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 in 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 portions of the divisions of the SIS/RHRS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.3-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

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 Equipment identified as Seismic Category I in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.2.3-1.

3.5 Deleted.

3.6 Components listed as ASME Code Class 1 in Table 2.2.3-1 will be analyzed for fatigue per ASME Section III Class 1.

3.7 Deleted.

3.8 Deleted.

3.9 Deleted.

3.10 Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 are designed in accordance with ASME Code Section III requirements.

3.11 Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 are installed in accordance with an ASME Code Section III Design Report.

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

3.13 Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 retain their pressure boundary integrity at their design pressure.

3.14 Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 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 Valves listed in Table 2.2.3-2 fail as-is on loss of power.

6.0 Environmental Qualifications

6.1 Equipment listed in Table 2.2.3-2 for harsh environment can perform the function in Table 2.2.3-1 following exposure to the design basis environments for the time required.

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 have sufficient storage volume for core cooling due to design basis events.

7.3 Each accumulator line has a minimum head loss coefficient (fL/D + K) for a timely core cooling due to design basis events.

7.4 The pumps listed in Table 2.2.3-1 have sufficient net positive suction head available (NPSHA).

7.5 The SIS/RHRS delivers water to the reactor coolant system at the required flow for core cooling due to design basis events.

7.6 The SIS/RHRS delivers water to the reactor coolant system within the pumps run-out flow rate and 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 design conditions.

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
RHR 1st RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10 AA001 (30JNA20 AA001) (30JNA30 AA001) (30JNA40 AA001)	Reactor Building	yes (Class 1)	open close	I
RHR 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10 AA002 (30JNA20 AA002) (30JNA30 AA002) (30JNA40 AA002)	Reactor Building	yes (Class 1)	open close (Cont. Isol.)	I
RHR Outside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10 AA003 (30JNA20 AA003) (30JNA30 AA003) (30JNA40 AA003)	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)	30JNA10 AA101 (30JNA20 AA101) (30JNA30 AA101) (30JNA40 AA101)	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)	30JNA30 AA004 (30JNA40 AA004)	Safeguard Building 3 (Safeguard Building 4)	yes	close	I
LHSI Heat Exchanger Bypass Throttle Valve on Purification Line to CVCS Division 3 (Division 4)	30JNA30 AA103 (30JNA40 AA103)	Safeguard Building 3 (Safeguard Building 4)	yes	close	I

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
MHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JND10 AP001 (30JND20 AP001) (30JND30 AP001) (30JND40 AP001)	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)	30JND10 AA002 (30JND20 AA002) (30JND30 AA002) (30JND40 AA002)	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)	30JND10 AA003 (30JND20 AA003) (30JND30 AA003) (30JND40 AA003)	Reactor Building	yes (Class 1)	open close	I
MHSI Small Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10 AA004 (30JND20 AA004) (30JND30 AA004) (30JND40 AA004)	Reactor Building	yes	open	I
MHSI Large Miniflow Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10 AA005 (30JND20 AA005) (30JND30 AA005) (30JND40 AA005)	Reactor Building	yes	open close	I
MHSI Inside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JND10 AA007 (30JND20 AA007) (30JND30 AA007) (30JND40 AA007)	Reactor Building	yes	open close (Cont. Isol.)	I

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
LHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JNG10 AP001 (30JNG20 AP001) (30JNG30 AP001) (30JNG40 AP001)	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)	30JNG10 AC001 (30JNG20 AC001) (30JNG30 AC001) (30JNG40 AC001)	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)	30JNG13 BB001 (30JNG23 BB001) (30JNG33 BB001) (30JNG43 BB001)	Reactor Building	yes	storage volume	I
LHSI Suction Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA001 (30JNG20 AA001) (30JNG30 AA001) (30JNG40 AA001)	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)	30JNG10 AA003 (30JNG20 AA003) (30JNG30 AA003) (30JNG40 AA003)	Reactor Building	yes	close	I
LHSI Tangential Miniflow Line Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA004 (30JNG20 AA004) (30JNG30 AA004) (30JNG40 AA004)	Reactor Building	yes	open close	I

