

2.4.4 Safety Automation System

1.0 Description

The safety automation system (SAS) provides control and monitoring of safety systems.

The SAS has the following safety related functions:

- Provides control and monitoring of systems required to transfer the plant to cold shutdown and maintain it in this state following a design basis event.
- Provides control and monitoring of safety related functions of auxiliary support systems.
- Provides acquisition and processing of Type A, B and C post-accident monitoring variables for display to the operators in the main control room (MCR) and on the remote shutdown station (RSS).
- Provides a safety interlock function.

2.0 Arrangement

2.1 The SAS equipment is located as listed in Table 2.4.4-1—Safety Automation System Equipment.

2.2 Physical separation exists between the four divisions of the SAS.

3.0 Seismic 1 Classifications

3.1 Equipment identified as Seismic Category I in Table 2.4.4-1 can withstand a seismic design basis loads without loss of a safety function.

4.0 I&C Design Features, Displays and Controls

4.1 The SAS equipment classified as Class 1E in Table 2.4.4-1 can perform its safety function when subjected to electromagnetic interference (EMI), radio-frequency interference (RFI), electrostatic discharges (ESD), and power surges.

4.2 The SAS receives input signals from the sources listed in Table 2.4.4-2.

4.3 The SAS provides output signals listed in Table 2.4.4-3.

4.4 The SAS provides the interlocks listed in Table 2.4.4-4—Safety Automation System Interlocks.

4.5 The SAS hardware and software are developed using a design process with the following life cycle phases:

- Basic design phase.

- Detailed design phase.
- Manufacturing phase.
- Testing phase.
- Installation and commissioning phase.

5.0 Electrical Power

5.1 The equipment identified as Class 1E in Table 2.4.4-1 receives power from its respective Class 1E division power supply.

6.0 System Inspections, Tests, Analyses, and Acceptance Criteria

6.1 Table 2.4.4-5—Safety Automation System ITAAC specifies the inspections, tests, analyses, and acceptance criteria for the SAS.

Table 2.4.4-1—Safety Automation System Equipment

Equipment Description	Equipment Tag Number ⁽¹⁾	Equipment Location	Seismic Category	IEEE Class 1E
SAS Cabinets, Division 1	30DRA1	Safeguard Building 1	I	Yes
SAS Cabinets, Division 2	30DRA2	Safeguard Building 2	I	Yes
SAS Cabinets, Division 3	30DRA3	Safeguard Building 3	I	Yes
SAS Cabinets, Division 4	30DRA4	Safeguard Building 4	I	Yes

- 1) Equipment Tag numbers are provided for information and are not part of the design certification.

Table 2.4.4-2—Safety Automation System Input Signals

Item #	Signal	Source	# Divisions	IEEE Class 1E
1	Steam Generator Pressure	Protection System	4	Yes
2	Main Steam Relief Control Valve Position	Main Steam System	4	Yes
3	Core Thermal Power	Protection System	4	Yes
4	Main Steam Relief Isolation Valve Position	Main Steam System	4	Yes
5	Steam Generator Level Wide Range	Protection System	4	Yes
6	Emergency Feedwater System Flow	Emergency Feedwater System	4	Yes

Table 2.4.4-3—Safety Automation System Output Signals

Item #	Output Signal	Signal Generation	Recipient	# Divisions	IEEE Class 1E
1	EFW Flow Control Valve Position Signal	Auto	PACS	4	Yes
2	EFW SG Level Control Valve Position Signal	Auto	PACS	4	Yes
3	Main Steam Relief Control Valve Signal	Auto	PACS	4	Yes

Table 2.4.4-4—Safety Automation System Interlocks

Isolation of Component Cooling Water System (CCWS) Trains

Table 2.4.4-5—Safety Automation System ITAAC (3 Sheets)

