2.2.3 Safety Injection System and Residual Heat Removal System

1.0 Description

The safety injection system and residual heat removal system (SIS/RHRS) is a safety-related system. The SIS/RHRS has four divisions. The SIS/RHRS provides the following safety-related functions:

- Emergency core cooling.
- Residual heat removal.
- Reactor coolant pressure boundary integrity.
- Containment isolation.

2.0 Arrangement

2.1 The functional arrangement of the SIS/RHRS is as shown on Figure 2.2.3-1—Safety Injection System and Residual Heat Removal System Functional Arrangement.

2.2 The location of the SIS/RHRS equipment is as listed in Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design.

2.3 Physical separation exists between the divisions of the SIS/RHRS located in the Safeguard Buildings.

3.0 Mechanical Design Features

3.1 Pumps and valves listed in Table 2.2.3-1 will be functionally designed and qualified such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident conditions.

3.2 Check valves listed in Table 2.2.3-1 will function as listed in Table 2.2.3-1.

3.3 Deleted.

3.4 Components identified as Seismic Category I in Table 2.2.3-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.2.3-1.

3.5 Deleted.

3.6 Deleted.

3.7 Deleted.

3.8 Deleted.

3.9 Deleted.

3.10 SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is designed in accordance with ASME Code Section III requirements.

3.11 SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is installed in accordance with an ASME Code Section III Design Report.

3.12 Pressure boundary welds in SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 are in accordance with ASME Code Section III.

3.13 SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 retains pressure boundary integrity at design pressure.

3.14 SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is installed and inspected in accordance with ASME Code Section III requirements.

3.15 Components listed in Table 2.2.3-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements.

3.16 Components listed in Table 2.2.3-1 as ASME Code Section III are fabricated in accordance with ASME Code Section III requirements.

3.17 Pressure boundary welds on components listed in Table 2.2.3-1 as ASME Code Section III are in accordance with ASME Code Section III requirements.

3.18 Components listed in Table 2.2.3-1 as ASME Code Section III retain pressure boundary integrity at design pressure.

3.19 Components listed in Table 2.2.3-1 as ASME Code Section III are installed in accordance with ASME Code Section III requirements.

4.0 Instrumentation and Controls (I&C) Design Features, Displays, and Controls

4.1 Displays listed in Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.2.3-2.

4.2 The SIS/RHRS equipment controls are provided in the MCR and the RSS as listed in Table 2.2.3-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.2.3-2 responds to the state requested by a test signal.

4.4 The SIS/RHRS has the following system interlocks:

- Opening of the accumulator injection path.
- Opening authorization of the residual heat removal system suction path from the reactor coolant system.
- Opening authorization of the hot-leg safety injection path.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.2.3-2 are powered from the Class 1E division as listed in Table 2.2.3-2 in a normal or alternate feed condition.

5.2 Deleted.

6.0 Environmental Qualifications

6.1 Components in Table 2.2.3-2, that are designated as harsh environment, will perform the function listed in Table 2.2.3-1 in the environments that exist during and following design basis events.

7.0 Equipment and System Performance

7.1 The SIS/RHRS heat exchangers listed in Table 2.2.3-1 have the capacity to transfer the design heat load to the component cooling water system.

7.2 The accumulators listed in Table 2.2.3-1 provide a storage volume.

7.3 Each accumulator line has a minimum head loss coefficient (fL/D + K).

7.4 The pumps listed in Table 2.2.3-1 have net positive suction head available (NPSHA) that is greater than net positive suction head required (NPSHR) at system run-out flow.

7.5 The SIS/RHRS delivers water to the reactor coolant system for core cooling.

7.6 The SIS/RHRS delivers water to the reactor coolant system within the system run-out flow rate and pump shutoff head for core cooling due to design basis events.

7.7 Class 1E valves listed in Table 2.2.3-2 can perform the function listed in Table 2.2.3-1 under system operating conditions.

7.8 The SIS/RHRS provides for flow testing of the SIS/RHRS pumps during plant operation.

7.9 Safety injection pumped flow will be delivered to the RCS before the maximum elapsed time.

7.10 Each LHSI pump delivers water at the required flow rate to its respective hot leg of the reactor coolant system.

7.11 LHSI pump and MHSI pump provide safety injection flow to the RCS during post-LOCA operation.

7.12 LHSI heat exchanger cools the post-LOCA fluid for a minimum of 30 days.

7.13 LHSI and MHSI systems provide safety injection flow to the RCS during post-LOCA operation.

8.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.3-3 lists the SIS/RHRS ITAAC.