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
LHSI 2nd RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA006 (30JNG20 AA006) (30JNG30 AA006) (30JNG40 AA006)	Reactor Building	yes (Class 1)	open close	I
LHSI Inside Containment Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA009 (30JNG20 AA009) (30JNG30 AA009) (30JNG40 AA009)	Reactor Building	yes	open close (Cont. Isol.)	I
LHSI Cross-Connect Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA010 (30JNG20 AA010) (30JNG30 AA010) (30JNG40 AA010)	Reactor Building	yes	open close	I
LHSI Cross-Connect Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA011 (30JNG20 AA011) (30JNG30 AA011) (30JNG40 AA011)	Reactor Building	yes	open close	I
LHSI Outside Containment Main Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA060 (30JNG20 AA060) (30JNG30 AA060) (30JNG40 AA060)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close (Cont. Isol.)	I
LHSI Outside Containment Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA061 (30JNG20 AA061) (30JNG30 AA061) (30JNG40 AA061)	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)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
LHSI Heat Exchanger Main Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA102 (30JNG20 AA102) (30JNG30 AA102) (30JNG40 AA102)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open close	I
LHSI Heat Exchanger Pre-Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA104 (30JNG20 AA104) (30JNG30 AA104) (30JNG40 AA104)	Safeguard Building 1 (Safeguard Building 2) (Safeguard Building 3) (Safeguard Building 4)	yes	open	I
LHSI Hot Leg Injection Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG12 AA001 (30JNG22 AA001) (30JNG32 AA001) (30JNG42 AA001)	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)	30JNG12 AA002 (30JNG22 AA002) (30JNG32 AA002) (30JNG42 AA002)	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)	30JNG13 AA002 (30JNG23 AA002) (30JNG33 AA002) (30JNG43 AA002)	Reactor Building	yes	close	I
SIS 1st RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA005 (30JNG23 AA005) (30JNG33 AA005) (30JNG43 AA005)	Reactor Building	yes (Class 1)	open close	I

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
Accumulator-Nitrogen Distribution Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA006 (30JNG23 AA006) (30JNG33 AA006) (30JNG43 AA006)	Reactor Building	yes	close	I
Accumulator Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA008 (30JNG23 AA008) (30JNG33 AA008) (30JNG43 AA008)	Reactor Building	yes	open close	I
Accumulator Check Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA009 (30JNG23 AA009) (30JNG33 AA009) (30JNG43 AA009)	Reactor Building	yes (Class 1)	open close	I
Accumulator Depressurization Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA101 (30JNG13 AA101) (30JNG33 AA101) (30JNG43 AA101)	Reactor Building	yes	close	I
Accumulator Depressurization Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA502 (30JNG23 AA502) (30JNG33 AA502) (30JNG43 AA502)	Reactor Building	yes	close	I
Dead Leg Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15 AA001 (30JNG25 AA001) (30JNG35 AA001) (30JNG45 AA001)	Reactor Building	yes (Class 1)	close	I

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

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
RCS Suction Line Pressurization Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15 AA002 (30JNG25 AA002) (30JNG35 AA002) (30JNG45 AA002)	Reactor Building	yes (Class 1)	close	I
Dead Leg Pressure Bypass Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15 AA003 (30JNG25 AA003) (30JNG35 AA003) (30JNG45 AA003)	Reactor Building	yes	close	I
Dead Leg Pressure Control Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15 AA004 (30JNG25 AA004) (30JNG35 AA004) (30JNG45 AA004)	Reactor Building	yes (Class 1)	close (Cont. Isol.)	I
SAHRS-IRWSTS 1st Isolation Valve Division 4	30JNG40 AA007	Safeguard Building 4	yes	close	I
SAHRS-IRWSTS 2nd Isolation Valve Division 4	30JNG40 AA008	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)

