisfies the CRA drop time acceptance criteria with the reactor operating at 10 - 20 percent reactor thermal power.
Prerequisites
i. Communication exists between the MCR and the remote shutdown station. ii. The reactor is operating in a steady-state condition at 10 - 20 percent reactor thermal power.
Test Method
i. Using the appropriate operating procedure, the operator manually trips the reactor under test before leaving the MCR. ii. Measure the drop time for each fully withdrawn CRA. iii. Using the appropriate operating procedure, the operator uses manual switches in the remote shutdown station to isolate the module protection system manual actuation switches, override switches, and the enable nonsafety control switches for each nuclear power modules' module protection system in the MCR to prevent spurious actuation of equipment due to fire damage.
Acceptance Criteria
i. An operator verifies that the module protection switch controls in the MCR have been disabled. The displays in the remote shutdown station verify the following NPM status: ii. The reactor is tripped. iii. All CIVs are closed. iv. The DHRS actuation valves are open. v. All RCS temperatures cool to less than 420°F (mode 3, safe shutdown) without operator action. vi. Safety-related components cannot be operated from the remote shutdown station. vii. The nonsafety-related controls in the remote shutdown station controls can be used to place the plant in a configuration specified by the appropriate operating procedure. viii. Each fully withdrawn CRA drop time is within Technical Specification limits.

Table 14.2-109: List of Test Abstracts (Continued)

Test Number	System Abbreviation	Test Abstract
99	N/A	Steam Generator Level Control
100	N/A	Ramp Change in Load Demand
101	N/A	Step Change in Load Demand
102	N/A	Loss of Feedwater Heater
103	N/A	100 Percent Load Rejection
104	N/A	Reactor Trip from 100 Percent Power
105	N/A	Island Mode Test for the First NuScale Power Module
106	N/A	Island Mode Test for Multiple NuScale Power Modules
107	N/A	Not UsedRemote Shutdown Workstation
108	N/A	NuScale Power Module Vibration

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference(1) (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.01	MPS	Section 7.2.1.1, I&C Safety System Development Process, discusses the software lifecycle phases for the MPS. The purpose is to verify software implementation based on licensing commitments to 10 CFR Part 50, Appendix A, GDC 1 (Quality), Appendix B (Quality Assurance Criteria), RGs 1.28, 1.152, 1.168, 1.169, 1.170, 1.171, 1.172, and 1.173, and the associated IEEE standards. The licensee shall perform analyses for each phase and generate technical reports to conclude that the lifecycle phases were implemented per the licensing commitments. Per RG 1.152, a generic waterfall software life cycle model consists of the following phases: (1) concepts, (2) requirements, (3) design, (4) implementation, (5) test, (6) installation, checkout, and acceptance testing, (7) operation, (8) maintenance, and (9) retirement. The ITAAC verifies that output documentation of each Software Lifecycle phase satisfies the requirements of that phase for the MPS and that software were implemented per licensing commitments to 10 CFR Part 50, Appendix A, GDC1 (Quality), Appendix B (Quality Assurance Criteria), RGs 1.28, 1.152, 1.168, 1.169, 1.170, 1.171, 1.172, and 1.173, and the associated IEEE standards.	X				
02.05.02	MPS	Section 7.2.9, Control of Access, Identification, and Repair, discusses the protective measures that prevent modification of the MPS tunable parameters without proper configuration and authorization. Guidance on this issue is provided in DI&C-ISG-04 Revision 1, "Highly-Integrated Control Rooms - Communications Issues," under interdivisional communications, staff position 10. In accordance with Table 14.2-63, a preoperational test demonstrates that protective measures restrict modification to the MPS tunable parameters without proper configuration and authorization. This test will be performed by attempting to modify the tunable parameters with the MPS not in the correct configuration or without authorization.Not used.	X				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[(1)] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.06	~~MPS~~	~~Section 7.1.2, Independence, discusses the communication independence between redundant Class 1E digital communication system divisions. The purpose is to verify proper data isolation between redundant divisions. Requirements for independence are given in IEEE Std. 603-1991. Guidance for providing independence between redundant divisions of the Class 1E digital communication system is provided in Digital I&Cs Interim Staff Guidance (ISG) 04.~~ ~~A vendor test demonstrates that independence between redundant divisions of the Class 1E MPS is provided.~~Not used.	~~X~~				