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number [1]	Location	ASME Code Section III	Function	Seismic Category
RHR 1st RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA001 (30JNA20AA001) (30JNA30AA001) (30JNA40AA001)	Reactor Building	yes	open close	I
RHR 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA002 (30JNA20AA002) (30JNA30AA002) (30JNA40AA002)	Reactor Building	yes	open close (Cont. Isol.)	I
RHR Outside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA003 (30JNA20AA003) (30JNA30AA003) (30JNA40AA003)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I
LHSI Heat Exchanger Bypass Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA101 (30JNA20AA101) (30JNA30AA101) (30JNA40AA101)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close	I
LHSI Heat Exchanger Bypass Isolation Valve on Purification Line to CVCS Division 3 (Division 4)	30JNA30AA004 (30JNA40AA004)	Safeguard Building 3 (Safeguard Building 4)	yes	close	I
LHSI Heat Exchanger Bypass Throttle Valve on Purification Line to CVCS Division 3 (Division 4)	30JNA30AA103 (30JNA40AA103)	Safeguard Building 3 (Safeguard Building 4)	yes	close	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
MHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JND10AP001 (30JND20AP001) (30JND30AP001) (30JND40AP001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	run	I
MHSI Outside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA002 (30JND20AA002) (30JND30AA002) (30JND40AA002)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I
MHSI 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA003 (30JND20AA003) (30JND30AA003) (30JND40AA003)	Reactor Building	yes	open close	I
MHSI Small Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA004 (30JND20AA004) (30JND30AA004) (30JND40AA004)	Reactor Building	yes	open	I
MHSI Large Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA005 (30JND20AA005) (30JND30AA005) (30JND40AA005)	Reactor Building	yes	open close	I
MHSI Control Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA103 (30JND20AA103) (30JND30AA103) (30JND40AA103)	Reactor Building	yes	open close	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
MHSI Inside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA007 (30JND20AA007) (30JND30AA007) (30JND40AA007)	Reactor Building	yes	open close (Cont. Isol.)	I
LHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JNG10AP001 (30JNG20AP001) (30JNG30AP001) (30JNG40AP001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	run	I
LHSI Heat Exchanger Division 1 (Division 2, Division 3, Division 4)	30JNG10AC001 (30JNG20AC001) (30JNG30AC001) (30JNG40AC001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	heat transfer device	I
SIS Accumulator Division 1 (Division 2, Division 3, Division 4)	30JNG13BB001 (30JNG23BB001) (30JNG33BB001) (30JNG43BB001)	Reactor Building	yes	storage volume	I
LHSI Suction Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA001 (30JNG20AA001) (30JNG30AA001) (30JNG40AA001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close	I
LHSI Radial Miniflow Line Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA003 (30JNG20AA003) (30JNG30AA003) (30JNG40AA003)	Reactor Building	yes	close	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
LHSI Tangential Miniflow Line Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA004(30JNG20AA004)(30JNG30AA004)(30JNG40AA004)	Reactor Building	yes	open close	I
LHSI 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA006 (30JNG20AA006) (30JNG30AA006) (30JNG40AA006)	Reactor Building	yes	open close	I
LHSI Inside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA009 (30JNG20AA009) (30JNG30AA009) (30JNG40AA009)	Reactor Building	yes	open close (Cont. Isol.)	I
LHSI Cross-Connect Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA010 (30JNG20AA010) (30JNG30AA010) (30JNG40AA010)	Reactor Building	yes	open close	I
LHSI Cross-Connect Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA011 (30JNG20AA011) (30JNG30AA011) (30JNG40AA011)	Reactor Building	yes	open close	I
LHSI Outside Containment Main Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA060 (30JNG20AA060) (30JNG30AA060) (30JNG40AA060)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number [1]	Location	ASME Code Section III	Function	Seismic Category
LHSI Outside Containment Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA061 (30JNG20AA061) (30JNG30AA061) (30JNG40AA061)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I
LHSI Heat Exchanger Main Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA102 (30JNG20AA102) (30JNG30AA102) (30JNG40AA102)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close	I
LHSI Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA106 (30JNG20AA106) (30JNG30AA106) (30JNG40AA106)	Reactor Building	yes	open close	I
LHSI Hot Leg Injection Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG12AA001 (30JNG22AA001) (30JNG32AA001) (30JNG42AA001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I
LHSI Hot Leg Injection Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG12AA002 (30JNG22AA002) (30JNG32AA002) (30JNG42AA002)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close	I
Accumulator Filling Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA002 (30JNG23AA002) (30JNG33AA002) (30JNG43AA002)	Reactor Building	yes	close	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
SIS 1st RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA005 (30JNG23AA005) (30JNG33AA005) (30JNG43AA005)	Reactor Building	yes	open close	I
Accumulator-Nitrogen Distribution Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA006 (30JNG23AA006) (30JNG33AA006) (30JNG43AA006)	Reactor Building	yes	close	I
Accumulator Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA008 (30JNG23AA008) (30JNG33AA008) (30JNG43AA008)	Reactor Building	yes	open close	I
Accumulator Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA009 (30JNG23AA009) (30JNG33AA009) (30JNG43AA009)	Reactor Building	yes	open close	I
Accumulator Depressurization Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA101 (30JNG13AA101) (30JNG33AA101) (30JNG43AA101)	Reactor Building	yes	close	I
Accumulator Depressurization Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA502 (30JNG23AA502) (30JNG33AA502) (30JNG43AA502)	Reactor Building	yes	close	I