Equipment Description	Equipment Tag Number(1)	Equipment 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)	30JNA10 AA001 (30JNA20 AA001) (30JNA30 AA001) (30JNA40 AA001)	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)	30JNA10 AA002 (30JNA20 AA002) (30JNA30 AA002) (30JNA40 AA002)	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)	30JNA10 AA003 (30JNA20 AA003) (30JNA30 AA003) (30JNA40 AA003)	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)	30JNA10 AA101 (30JNA20 AA101) (30JNA30 AA101) (30JNA40 AA101)	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)	30JNA30 AA004 (30JNA40 AA004)	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)

Equipment Description	Equipment Tag Number[1]	Equipment 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)	30JNA30 AA103 (30JNA40 AA103)	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)	30JND10 AP001 (30JND20 AP001) (30JND30 AP001) (30JND40 AP001)	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)	30JND10 AA002 (30JND20 AA002) (30JND30 AA002) (30JND40 AA002)	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)	30JND10 AA004 (30JND20 AA004) (30JND30 AA004) (30JND40 AA004)	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)	30JND10 AA005 (30JND20 AA005) (30JND30 AA005) (30JND40 AA005)	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)

Equipment Description	Equipment Tag Number[1]	Equipment Location	IEEE Class 1E[2]	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Pump Division 1 (Division 2, Division 3, Division 4)	30JNG10 AP001 (30JNG20 AP001) (30JNG30 AP001) (30JNG40 AP001)	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)	30JNG10 AA001 (30JNG20 AA001) (30JNG30 AA001) (30JNG40 AA001)	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)	30JNG10 AA003 (30JNG20 AA003) (30JNG30 AA003) (30JNG40 AA003)	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)	30JNG10 AA004 (30JNG20 AA004) (30JNG30 AA004) (30JNG40 AA004)	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 Cross-Connect Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA010 (30JNG20 AA010) (30JNG30 AA010) (30JNG40 AA010)	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)

Equipment Description	Equipment Tag Number[1]	Equipment Location	IEEE Class 1E[2]	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Outside Containment Main Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA060 (30JNG20 AA060) (30JNG30 AA060) (30JNG40 AA060)	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)	30JNG10 AA061 (30JNG20 AA061) (30JNG30 AA061) (30JNG40 AA061)	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)	30JNG10 AA102 (30JNG20 AA102) (30JNG30 AA102) (30JNG40 AA102)	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 Pre-Valve Division 1 (Division 2, Division 3, Division 4)	30JNG10 AA104 (30JNG20 AA104) (30JNG30 AA104) (30JNG40 AA104)	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 Hot Leg Injection Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG12 AA001 (30JNG22 AA001) (30JNG32 AA001) (30JNG42 AA001)	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)

Equipment Description	Equipment Tag Number[1]	Equipment Location	IEEE Class 1E[2]	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Accumulator Filling Line Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA002 (30JNG23 AA002) (30JNG33 AA002) (30JNG43 AA002)	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)	30JNG13 AA006 (30JNG23 AA006) (30JNG33 AA006) (30JNG43 AA006)	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)	30JNG13 AA008 (30JNG23 AA008) (30JNG33 AA008) (30JNG43 AA008)	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 Depressurization Control Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA101 (30JNG13 AA101) (30JNG33 AA101) (30JNG43 AA101)	Reactor Building	N/A	yes	N/A	position / N/A	open-close / N/A

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

Equipment Description	Equipment Tag Number[1]	Equipment Location	IEEE Class 1E[2]	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Accumulator Depressurization Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA502 (30JNG23 AA502) (30JNG33 AA502) (30JNG43 AA502)	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)	30JNG15 AA001 (30JNG25 AA001) (30JNG35 AA001) (30JNG45 AA001)	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)	30JNG15 AA002 (30JNG25 AA002) (30JNG35 AA002) (30JNG45 AA002)	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)	30JNG15 AA003 (30JNG25 AA003) (30JNG35 AA003) (30JNG45 AA003)	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 Control Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG15 AA004 (30JNG25 AA004) (30JNG35 AA004) (30JNG45 AA004)	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

