

## 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 and tested to 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 Piping indicated in Figure 2.2.3-1 as ASME Code Section III is designed, welded, and tested in accordance with ASME Code Section III.

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

3.5 Supports for piping shown as ASME Section III on Figure 2.2.3-1 will be designed in accordance with ASME Section III.

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 Specifications exist for components listed as ASME Section III in Table 2.2.3-1.

3.8 Specifications exist for piping shown as ASME Section III on Figure 2.2.3-1.

3.9 Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.

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#### **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 Actuators listed as being controlled by a priority actuation and control system (PACS) module in Table 2.2.3-2 are controlled by a PACS module.
- 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.

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- 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—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria specifies the inspections, tests, analyses, and acceptance criteria for the SIS/RHRS.

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

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
RHR 1 <sup>st</sup> 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 2 <sup>nd</sup> 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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
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 2 <sup>nd</sup> 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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
LHSI 2 <sup>nd</sup> 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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
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 1 <sup>st</sup> 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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
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)**

<b>Equipment Description</b>	<b>Equipment Tag Number <sup>(1)</sup></b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
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 1 <sup>st</sup> Isolation Valve Division 4	30JNG40 AA007	Safeguard Building 4	yes	close	I
SAHRS-IRWSTS 2 <sup>nd</sup> 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 (6 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number<sup>(1)</sup></b>	<b>Equipment Location</b>	<b>IEEE Class 1E<sup>(2)</sup></b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
RHR 1 <sup>st</sup> RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10 AA001 (30JNA20 AA001) (30JNA30 AA001) (30JNA40 AA001)	Reactor Building	1 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close
RHR 2 <sup>nd</sup> RCPB Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNA10 AA002 (30JNA20 AA002) (30JNA30 AA002) (30JNA40 AA002)	Reactor Building	2 <sup>N</sup> / 1 <sup>A</sup> (1 <sup>N</sup> ) / (2 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 4 <sup>A</sup> (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close

**Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (6 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number<sup>(1)</sup></b>	<b>Equipment Location</b>	<b>IEEE Class 1E<sup>(2)</sup></b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
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 <sup>N</sup> / 4 <sup>A</sup> (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close
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

**Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (6 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number<sup>(1)</sup></b>	<b>Equipment Location</b>	<b>IEEE Class 1E<sup>(2)</sup></b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close
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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close

**Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (6 Sheets)**

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

**Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (6 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number<sup>(1)</sup></b>	<b>Equipment Location</b>	<b>IEEE Class 1E<sup>(2)</sup></b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
Accumulator Isolation Valve Division 1 (Division 2, Division 3, Division 4)	30JNG13 AA008 (30JNG23 AA008) (30JNG33 AA008) (30JNG43 AA008)	Reactor Building	1 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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
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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	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 <sup>N</sup> / 2 <sup>A</sup> (2 <sup>N</sup> ) / (1 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> )	yes	yes	position / position	open-close / open-close

**Table 2.2.3-2—SIS/RHRS Equipment I&C and Electrical Design (6 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number<sup>(1)</sup></b>	<b>Equipment Location</b>	<b>IEEE Class 1E<sup>(2)</sup></b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
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 <sup>N</sup> / 1 <sup>A</sup> (1 <sup>N</sup> ) / (2 <sup>A</sup> ) (4 <sup>N</sup> ) / (3 <sup>A</sup> ) (3 <sup>N</sup> ) / (4 <sup>A</sup> )	yes	yes	position / position	open-close / open-close
SAHRS-IRWSTS 1 <sup>st</sup> Isolation Valve Division 4	30JNG40 AA007	Safeguard Building 4	4 <sup>N</sup> / 3 <sup>A</sup>	yes	yes	position / position	open-close / open-close
SAHRS-IRWSTS 2 <sup>nd</sup> Isolation Valve Division 4	30JNG40 AA008	Safeguard Building 4	4 <sup>N</sup> / 3 <sup>A</sup>	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) <sup>N</sup> denotes the division the component is normally powered from. <sup>A</sup> denotes the division the component is powered from when alternate feed is implemented.

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Test, or Analysis</b>	<b>Acceptance Criteria</b>
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	The components designated as ASME Code Section III in Table 2.2.3-1 are designed to ASME Code Section III requirements.	Inspections will be conducted of ASME design, NDE and hydrostatic test reports for the components listed as ASME Code Section III in Table 2.2.3-1.	The components listed as ASME Code Section III in Table 2.2.3-1 have been designed and hydrostatically tested in accordance with ASME Code Section III 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.
3.3a	The piping identified as being within the ASME Code Section III boundary as indicated in Figure 2.2.3-1 has been designed in accordance with ASME Code Section III requirements including seismic loads.	Analysis of the as-designed piping will be performed in accordance with ASME Code Section III requirements for the piping indicated in Figure 2.2.3-1.	The as-designed piping identified as ASME Code Section III in Figure 2.2.3-1 meets ASME Code Section III design requirements.
3.3b	The piping identified as being within the ASME Code Section III boundary as indicated in Figure 2.2.3-1 has been welded and hydrostatically tested in accordance with ASME Code Section III.	Inspections will be conducted of the as-built piping as indicated in Figure 2.2.3-1 for the following: Welding has been performed per ASME Code Section III. Hydrostatic testing per ASME Code Section III was performed.	The piping as indicated in Figure 2.2.3-1 as ASME Code Section III has been welded in accordance with ASME Code Section III welding requirements. The piping as indicated in Figure 2.2.3-1 as ASME Code Section III has been hydrostatically tested in