Table 2.2.3-1—SIS/RHRS Equipment Mechanical Design (7 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
Dead Leg Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA001 (30JNG25AA001) (30JNG35AA001) (30JNG45AA001)	Reactor Building	yes	close	I
RCS Suction Line Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA002 (30JNG25AA002) (30JNG35AA002) (30JNG45AA002)	Reactor Building	yes	close	I
Dead Leg Pressure Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA003 (30JNG25AA003) (30JNG35AA003) (30JNG45AA003)	Reactor Building	yes	close	I
Dead Leg Pressure Control Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA004 (30JNG25AA004) (30JNG35AA004) (30JNG45AA004)	Reactor Building	yes	close (Cont. Isol.)	I
SAHRS-IRWSTS 1st Isolation Valve Division 4	30JNG40AA007	Safeguard Building 4	yes	close	I
SAHRS-IRWSTS 2nd Isolation Valve Division 4	30JNG40AA008	Safeguard Building 4	yes	close	I

1) Equipment tag numbers are provided for information only and are not part of the certified design.

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
RHR 1st RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA001 (30JNA20AA001) (30JNA30AA001) (30JNA40AA001)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
RHR 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA002 (30JNA20AA002) (30JNA30AA002) (30JNA40AA002)	Reactor Building	2^N / 1^A (1^N) / (2^A) (4^N) / (3^A) (3^N) / (4^A)	yes	yes	position / position	open-close / open-close
RHR Outside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA003 (30JNA20AA003) (30JNA30AA003) (30JNA40AA003)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Heat Exchanger Bypass Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10AA101 (30JNA20AA101) (30JNA30AA101) (30JNA40AA101)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Heat Exchanger Bypass Isolation Valve on Purification Line to CVCS Division 3 (Division 4)	30JNA30AA004 (30JNA40AA004)	Safeguard Building 3 (Safeguard Building 4)	3^N / 4^A (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Heat Exchanger Bypass Throttle Valve on Purification Line to CVCS Division 3 (Division 4)	30JNA30AA103 (30JNA40AA103)	Safeguard Building 3 (Safeguard Building 4)	3^N / 4^A (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
MHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JND10AP001 (30JND20AP001) (30JND30AP001) (30JND40AP001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1 (2) (3) (4)	yes	yes	on-off / on-off	start-stop / start-stop
MHSI Outside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA002 (30JND20AA002) (30JND30AA002) (30JND40AA002)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
MHSI Small Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA004 (30JND20AA004) (30JND30AA004) (30JND40AA004)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
MHSI Large Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA005 (30JND20AA005) (30JND30AA005) (30JND40AA005)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Control Valve Division 1 (Division 2, Division 3, Division 4)	30JND10AA106 (30JND20AA106) (30JND30AA106) (30JND40AA106)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JNG10AP001 (30JNG20AP001) (30JNG30AP001) (30JNG40AP001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1 (2) (3) (4)	yes	yes	on-off / on-off	start-stop / start-stop
LHSI Suction Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA001 (30JNG20AA001) (30JNG30AA001) (30JNG40AA001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Radial Miniflow Line Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA003 (30JNG20AA003) (30JNG30AA003) (30JNG40AA003)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Tangential Miniflow Line Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA004 (30JNG20AA004) (30JNG30AA004) (30JNG40AA004)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Cross-Connect Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA010 (30JNG20AA010) (30JNG30AA010) (30JNG40AA010)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Outside Containment Main Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA060 (30JNG20AA060) (30JNG30AA060) (30JNG40AA060)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Outside Containment Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA061 (30JNG20AA061) (30JNG30AA061) (30JNG40AA061)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Heat Exchanger Main Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA102 (30JNG20AA102) (30JNG30AA102) (30JNG40AA102)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10AA106 (30JNG20AA106) (30JNG30AA106) (30JNG40AA106)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
LHSI Hot Leg Injection Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG12AA001 (30JNG22AA001) (30JNG32AA001) (30JNG42AA001)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
Accumulator Filling Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA002 (30JNG23AA002) (30JNG33AA002) (30JNG43AA002)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
Accumulator-Nitrogen Distribution Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA006 (30JNG23AA006) (30JNG33AA006) (30JNG43AA006)	Reactor Building	N/A	yes	N/A	position / N/A	open-close / N/A
Accumulator Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA008 (30JNG23AA008) (30JNG33AA008) (30JNG43AA008)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Accumulator Depressurization Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA101 (30JNG13AA101) (30JNG33AA101) (30JNG43AA101)	Reactor Building	N/A	yes	N/A	position / N/A	open-close / N/A
Accumulator Depressurization Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13AA502 (30JNG23AA502) (30JNG33AA502) (30JNG43AA502)	Reactor Building	N/A	yes	N/A	position / N/A	open-close / N/A
Dead Leg Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA001 (30JNG25AA001) (30JNG35AA001) (30JNG45AA001)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
RCS Suction Line Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA002 (30JNG25AA002) (30JNG35AA002) (30JNG45AA002)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close
Dead Leg Pressure Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA003 (30JNG25AA003) (30JNG35AA003) (30JNG45AA003)	Reactor Building	1^N / 2^A (2^N) / (1^A) (3^N) / (4^A) (4^N) / (3^A)	yes	yes	position / position	open-close / open-close

Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number(1)	Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Dead Leg Pressure Control Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15AA004 (30JNG25AA004) (30JNG35AA004) (30JNG45AA004)	Reactor Building	2^N / 1^A (1^N) / (2^A) (4^N) / (3^A) (3^N) / (4^A)	yes	yes	position / position	open-close / open-close
SAHRS-IRWSTS 1st Isolation Valve Division 4	30JNG40AA007	Safeguard Building 4	4^N / 3^A	yes	yes	position / position	open-close / open-close
SAHRS-IRWSTS 2nd Isolation Valve Division 4	30JNG40AA008	Safeguard Building 4	4^N / 3^A	yes	yes	position / position	open-close / open-close

1) Equipment tag numbers are provided for information only and are not part of the certified design.