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

Equipment Description	Equipment Tag Number(1)	Equipment Location	IEEE Class 1E(2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
SAHRS-IRWSTS 1st Isolation Valve Division 4	30JNG40 AA007	Safeguard Building 4	4^N / 3^A	yes	yes	position / position	open-close / open-close
SAHRS-IRWSTS 2nd Isolation Valve Division 4	30JNG40 AA008	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—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	The functional arrangement of the SIS/RHRS is as shown in 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 in 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 portions of the divisions of the SIS/RHRS.	An inspection will be performed to verify that portions of the divisions of the SIS/RHRS are located in separate Safeguard Buildings.	Portions of the divisions of the SIS/RHRS are located in separate Safeguard Buildings.
3.1	Equipment listed in Table 2.2.3-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.	a. Analysis of the equipment identified in Table 2.2.3-1 as ASME Code Section III will be performed per ASME Code Section III design requirements. b. Inspections will be conducted on the equipment identified in Table 2.2.3-1 as ASME Code Section III to verify welding has been performed per ASME Code Section III welding requirements. c. Hydrostatic testing of the equipment identified in Table 2.2.3-1 as ASME Code Section III will be performed per ASME Code Section III hydrostatic testing requirements.	a. ASME Code Section III Design Reports (NCA-3550) exist and conclude that the equipment identified in Table 2.2.3-1 as ASME Code Section III meets ASME Code Section III design requirements. b. Equipment identified in Table 2.2.3-1 as ASME Code Section III has been welded per ASME Code Section III welding requirements. c. Equipment identified in Table 2.2.3-1 as ASME Code Section III has been hydrostatically tested per ASME Code Section III hydrostatic testing requirements.
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.

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
3.3	Deleted.	Deleted.	Deleted.
3.4	Equipment identified as Seismic Category I in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.2.3-1.	a. Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment listed 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 as-installed Seismic Category I equipment listed in Table 2.2.3-1 to verify that the equipment including anchorage is installed as specified on the construction drawings.	a. Tests/analysis reports exists and conclude that the Seismic Category I equipment listed in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function. b. Inspection reports exist and conclude that the as-installed Seismic Category I equipment listed in Table 2.2.3-1 including anchorage is installed as specified on the construction drawings.
3.5	Deleted.	Deleted.	Deleted.
3.6	Components listed as ASME Code Class 1 in Table 2.2.3-1 will be analyzed for fatigue per ASME Section III Class 1.	An analysis will be performed.	a. Fatigue analysis has been performed for components listed as ASME Code Class 1 in Table 2.2.3-1. b. For components listed as ASME Code Class 1 in Table 2.2.3-1 operating modes where peak stresses are within 10% of allowable have been identified.
3.7	Deleted.	Deleted.	Deleted.
3.8	Deleted.	Deleted.	Deleted.
3.9	Deleted.	Deleted.	Deleted.

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
3.10	Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 are designed in accordance with ASME Code Section III requirements.	Inspections will be performed for the existence of ASME Code Section III Design Reports.	ASME Code section III Design Reports (NCA-3550) exist for portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1.
3.11	Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 are installed in accordance with an ASME Code Section III Design Report.	Inspections will be performed to verify the existence of an analysis which reconciles as-fabricated deviations to the ASME Code Design Report as required by ASME Code Section III.	For portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1, ASME Code Data Reports (N-5) exist and conclude that reconciliation (NCA-3554) of the as-installed system with the Design Report (NCA-3550) has occurred.
3.12	Pressure boundary welds in portions of the SIS/RHRS piping shown as ASME Code Section III in 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 portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 has been performed in accordance with ASME Code Section III.
3.13	Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 retain their pressure boundary integrity at their design pressure.	Hydrostatic tests will be performed on the as-fabricated system.	For portions of the SIS/RHRS piping shown as ASME Code Section III in 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	Portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1 are installed in accordance with ASME Code Section III requirements.	An inspection for the existence of ASME N–5 Data Reports will be performed.	For portions of the SIS/RHRS piping shown as ASME Code Section III in Figure 2.2.3-1, N–5 Data Reports exist and conclude that installation is in accordance with ASME Code Section III requirements.