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Test, or Analysis</b>	<b>Acceptance Criteria</b>
			accordance with ASME Code Section III requirements.
3.4	Equipment identified as Seismic Category I in Table 2.2.3-1 can withstand a design basis seismic load without loss of function as listed in Table 2.2.3-1.	<ul style="list-style-type: none"> <li>a. Inspection will be conducted of the equipment identified as Seismic Category I in Table 2.2.3-1.</li> <li>b. Type tests, tests, analyses, or a combination of tests and analyses will be performed on the equipment designated as Seismic Category I in Table 2.2.3-1.</li> </ul>	<ul style="list-style-type: none"> <li>a. The equipment designated as Seismic Category I in Table 2.2.3-1 is installed as designed.</li> <li>b. The equipment designated as Seismic Category I in Table 2.2.3-1 can withstand a design basis seismic load without loss of function.</li> </ul>
3.5	Supports for piping shown as ASME Section III on Figure 2.2.3-1 will be designed in accordance with ASME Section III.	An analysis will be performed.	<ul style="list-style-type: none"> <li>a. Supports for piping shown as ASME Section III on Figure 2.2.3-1 are designed to ASME Section III.</li> <li>b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III on Figure 2.2.3-1.</li> <li>c. Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III on Figure 2.2.3-1.</li> </ul>
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.	<ul style="list-style-type: none"> <li>a. Fatigue analysis has been performed for components listed as ASME Code Class 1 in Table 2.2.3-1.</li> <li>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.</li> </ul>

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Test, or Analysis</b>	<b>Acceptance Criteria</b>
3.7	Specifications exist for components listed as ASME Section III in Table 2.2.3-1.	An inspection will be performed.	Specifications exist for components listed as ASME Section III in Table 2.2.3-1.
3.8	Specifications exist for piping shown as ASME Section III on Figure 2.2.3-1.	An inspection will be performed.	Specifications exist for piping identified as ASME Section III on Figure 2.2.3-1.
3.9	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III on Figure 2.2.3-1.
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.	The displays listed in Table 2.2.3-2 as being retrieved in the MCR can be retrieved in the MCR. 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.	The controls listed in Table 2.2.3-2 as being in the MCR exist in the MCR. The controls listed in Table 2.2.3-2 as being in the RSS exist in the RSS.
4.3	Actuators listed as being controlled by a PACS module in Table 2.2.3-2 are controlled by a PACS module.	An operational test will be performed using test signals for the actuators being controlled by a PACS module as listed in Table 2.2.3-2. An inspection will be performed on the actuation of the actuator.	The actuators listed as being controlled by a PACS module in Table 2.2.3-2 actuate to the state requested by the signal.
4.4	The SIS/RHRS has the following system interlocks: <ul style="list-style-type: none"> <li>• Opening of the accumulator injection path.</li> <li>• Opening authorization of the residual heat removal system suction path from the reactor coolant system.</li> <li>• Opening authorization of the hot leg safety injection</li> </ul>	Tests will be performed using simulated signals to verify the interlock.	The interlock functions in response to a simulated signal.

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Test, or Analysis</b>	<b>Acceptance Criteria</b>
	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.	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. 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.	The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.2.3-2. 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.	6.1a. 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. 6.1b. 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.	6.1a. 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. 6.1b. 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: Minimum design heat load per all four heat exchangers = 1.2479E+08 BTU/hr

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Test, or Analysis</b>	<b>Acceptance Criteria</b>
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 <sup>3</sup>
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 = 2.78 for a flow area of 0.3941 ft <sup>2</sup> .
7.4	The pumps listed in Table 2.2.3-1 have sufficient NPSHA.	Testing and analyses will be performed to verify adequate NPSHA for pumps listed in Table 2.2.3-1.	The pumps listed in Table 2.2.3-1 have sufficient 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.	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
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 lbm/s Maximum run-out flow rate per train (with large miniflow line open) = 112.0 lbm/s Minimum run-out flow rate per train (with large miniflow line closed) = 130.1 lbm/s b. LHSI pump: Minimum run-out flow rate per train = 312.2 lbm/s

**Table 2.2.3-3—SIS/RHRS Inspections, Tests, Analyses, and Acceptance Criteria (6 Sheets)**

	Commitment Wording	Inspection, Test, or Analysis	Acceptance Criteria
			<p>The SIS/RHRS delivers water to the reactor coolant system within the following pumps shutoff head:</p> <p>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)</p> <p>b. LHSI pump:            Minimum shutoff head = 302 psia (cold leg pressure).</p>
7.7	<p>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.</p>	<p>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.</p>	<p>The as-installed valve changes position as listed Table 2.2.3-1 under system design conditions.</p>
7.8	<p>The SIS/RHRS has provisions to allow flow testing of the SIS/RHRS pumps during plant operation.</p>	<p>Testing for flow of the SIS/RHRS pumps back to the recirculation path will be performed.</p>	<p>The flow test line allows SIS/RHRS pump flow back to the recirculation path.</p>