Commitment Wording	Inspection, Analysis or Test	Acceptance Criteria
2.1 The location of the SAS equipment is as listed in Table 2.4.4-1.	An inspection will be performed of the location of the equipment listed in Table 2.4.4-1.	The equipment listed in Table 2.4.4-1 is located as listed in Table 2.4.4-1.
2.2 Separation exists between the four divisions of the SAS.	Inspection will be performed to verify that redundant divisions of the SAS are located in separate buildings.	The four divisions of the SAS are located in separate buildings.
3.1 Equipment identified as Seismic Category I in Table 2.4.4-1 can withstand a design basis seismic event without loss of safety function.	Inspections, type tests, tests, analyses or a combination of tests and analyses will be performed on the equipment designated as Seismic Category I in Table 2.4.4-1.	(1) A report exists and concludes that the equipment listed as Seismic Category I in Table 2.4.4-1 is installed as designed. (2) A report exists and concludes that the equipment listed as Seismic Category I in Table 2.4.4-1 can withstand seismic design basis loads without loss of safety function.
4.1 Equipment listed as Class 1E in Table 2.4.4-1 can perform its safety function when subjected to electromagnetic interference EMI, RFI, ESD, and power surges.	Type tests, tests, analyses or a combination of these will be performed for the Class 1E equipment listed in Table 2.4.4-1.	A report exists and concludes that the equipment listed as Class 1E in Table 2.4.4-1 can perform its safety function when subjected to electromagnetic interference EMI, RFI, ESD, and power surges.
4.2 The SAS receives input signals from the sources listed in Table 2.4.4-2.	Inspections will be performed to verify the existence of input signals.	The SAS receives input signals from the sources listed in Table 2.4.4-2.
4.3 The SAS provides output signals listed in Table 2.4.4-3.	Inspections will be performed to verify the existence of output signals.	The SAS provides output signals to the recipients listed in Table 2.4.4-3.
4.4 The SAS provides the interlocks listed in Table 2.4.4-4.	Tests will be performed to verify the operation of the interlocks listed in Table 2.4.4-4.	The SAS provides the interlocks listed in Table 2.4.4-4.
4.5 The SAS hardware and software are developed using a design process with the following life cycle phases: <ul style="list-style-type: none"> • Basic design phase. 	Inspections will be performed on the design process for the SAS hardware and software development. An analysis will be performed to	1a) A report exists and provides the design outputs of the basic design phase of the SAS hardware and software design process.

Table 2.4.4-5—Safety Automation System ITAAC (3 Sheets)

Commitment Wording	Inspection, Analysis or Test	Acceptance Criteria
<ul style="list-style-type: none"> • Detailed design phase. • Manufacturing phase. • Testing phase. • Installation and commissioning phase. 	<p>Verify that the SAS hardware and software are developed in accordance with the design process.</p>	<p>1b) V&V reports exist that address the Concept and Requirements Activities and conclude that the design outputs generated in the basic design phase conform to the requirements of this phase.</p> <p>2a) A report exists and provides the design outputs of the detailed design phase of the SAS hardware and software design process.</p> <p>2b) V&V reports exist that address the Design and Implementation Activities and conclude that the design outputs generated in the detailed design phase conform to the requirements of this phase.</p> <p>3) A report exists and provides the design outputs of the manufacturing phase of the SAS hardware and software design process.</p> <p>4a) A report exists and provides the design outputs of the testing phase of the SAS hardware and software design process.</p> <p>4b) A V&V report exists that address the Test Activity and concludes that the design outputs generated in the testing phase conform to the requirements of this phase.</p> <p>5a) A report exists and provides the design outputs of the installation and commissioning</p>

Table 2.4.4-5—Safety Automation System ITAAC (3 Sheets)

Commitment Wording	Inspection, Analysis or Test	Acceptance Criteria
		<p>phase of the SAS hardware and software design process.</p> <p>5b) A V&V report exists that addresses the Installation and Checkout Activity summary report, if required, for any changes following testing phase and concludes that the design outputs generated in the installation and commissioning phase conform to the requirements of this phase.</p>
<p>5.1 The equipment identified as Class 1E in Table 2.4.4-1 receives power from its respective Class 1E division power supply.</p>	<p>Inspections will be performed to verify the source of power for Class 1E equipment.</p>	<p>The Class 1E equipment listed in Table 2.4.4-1 is powered from its respective Class 1E division power supply.</p>