## 2.8.7 Steam Generator Blowdown System

### 1.0 Description

The steam generator blowdown system (SGBS) is a non-safety-related system with safety-related portions. It assists in maintaining the chemical characteristics of the secondary water within permissible limits. The SGBS is safety related from its connections to the steam generators to the outer containment isolation valves. The remaining portion of the blowdown system downstream of the outer containment isolation valves is non-safety-related.

The SGBS provides the following safety-related functions:

- Containment isolation.
- SG blowdown isolation.

### 2.0 Arrangement

2.1 The functional arrangement of the SGBS is as shown in Figure 2.8.7-1—SGBS Functional Arrangement.

2.2 The location of the SGBS equipment is as listed in Table 2.8.7-1—SGBS Equipment Mechanical Design.

### 3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.8.7-1 as ASME Code Section III is designed, welded, and hydrostatically tested in accordance with ASME Code Section III.

3.2 Deleted.

3.3 Equipment identified as Seismic Category I in Table 2.8.7-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.8.7-1.

3.4 Deleted.

3.5 Deleted.

3.6 Deleted.

3.7 Deleted.

3.8 Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 are designed in accordance with ASME Code Section III requirements.

3.9 Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 are installed in accordance with an ASME Code Section III Design Report.

3.10 Pressure boundary welds in portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 are in accordance with ASME Code Section III.

3.11 Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 retain their pressure boundary integrity at their design pressure.

3.12 Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 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 2.8.7-2—SGBS Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.8.7-2.

4.2 SGBS equipment controls are provided in the MCR and the RSS as listed in Table 2.8.7-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.8.7-2 responds to the state requested by a test signal.

4.4 The SGBS has an interlock to close the blowdown isolation valves if there is an EFW actuation signal.

## 5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.8.7-2 are powered from the Class 1E division as listed in Table 2.8.7-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.8.7-2 fail as-is on loss of power.

## 6.0 Environmental Qualifications

6.1 Electrical drivers for equipment listed in Table 2.8.7-2 for harsh environment can perform the safety function in Table 2.8.7-1 following exposure to the design basis environments for the time required.

## 7.0 Equipment and System Performance

7.1 Class 1E valves listed in Table 2.8.7-2 can perform the function listed in Table 2.8.7-1 under system design conditions.

7.2 Containment isolation valves listed in Table 2.8.7-1 close within the containment isolation response time following initiation of a containment isolation signal.

## 8.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.8.7-3 lists the SGBS ITAAC.

**Table 2.8.7-1—SGBS Equipment Mechanical Design (2 Sheets)**

| Equipment Description | Equipment Tag Number (1) | Equipment Location | ASME Code Section III | Function | Seismic Category |
|---|---|---|---|---|---|
| SG 1 cold leg blowdown isolation valve | 30LCQ10AA002 | Reactor Building | yes | close | I |
| SG 2 cold leg blowdown isolation valve | 30LCQ20AA002 | Reactor Building | yes | close | I |
| SG 3 cold leg blowdown isolation valve | 30LCQ30AA002 | Reactor Building | yes | close | I |
| SG 4 cold leg blowdown isolation valve | 30LCQ40AA002 | Reactor Building | yes | close | I |
| SG 1 hot leg blowdown isolation valve | 30LCQ10AA001 | Reactor Building | yes | close | I |
| SG 2 hot leg blowdown isolation valve | 30LCQ20AA001 | Reactor Building | yes | close | I |
| SG 3 hot leg blowdown isolation valve | 30LCQ30AA001 | Reactor Building | yes | close | I |
| SG 4 hot leg blowdown isolation valve | 30LCQ40AA001 | Reactor Building | yes | close | I |
| SG 1 common blowdown isolation valve | 30LCQ10AA003 | Reactor Building | yes | close | I |
| SG 2 common blowdown isolation valve | 30LCQ20AA003 | Reactor Building | yes | close | I |
| SG 3 common blowdown isolation valve | 30LCQ30AA003 | Reactor Building | yes | close | I |
| SG 4 common blowdown isolation valve | 30LCQ40AA003 | Reactor Building | yes | close | I |
| SG 1 blowdown flow rate control valve | 30LCQ10AA104 | Reactor Building | yes | pressure retaining component | I |