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.2.3-2.	Inspections will be performed for the existence or 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.
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 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.
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.	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.

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
		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.	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	Valves listed in Table 2.2.3-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.2.3-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.2.3-2 fail as-is.
6.1	Components listed as Class 1E 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 before and during the time required to perform their function.	a. Type tests, tests, analyses, or a combination of tests and analyses will be performed to demonstrate the ability of the equipment listed for 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 before and during a design basis accident.	a. The Class 1E equipment listed for harsh environment in Table 2.2.3-2 can perform the function listed in Table 2.2.3-1 before and during design basis accidents for the time required to perform the listed function.
		b. For equipment listed for harsh environment in Table 2.2.3-2, an inspection will be performed of the as-installed Class 1E equipment and the associated wiring, cables, and terminations.	b. Inspection concludes the as-installed Class 1E equipment and associated wiring, cables, and terminations as listed in Table 2.2.3-2 for harsh environment conform with the design.
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 and analyses will be performed to demonstrate the capability 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: Design heat load per one heat exchanger = 2.35E+08 BTU/hr.

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.2	The accumulators listed in Table 2.2.3-1 have sufficient storage volume for core cooling due to design basis events.	Inspections and analyses will be performed to verify adequate storage volume for accumulators listed in Table 2.2.3-1.	The accumulators listed in Table 2.2.3-1 provide the following storage volume: Minimum storage volume per accumulator = 1942.3 ft^3
7.3	Each accumulator line has a minimum head loss coefficient (fL/D + K) for a timely core cooling due to design basis events.	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 0.3941ft^2 and f = 0.014.
7.4	The pumps listed in Table 2.2.3-1 have sufficient NPSHA.	Testing and analyses 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 net positive suction head required (NPSHR) at system run-out flow.
7.5	The SIS/RHRS delivers water to the reactor coolant system at the required flow for core cooling due to design basis events.	Tests and analyses will be performed to determine the SIS/RHRS delivery rate under design conditions.	The SIS/RHRS delivers the following design flowrate to the reactor coolant system: a. MHSI pump capacity: 600 gpm @ TDH of 2260 ft b. LHSI pump capacity: 2200 gpm @ TDH of 480 ft

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.6	The SIS/RHRS delivers water to the reactor coolant system within the pumps run-out flow rate and shutoff head for core cooling due to design basis events.	Tests and analyses will be performed to determine the SIS/RHRS pumps run-out flow rate and shutoff head under design conditions.	The SIS/RHRS delivers water to the reactor coolant system within the following pumps run-out flow rate: a. MHSI pump: Maximum run-out flow rate per train (with large miniflow line closed) = 153.1 lb_m/s Maximum run-out flow rate per train (with large miniflow line open) = 112.0 lb_m/s Minimum run-out flow rate per train (with large miniflow line closed) = 130.1 lb_m/s b. LHSI pump: Minimum run-out flow rate per train = 312.2 lb_m/s The SIS/RHRS delivers water to the reactor coolant system within the following pumps shutoff head: a. MHSI pump: Maximum shutoff head (with large miniflow line closed) = 1407 psia (cold leg pressure) Maximum shutoff head (with large miniflow line open) = 614 psia (cold leg pressure) Minimum shutoff head (with large miniflow line closed) = 1300 psia (cold leg pressure) b. LHSI pump: Minimum shutoff head = 302 psia (cold leg pressure).

Table 2.2.3-3—SIS/RHRS ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
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 design 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 design conditions.	The as-installed valve changes position as listed Table 2.2.3-1 under system design conditions.
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 will be performed.	The SIS/RHRS pumps deliver the following flow rates: MHSI pump: Flow rate per pump is greater than or equal to 480 gpm. LHSI pump: Flow rate per pump is greater than or equal to 1760 gpm.

Next File