2) ^{N} denotes the division the component is normally powered from. ^{A} denotes the division the component is powered from when alternate feed is implemented.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The functional arrangement of the SIS/RHRS is as shown on Figure 2.2.3-1.	Inspections of the as-built system as shown on Figure 2.2.3-1 will be conducted.	The as-built SIS/RHRS conforms with the functional arrangement as shown on Figure 2.2.3-1.
2.2	The location of the SIS/RHRS equipment is as listed in Table 2.2.3-1.	An inspection will be performed of the location of the equipment listed in Table 2.2.3-1.	The equipment listed in Table 2.2.3-1 is located as listed in Table 2.2.3-1.
2.3	Physical separation exists between the divisions of the SIS/RHRS located in the Safeguard Buildings.	An inspection will be performed to verify that the divisions of the SIS/RHRS are located in separate Safeguard Buildings.	The divisions of the SIS/RHRS are located in separate Safeguard Buildings as shown on Figure 2.2.3-1.
3.1	Pumps and valves listed in Table 2.2.3-1 will be functionally designed and qualified such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident conditions.	Tests or type tests of the pumps and valves listed in Table 2.2.3-1 will be conducted to demonstrate that the pumps and valves function under conditions ranging from normal operating to design-basis accident conditions.	A test report exists and concludes that the pumps and valves listed in Table 2.2.3-1 function under conditions ranging from normal operating to design-basis accident conditions.
3.2	Check valves listed in Table 2.2.3-1 will function as listed in Table 2.2.3-1.	Tests will be performed for the operation of the check valves listed in Table 2.2.3-1.	The check valves listed in Table 2.2.3-1 perform the functions listed in Table 2.2.3-1.
3.3	Deleted.	Deleted.	Deleted.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.4	Components identified as Seismic Category I in Table 2.2.3-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.2.3-1.	a. Type tests, analyses, or a combination of type tests and analyses will be performed on the components identified as Seismic Category I in Table 2.2.3-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements. b. Inspections will be performed of the Seismic Category I components identified in Table 2.2.3-1 to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQDP, EQDP, or analyses).	a. Seismic qualification reports (SQDP, EQDP, or analyses) exist and conclude that the Seismic Category I components identified in Table 2.2.3-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.2.3-1 including the time required to perform the listed function. b. Inspection reports exist and conclude that the Seismic Category I components identified in Table 2.2.3-1, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQDP, EQDP, or analyses).
3.5	Deleted.	Deleted.	Deleted.
3.6	Deleted.	Deleted.	Deleted.
3.7	Deleted.	Deleted.	Deleted.
3.8	Deleted.	Deleted.	Deleted.
3.9	Deleted.	Deleted.	Deleted.
3.10	SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is designed in accordance with ASME Code Section III requirements.	Inspections of the ASME Code Section III Design Reports (NCA-3550) and associated reference documents will be performed. **{{DAC}}**	ASME Code Section III Design Reports (NCA-3550) exist and conclude that SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 complies with ASME Code Section III requirements. **{{DAC}}**