**Table 2.8.7-1—SGBS Equipment Mechanical Design (2 Sheets)**

| Equipment Description | Equipment Tag Number (1) | Equipment Location | ASME Code Section III | Function | Seismic Category |
|---|---|---|---|---|---|
| SG 2 blowdown flow rate control valve | 30LCQ20AA104 | Reactor Building | yes | pressure retaining component | I |
| SG 3 blowdown flow rate control valve | 30LCQ30AA104 | Reactor Building | yes | pressure retaining component | I |
| SG 4 blowdown flow rate control valve | 30LCQ40AA104 | Reactor Building | yes | pressure retaining component | I |
| Blowdown flash tank | 30LCQ50BB001 | Reactor Building | yes | pressure retaining component | I |
| Blowdown flash tank pressure relief valve | 30LCQ52AA191 | Reactor Building | yes | pressure retaining component | I |
| SG Blowdown Cooler – First Stage | 30LCQ51AC001 | Reactor Building | yes | pressure retaining component | I |
| SG Blowdown Cooler – First Stage | 30LCQ51AC002 | Reactor Building | yes | pressure retaining component | I |
| Inner containment isolation valve | 30LCQ52AA001 | Reactor Building | yes | close (Containment Isolation) | I |
| Inner containment isolation valve | 30LCQ51AA002 | Reactor Building | yes | close (Containment Isolation) | I |
| Outer containment isolation valve | 30LCQ52AA002 | Safeguard Building 1 | yes | close (Containment Isolation) | I |
| Outer containment isolation valve | 30LCQ51AA003 | Safeguard Building 4 | yes | close (Containment Isolation) | I |

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

**Table 2.8.7-2—SGBS Equipment I&C and Electrical Design (2 Sheets)**

| Equipment Description | Equipment Tag Number (1) | Equipment Location | IEEE Class 1E (2) | EQ – Harsh Env. | PACS | MCR/RSS Controls |
|---|---|---|---|---|---|---|
| SG 1 hot leg blowdown isolation valve | 30LCQ10AA001 | Reactor Building | $1^N$ $2^A$ | yes | yes | Close/Close |
| SG 1 cold leg blowdown isolation valve | 30LCQ10AA002 | Reactor Building | $1^N$ $2^A$ | yes | yes | Close/Close |
| SG 1 common blowdown isolation valve | 30LCQ10AA003 | Reactor Building | $3^N$ $4^A$ | yes | yes | Close/Close |
| SG 2 hot leg blowdown isolation valve | 30LCQ20AA001 | Reactor Building | $2^N$ $1^A$ | yes | yes | Close/Close |
| SG 2 cold leg blowdown isolation valve | 30LCQ20AA002 | Reactor Building | $2^N$ $1^A$ | yes | yes | Close/Close |
| SG 2 common blowdown isolation valve | 30LCQ20AA003 | Reactor Building | $3^N$ $4^A$ | yes | yes | Close/Close |
| SG 3 hot leg blowdown isolation valve | 30LCQ30AA001 | Reactor Building | $3^N$ $4^A$ | yes | yes | Close/Close |
| SG 3 cold leg blowdown isolation valve | 30LCQ30AA002 | Reactor Building | $3^N$ $4^A$ | yes | yes | Close/Close |
| SG 3 common blowdown isolation valve | 30LCQ30AA003 | Reactor Building | $2^N$ $1^A$ | yes | yes | Close/Close |
| SG 4 hot leg blowdown isolation valve | 30LCQ40AA001 | Reactor Building | $4^N$ $3^A$ | yes | yes | Close/Close |
| SG 4 cold leg blowdown isolation valve | 30LCQ40AA002 | Reactor Building | $4^N$ $3^A$ | yes | yes | Close/Close |
| SG 4 common blowdown isolation valve | 30LCQ40AA003 | Reactor Building | $2^N$ $1^A$ | yes | yes | Close/Close |