02.05.07	MPS	Section 7.1.2, Independence, discusses the communication independence between Class 1E digital communication systems and non-Class 1E digital communication systems. The purpose is to verify that logical or software malfunction of the nonsafety-related system cannot affect the functions of the safety system. Requirements for independence are given in IEEE Std. 603-1991. Guidance for providing independence between the Class 1E digital communication system and non-Class 1E digital communication systems is provided in Digital Instrumentation and Controls ISG 04. A vendor test demonstrates that independence between the Class 1E MPS and non-Class 1E digital systems is provided.	X				
02.05.08	~~MPS~~	~~Section 7.1.1.2.1, Protection Systems, describes automatic and manual reactor trips, variables that are monitored to provide input into automatic reactor trip signals, and the features of the reactor trip system (RTS). The reactor trip functions are listed in Table 7.1-3: Reactor Trip Functions. The reactor trip logic for the monitored variables is provided in Figure 7.1-1.~~ ~~The MPS initiates an automatic reactor trip signal when the associated plant condition(s) exist.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that a reactor trip signal is automatically initiated for each reactor trip function listed in Tier 1 Table 2.5-1.~~ ~~The actuation of reactor trip breakers (RTBs) is not required for this test. The verification of the existence of a reactor trip signal is accomplished using main control room (MCR) displays.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[(1)] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.09	~~MPS~~	~~Section 7.1.1.2.1, Protection Systems, describes automatic and manual engineered safety features (ESFs) actuations, variables that are monitored to provide input into automatic ESFs signals, and the features of the ESF systems. The ESFs functions are listed in Table 7.1-4: Module Protection System Engineered Safeguards Functions. The ESFs logic for the monitored variables is provided in Figure 7.1-1.~~ ~~The MPS initiates an automatic ESF actuation signal when the associated plant condition(s) exist.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that an automatic ESF actuation signal is automatically initiated for each of the ESF functions listed in Tier 1 Table 2.5-2.~~ ~~The actuation of ESFs equipment is not required for this test. The verification of the existence of an ESF actuation signal is accomplished using MCR displays.~~Not used.	~~X~~				
02.05.10	~~MPS~~	~~Section 7.1.1.2.1, Protection Systems, describes automatic and manual reactor trips, variables that are monitored to provide input into automatic reactor trip signals, and the features of the RTS. The reactor trip functions are listed in Table 7.1-3: Reactor Trip Functions. The reactor trip logic for the monitored variables is provided in Figure 7.1.~~ ~~The MPS initiates an automatic reactor trip signal for the reactor trip functions when the associated plant condition(s) exist.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that the RTBs open when any one of the automatic reactor trip functions is initiated from the MCR. The RTBs are only opened once to satisfy this test objective.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.11	~~MPS~~	~~Section 7.1.1.2.1, Protection Systems, describes automatic and manual ESFs actuations, variables that are monitored to provide input into automatic ESFs signals, and the features of the engineered safety feature systems. The ESFs functions are listed in Table 7.1-4: Module Protection System Engineered Safeguards Functions. The ESFs logic for the monitored variables is provided in Figure 7.1.~~ ~~The MPS initiates an automatic ESF actuation signal for the functions listed in Tier 1 Table 2.5-2 when the associated plant condition(s) exist.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that ESF equipment automatically actuates to perform its safety-related function listed in Tier 1 Table 2.5-2 upon an injection of a single simulated MPS signal.~~Not used.	~~X~~				
02.05.12	~~MPS~~	~~Section 7.1.1.2.1, Protection Systems, describes automatic and manual reactor trips, variables that are monitored to provide input into automatic reactor trip signals, and the features of the RTS. A manual reactor trip is one of the MPS manually actuated functions.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that the RTBs open when a reactor trip is manually initiated from the MCR.~~Not used.	~~X~~				