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.11	SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is installed in accordance with an ASME Code Section III Design Report.	Analyses to reconcile as-built deviations to the ASME Code Design Reports (NCA-3550) will be performed.	For SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1, ASME Code Data Reports (N-5) exist and conclude that design reconciliation (NCA-3554) has been completed in accordance with the ASME Code Section III for the as-built system. The report(s) document the as-built condition.
3.12	Pressure boundary welds in SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 are in accordance with ASME Code Section III.	Inspections of pressure boundary welds verify that welding is performed in accordance with ASME Code Section III requirements.	ASME Code Section III Data Reports exist and conclude that pressure boundary welding for SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 has been performed in accordance with ASME Code Section III.
3.13	SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 retains pressure boundary integrity at design pressure.	Hydrostatic tests will be performed on the as-built system.	For SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.
3.14	SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1 is installed and inspected in accordance with ASME Code Section III requirements.	An inspection of the as-built piping will be performed.	For SIS/RHRS piping shown as ASME Code Section III on Figure 2.2.3-1, N–5 Data Reports exist and conclude that installation and inspection are in accordance with ASME Code Section III requirements.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.15	Components listed in Table 2.2.3-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements.	Inspections of ASME Code Section III Design Reports and associated reference documents will be performed.	ASME Code Section III Design Reports (NCA-3550) exist and conclude that components listed as ASME Code Section III in Table 2.2.3-1 comply with ASME Code Section III requirements.
3.16	Components listed in Table 2.2.3-1 as ASME Code Section III are fabricated in accordance with ASME Code Section III requirements.	An analysis will be performed to verify that deviations to the component design reports (NCA-3550) have been reconciled.	ASME Code Section III Design Reports (NCA-3550) exist and conclude that components listed as ASME Code Section III in Table 2.2.3-1 comply with ASME Code Section III requirements and any deviations to the design report have been reconciled.
3.17	Pressure boundary welds on components listed in Table 2.2.3-1 as ASME Code Section III are in accordance with ASME Code Section III requirements.	Inspections of pressure boundary welds will be performed to verify that welding is performed in accordance with ASME Code Section III requirements.	For components listed as ASME Code Section III in Table 2.2.3-1, ASME Code Section III Data Reports (NCA-8000) exist and conclude that pressure boundary welding has been performed in accordance with ASME Code Section III.
3.18	Components listed in Table 2.2.3-1 as ASME Code Section III retain pressure boundary integrity at design pressure.	Hydrostatic tests will be performed on the components.	For components listed as ASME Code Section III in Table 2.2.3-1, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.19	Components listed in Table 2.2.3-1 as ASME Code Section III are installed in accordance with ASME Code Section III requirements.	An inspection of ASME Code Data Reports will be performed.	ASME Code Section III N-5 Data Reports exist and conclude that components listed as ASME Code Section III in Table 2.2.3-1 have been installed in accordance with ASME Code Section III requirements.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.3-2.	Tests will be performed for the retrievability of the displays in the MCR or the RSS as listed in Table 2.2.3-2.	a. The displays listed in Table 2.2.3-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.3-2 as being retrieved in the RSS can be retrieved in the RSS.