**Table 2.8.7-2—SGBS Equipment I&C and Electrical Design (2 Sheets)**

| Equipment Description | Equipment Tag Number (1) | Equipment Location | IEEE Class 1E (2) | EQ – Harsh Env. | PACS | MCR/RSS Controls |
|---|---|---|---|---|---|---|
| Inner containment isolation valve | 30LCQ52AA001 | Reactor Building | $1^{N}$<br>$2^{A}$ | yes | yes | Close/Close |
| Inner containment isolation valve | 30LCQ51AA002 | Reactor Building | $4^{N}$<br>$3^{A}$ | yes | yes | Close/Close |
| Outer containment isolation valve | 30LCQ52AA002 | Safeguard Building 1 | $3^{N}$<br>$4^{A}$ | no | yes | Close/Close |
| Outer containment isolation valve | 30LCQ51AA003 | Safeguard Building 4 | $2^{N}$<br>$1^{A}$ | no | yes | Close/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 2.8.7-3—SGBS ITAAC (5 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 2.1 | The functional arrangement of the SGBS is as shown on Figure 2.8.7-1. | Inspections of the as-built system as shown on Figure 2.8.7-1 will be conducted | The as-built SGBS conforms with the functional arrangement as shown in Figure 2.8.7-1. |
| 2.2 | The location of the SGBS equipment is as listed in Table 2.8.7-1. | An inspection will be performed of the location of the equipment listed in Table 2.8.7-1. | The equipment listed in Table 2.8.7-1 is located as listed in Table 2.8.7-1. |
| 3.1 | Equipment listed in Table 2.8.7-1 as ASME Code Section IIIis designed, welded, and hydrostatically tested in accordance with ASME Code Section III. | a. Analysis of the equipment identified in Table 2.8.7-1 as ASME Code Section III will be performed per ASME Code Section III design requirements. | a. ASME Code Section III Design Reports (NCA-3550) exist and conclude that the equipment identified in Table 2.8.7-1 as ASME Code Section III meets ASME Code Section III design requirements. |
| | | b. Inspections will be conducted on the equipment identified in Table 2.8.7-1 as ASME Code Section III to verify welding has been performed per ASME Code Section III welding requirements. | b. Equipment identified in Table 2.8.7-1 as ASME Code Section III has been welded per ASME Code Section III welding requirements. |
| | | c. Hydrostatic testing of the equipment identified in Table Table 2.8.7-1 as ASME Code Section III will be performed per ASME Code Section III hydrostatic testing requirements. | c. Equipment identified in Table 2.8.7-1 as ASME Code Section III has been hydrostatically tested per ASME Code Section III hydrostatic testing requirements. |
| 3.2 | Deleted. | Deleted. | Deleted. |
| 3.3 | Equipment identified as Seismic Category I in Table 2.8.7-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.8.7-1. | a. Type tests, analyses or a combination of type tests and analyses will be performed on the equipment designated as Seismic Category I in Table 2.8.7-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements. | a. Tests/analysis reports exists and conclude that the Seismic Category I equipment listed in Table 2.8.7-1 can withstand seismic design basis loads without loss of safety function. |

**Table 2.8.7-3—SGBS ITAAC (5 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| | | b. Inspections will be performed of the as-installed Seismic Category I equipment listed in Table 2.8.7-1 to verify that the equipment including anchorage is installed as specified on the construction drawings. | b. Inspection reports exist and conclude that the as-installed Seismic Category I equipment listed in Table 2.8.7-1 including anchorage is installed as specified on the construction drawings. |
| 3.4 | Deleted. | Deleted. | Deleted. |
| 3.5 | Deleted. | Deleted. | Deleted. |
| 3.6 | Deleted. | Deleted. | Deleted. |
| 3.7 | Deleted. | Deleted. | Deleted. |
| 3.8 | Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 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 SGBS piping shown as ASME Code Section III in Figure 2.8.7-1. |
| 3.9 | Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 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 SGBS piping shown as ASME Code Section III in Figure 2.8.7-1, 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. |
| 3.10 | Pressure boundary welds in portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 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 SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 has been performed in accordance with ASME Code Section III. |