02.05.13	MPS	Section 7.1.1.2.1, Protection Systems, describes manual ESFs actuation, variables that are monitored to provide input into automatic ESFs signals, and the features of the ESF system. The ESFs functions that can be manually actuated are shown in Figure 7.1-1 In accordance with Table 14.2-63, a preoperational test demonstrates that the MPS actuates the ESF equipment to perform its safety-related function listed in Tier 1 Table 2.5-2~~3~~ when manually initiated.	X				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.14	~~MPS~~	~~Section 7.1.6, Safety Evaluation, describes the MPS conformance to the GDC in 10 CFR 50 Appendix A. Guidance provided in Design Specific Review Standard Section 7.2.3, Reliability, Integrity, and Completion of Protective Action, states that the design incorporate protective measures that provide for I&C safety systems to fail in a safe state, or into a state that has been demonstrated to be acceptable on some other defined basis, if conditions such as disconnection of the system, loss of power, or adverse environments, are experienced.~~ ~~Section 7.1.6 describes that consistent with GDC 23, the MPS is designed, with sufficient functional diversity as to prevent the loss of a protection function, to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis if conditions such as disconnection of the system, loss of power, or postulated adverse environments are experienced. Section 7.2.3.2, System Integrity Characteristics, states that the MPS is designed such that in the event of a condition such as a system disconnection or loss of power the MPS fails into a safe state.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that when the loss of electrical power is detected in a separation group of the MPS that separation group fails to a safe state resulting in a reactor trip state for that separation group.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference(1) (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.15	~~MPS~~	~~Section 7.1.6, Safety Evaluation, describes the MPS conformance to the GDC in 10 CFR 50 Appendix A. Guidance provided in Design Specific Review Standard Section 7.2.3, Reliability, Integrity, and Completion of Protective Action, states that the design incorporate protective measures that provide for I&C safety systems to fail in a safe state, or into a state that has been demonstrated to be acceptable on some other defined basis, if conditions such as disconnection of the system, loss of power, or adverse environments, are experienced.~~ ~~Section 7.1.6 describes that consistent with GDC 23, the MPS is designed, with sufficient functional diversity as to prevent the loss of a protection function, to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis if conditions such as disconnection of the system, loss of power, or postulated adverse environments are experienced. Section 7.2.3.2, System Integrity Characteristics, states that the MPS is designed such that in the event of a condition such as a system disconnection or loss of power the MPS fails into a safe state. For an ESF function this predefined safe state may be that the actuated component remains as-is.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that when the loss of electrical power is detected in a separation group of the MPS that separation group fails to a safe state for that separation group.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.17	MPS	Section 7.2.12.1, Automatic Control, describes the signals and initiating logic for each reactor trip and required response times. In accordance with Table 14.2-63, a preoperational test demonstrates that the measured time for the reactor trip functions listed in Tier 1 Table 2.5-1 is less than or equal to the maximum values assumed in the accident analysis. Section 7.2.12.1, Automatic Control, describes the signals and initiating logic for each ESF and the required response times. In accordance with Table 14.2-63, a preoperational test demonstrates that the measured time for the ESF functions listed in Tier 1 Table 2.5-2 is less than or equal to the maximum values assumed in the accident analysis. Technical specification SR 3.0.1 bases states that surveillances may be performed by means of any series of sequential, overlapping, or total steps provided the entire surveillance is performed within the specified frequency. The technical specification bases also describe an allowance for response time to be verified by any series of sequential, overlapping, or total channel measurements.	X				