4.2	Controls exist in the MCR and the RSS as identified in Table 2.2.3-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.2.3-2.	a. The controls listed in Table 2.2.3-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.2.3-2 as being in the RSS exist in the RSS.
4.3	Equipment listed as being controlled by a PACS module in Table 2.2.3-2 responds to the state requested by a test signal.	A test will be performed using test signals.	Equipment listed as being controlled by a PACS module in Table 2.2.3-2 responds to the state requested by the signal.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
4.4	The SIS/RHRS has the following system interlocks: a. Opening of the accumulator injection path. b. Opening authorization of the residual heat removal system suction path from the reactor coolant system. c. Opening authorization of the hot leg safety injection path.	Tests will be performed using test signals to verify the interlock.	The following interlocks respond as specified below when activated by a test signal: a. Opening of the accumulator isolation valve (30JNG13/23/33/43 AA008). b. Opening authorization of the RHR 1st RCPB isolation valve (30JNA10/20/30/40 AA001) and the RHR 2nd RCPB isolation valve (30JNA10/20/30/40 AA002). c. Opening authorization of the LHSI hot leg injection isolation valve (30JNG12/22/32/42 AA001)
5.1	The components designated as Class 1E in Table 2.2.3-2 are powered from the Class 1E division as listed in Table 2.2.3-2 in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.2.3-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components designated as Class 1E in Table 2.2.3-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	a. The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.2.3-2. b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.2.3-2.
5.2	Deleted.	Deleted.	Deleted.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
6.1	Components in Table 2.2.3-2, that are designated as harsh environment, will perform the function listed in Table 2.2.3-1 in the environments that exist during and following design basis events.	a. Type tests or type tests and analysis will be performed to demonstrate the ability of the components listed as harsh environment in Table 2.2.3-2 to perform the function listed in Table 2.2.3-1 for the environmental conditions that could occur during and following design basis events. b. Components listed as harsh environment in Table 2.2.3-2 will be inspected to verify installation in accordance with the construction drawings including the associated wiring, cables and terminations. Deviations to the construction drawings will be reconciled to the EQDP.	a. Environmental Qualification Data Packages (EQDP) exist and conclude that the components listed as harsh environment in Table 2.2.3-2 can perform the function listed in Table 2.2.3-1 during and following design basis events including the time required to perform the listed function. b. Inspection reports exists and conclude that the components listed in Table 2.2.3-2 as harsh environment has been installed per the construction drawings and any deviations have been reconciled to the EQDP.
7.1	The SIS/RHRS heat exchangers listed in Table 2.2.3-1 have the capacity to transfer the design heat load to the component cooling water system.	Tests will be performed to demonstrate the capability of one of the SIS/RHRS heat exchangers as listed in Table 2.2.3-1 to transfer the heat load to the component cooling water system.	The SIS/RHRS has the capacity to remove the design heat load via the heat exchangers listed in Table 2.2.3-1: Heat load per heat exchanger $\geq$ 2.35E+08 BTU/hr.
7.2	The accumulators listed in Table 2.2.3-1 provide a storage volume.	Inspections will be performed to verify the storage volume for accumulators listed in Table 2.2.3-1.	The accumulators listed in Table 2.2.3-1 provide a minimum volume of 1942.3 ft^3 per accumulator.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
7.3	Each accumulator line has a minimum head loss coefficient (fL/D + K).	Tests and analyses will be performed to verify each accumulator line minimum head loss coefficient (fL/D + K).	Each accumulator line provides the following head loss coefficient: Minimum head loss coefficient (fL/D + K) per accumulator line = 3.71 for a flow area of $0.3941 ft^2$ and f = 0.014.