**Table 2.8.7-3—SGBS ITAAC (5 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 3.11 | Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 retain their pressure boundary integrity at their design pressure. | Hydrostatic tests will be performed on the as-fabricated system. | For portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements. |
| 3.12 | Portions of the SGBS piping shown as ASME Code Section III in Figure 2.8.7-1 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 SGBS piping shown as ASME Code Section III in Figure 2.8.7-1, N–5 Data Reports exist and conclude that installation is 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 2.8.7-2. | Inspections will be performed for the existence or retrieveability of the displays in the MCR or the RSS as listed in Table 2.8.7-2. | a. The displays listed in Table 2.8.7-2 as being retrieved in the MCR can be retrieved in the MCR.<br>b. The displays listed in Table 2.8.7-2 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 2.8.7-2. | Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.8.7-2. | a. The controls listed in Table 2.8.7-2 as being in the MCR exist in the MCR.<br>b. The controls listed in Table 2.8.7-2 as being in the RSS exist in the RSS. |
| 4.3 | Equipment listed as being controlled by a PACS module in Table 2.8.7-2 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 2.8.7-2 responds to the state requested by the test signal. |
| 4.4 | The SGBS has an interlock to close the blowdown isolation valves if there is an EFW actuation signal. | Tests will be performed using test signals to verify the interlock. | The following interlock responds as specified below when activated by a test signal:<br>Blowdown isolation valves isolate on EFW actuation signal. |

**Table 2.8.7-3—SGBS ITAAC (5 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 5.1 | The components designated as Class 1E in Table 2.8.7-2 are powered from the Class 1E division as listed in Table 2.8.7-2 in a normal or alternate feed condition. | a. Testing will be performed for components designated as Class 1E in Table 2.8.7-2 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 2.8.7-2. |
| | | b. Testing will be performed for components designated as Class 1E in Table 2.8.7-2 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 2.8.7-2. |
| 5.2 | Valves listed in Table 2.8.7-2 fail as-is on loss of power. | Testing will be performed for the valves listed in Table 2.8.7-2 to fail as-is on loss of power. | Following loss of power, the valves listed in Table 2.8.7-2 fail as-is. |
| 6.1 | Components listed as Class 1E in Table 2.8.7-2 that are designated as harsh environment will perform the function listed in Table 2.8.7-1 in the environments that exist before and during the time required to perform their safety 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 2.8.7-2 to perform the function listed in Table 2.8.7-1 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 2.8.7-2 can perform the function listed in Table 2.8.7-1 before and during design basis accidents for the time required to perform the listed function. |
| | | b. For equipment listed for harsh environment in Table 2.8.7-2, 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 2.8.7-2 for harsh environment conform with the design. |

**Table 2.8.7-3—SGBS ITAAC (5 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 7.1 | Class 1E valves listed in Table 2.8.7-2 perform the function listed in Table 2.8.7-1 under system conditions. | Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.8.7-2 to change position as listed in Table 2.8.7-1 under system design conditions. | The as-installed valve changes position as listed Table 2.8.7-1 under system design conditions. |
| 7.2 | Containment isolation valves listed in Table 2.8.7-1 close within the containment isolation response time following initiation of a containment isolation signal. | Tests will be performed to demonstrate the ability of the containment isolation valves listed in Table 2.8.7-1 to close within the containment isolation response time following initiation of a containment isolation signal. | The containment isolation valves listed in Table 2.8.7-1 close within60 seconds following initiation of a containment isolation signal. |

Next File