02.05.18	~~MPS~~	~~Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for reactor trip functions. Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for ESF actuations. The operating bypasses are applied automatically when plant conditions dictate that the safety function is not needed, or that the safety function prevents proper plant operation at a specific mode of operation.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that the MPS interlocks listed in Tier 1 Table 2.5-4 automatically establish an operating bypass for the specified reactor trip or ESF actuations when a real or simulated signal simulates that the associated interlock condition is met; and are automatically removed when the real or simulated signal simulates that the associated permissive condition is no longer satisfied.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.19	~~MPS~~	~~Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for reactor trip functions. Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for ESF actuations. The operating bypasses are applied automatically when plant conditions dictate that the safety function is not needed, or that the safety function prevents proper plant operation at a specific mode of operation.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that the MPS permissives listed in Tier 1 Table 2.5-4 allows the manual bypass of the specified reactor trip or ESF actuations when a real or simulated signal simulates that the associated permissive condition is met; and are automatically removed when the real or simulated signal simulates that the associated permissive condition is no longer satisfied.~~Not used.	~~X~~				
02.05.20	~~MPS~~	~~Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for reactor trip functions. Section 7.2.4.1, Operating Bypasses, describes MPS operating bypasses for ESF actuations. The operating bypasses are applied automatically when plant conditions dictate that the safety function is not needed, or that the safety function prevents proper plant operation at a specific mode of operation.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that the MPS overrides listed in Tier 1 Table 2.5-4 are established when the manual override switch is active and a real or simulated RT-1 interlock is established.~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.21	~~MPS~~	~~Section 7.2.4.2, Maintenance Bypass, describes the MPS maintenance bypass operation mode. An individual protection channel can be placed in a maintenance bypass operation mode to allow manual testing and maintenance during power operation, while ensuring that the minimum redundancy required by the Technical Specifications is maintained. The reactor trip functions are listed in Table 7.1-3: Reactor Trip Functions. The ESFs functions are listed in Table 7.1-4: Module Protection System Engineered Safeguards Functions.~~ ~~In accordance with Table 14.2-63, a preoperational test demonstrates that with a safety function module out of service switch activated, the safety function is placed in trip or bypass based on the position of the safety function module trip/bypass switch. Each separation group of the reactor trip functions listed in Tier 1 Table 2.5-1 and each separation group of the ESFs signals listed in Tier 1 Table 2.5-2 is tested by placing the separation group in maintenance bypass.~~Not used.	~~X~~				
02.05.22	MPS	Section 7.2.4.2, Maintenance Bypass, describes the MPS maintenance bypass operation mode. An individual protection channel can be placed in a maintenance bypass operation mode to allow manual testing and maintenance during power operation, while ensuring that the minimum redundancy required by the technical specifications is maintained. Section 7.2.4.2 discusses the status indication of MPS manual or automatic bypasses placed in maintenance bypass operation mode. In accordance with Table 14.2-63, a preoperational test demonstrates that each operational MPS manual or automatic bypass is indicated in the MCR.	X				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[1] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.05.27	~~MPS~~	~~Section 7.0.4.1.2, Reactor Trip System, discusses the arrangement of the protection system RTBs. Figure 7.0-6: Reactor Trip Breaker Arrangement provides the arrangement of the RTBs.~~ ~~This ITAAC verifies that the RTBs conform to the arrangement indicated in Tier 1 Figure 2.5-1. In addition, the ITAAC inspection verifies proper connection of the shunt and undervoltage trip mechanisms and other auxiliary contacts.~~Not used.	~~X~~				
02.05.28	~~MPS~~	~~Section 7.1.5.1, Application of NUREG/CR-6303 Guidelines, discusses that two of the four separation groups and one of the two divisions of RTS and ESFAS will utilize a different programmable technology.~~ ~~A ITAAC inspection is performed to verify that MPS separation groups A & C and Division I of RTS and ESFAS utilize a different programmable technology from separation groups B & D and Division II of RTS and ESFAS.~~Not used.	~~X~~				
02.05.29	~~MPS~~	~~Section 7.1.3.3, Redundancy in Nonsafety I&C System Design, discusses that when operators evacuate the MCR and occupy the RSS, two manual isolation switches for the MPS divisions are provided to isolate the MPS manual actuation switches in the MCR to prevent fires in the MCR from causing spurious actuations of associated equipment.~~ ~~An ITAAC inspection is performed of each MCR isolation switch location to verify that the switch exists in the RSS.~~Not used.	~~X~~				