7.4	The pumps listed in Table 2.2.3-1 have NPSHA that is greater than NPSHR at system run-out flow.	Testing will be performed to verify NPSHA for pumps listed in Table 2.2.3-1.	The pumps listed in Table 2.2.3-1 have NPSHA that is greater than NPSHR at system run-out flow.
7.5	The SIS/RHRS delivers water to the reactor coolant system for core cooling.	Tests will be performed to determine the SIS/RHRS delivery rate under design conditions.	The SIS/RHRS delivers the following flowrate to the reactor coolant system: a. MHSI pump capacity: $\geq$ 600 gpm @ 580 psia (cold leg pressure). b. LHSI pump capacity: $\geq$ 2200 gpm @ 25 psia (cold leg pressure).
7.6	The SIS/RHRS delivers water to the reactor coolant system within the system run-out flow rate and pump shutoff head for core cooling.	a. Tests will be performed to verify satisfactory operations of the SIS/RHRS pumps at run-out flow rate. b. Tests will be performed to verify satisfactory operations of the SIS/RHRS pumps at shutoff head.	a. The SIS/RHRS pumps perform satisfactorily at system run-out flow rate. b. The SIS/RHRS pumps perform satisfactorily at shutoff head (minimum recirculation flow).
7.7	Class 1E valves listed in Table 2.2.3-2 can perform the function listed in Table 2.2.3-1 under system operating conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.2.3-2 to change position as listed in Table 2.2.3-1 under system operating conditions.	The valve changes position as listed Table 2.2.3-1 under system operating conditions.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
7.8	The SIS/RHRS has provisions to allow flow testing of the SIS/RHRS pumps during plant operation.	Testing for flow of the SIS/RHRS pumps through the flow test line will be performed.	The flow test line allows the SIS/RHRS pumps to deliver the following flow rates: a. MHSI pump: Flow rate per pump is greater than or equal to 480 gpm. b. LHSI pump: Flow rate per pump is greater than or equal to 1760 gpm.
7.9	Safety injection pumped flow will be delivered to the RCS before the maximum elapsed time.	Tests will be performed to determine the safety injection pumped flow delivery time.	Time for safety injection flow to reach full flow does not exceed 15 seconds with offsite power available or 40 seconds with loss of offsite power.
7.10	Each LHSI pump delivers water at the required flow rate to its respective hot leg of the reactor coolant system.	Testing will be performed to demonstrate that each LHSI pump delivers the required flow to its respective hot leg of the RCS.	Each LHSI pump delivers a flow rate greater than or equal to 1720 gpm to its respective hot leg of the RCS at an equivalent RCS pressure of 69.27 psia.
7.11	LHSI pump and MHSI pump provide safety injection flow to the RCS during post-LOCA operation.	Type tests, analyses, or a combination of type tests and analyses for LHSI and MHSI pumps will be performed.	Test results confirm that the LHSI and MHSI pumps are capable of providing their required safety injection flow for a minimum of 30 days of continuous post-LOCA operation.
7.12	LHSI heat exchanger cools the post-LOCA fluid for a minimum of 30 days.	Type tests, analyses, or a combination of type tests and analyses for heat exchanger performance will be provided by the vendor.	Analysis confirms that tube plugging and failure due to abrasive wear will not degrade the performance of the heat exchanger below the 30-day acceptance criteria.

Table 2.2.3-3—Safety Injection System and Residual Heat Removal System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
7.13	LHSI and MHSI systems provide safety injection flow to the RCS during post-LOCA operation.	Analysis of plugging and wear of valves and orifices will be performed.	Analysis confirms that pressure drop/overall system resistance across ECCS is consistent with safety analysis results for 30 days of post-LOCA operation. Analysis also confirms that wear rates are acceptable for 30 days of post-LOCA operation based on provided equipment specification.